

TECHNICAL SPECIFICATIONS FOR

SUPPLY AND INSTALLATION OF ODOR CONTROL

UTULEI WASTEWATER TREATMENT PLANT

APRIL 26, 2021

Supply and Installation of Odor Control

**TECHNICAL SPECIFICATIONS
TABLE OF CONTENTS**

DIVISION 01	-	GENERAL REQUIREMENTS
01 00 00		General Requirements
01 11 00		Summary of Work
01 20 00.00 20		Price and Payment Procedures
01 32 01.00 10		Project Schedule
01 33 00		Submittal Procedures
01 35 26		Safety Requirements
01 35 40.00 20		Environmental Management
01 35 45.00 10		Chemical Data Quality Control
01 45 00.00 10		Quality Control
01 50 00		Temporary Construction Facilities and Controls
01 57 19.00 20		Temporary Environmental Controls
01 57 20.00 10		Environmental Protection
01 57 23		Temporary Storm Water Pollution Control
01 58 00		Project Identification
01 74 19		Construction and Demolition Waste Management
01 78 00		Closeout Submittals
01 78 23		Operation and Maintenance Data
DIVISION 02	-	EXISTING CONDITIONS
02 41 00		Demolition
DIVISION 03	-	CONCRETE
03 05 15		Portland Cement Concrete
03 11 00		Concrete Forming
03 20 00.00 10		Concrete Reinforcing
03 30 53		Miscellaneous Cast-In-Place Concrete
03 35 00		Concrete Finishing
03 40 00		Precast Concrete
DIVISION 5	-	METALS
05 05 23		Metal Fastenings
05 50 00		Formed Metal Fabrications
DIVISION 26	-	ELECTRICAL
26 05 00		Common Works Results for Electrical
26 05 19		Low-Voltage Electrical Power Conductors and Cables
26 05 26		Grounding and Bonding for Electrical Systems
26 05 29		Hangers and Supports for Electrical Systems
26 05 33		Raceways and Boxes for Electrical Systems
26 05 53		Identification for Electrical Systems

Supply and Installation of Odor Control

26 24 16	Panel Boards
26 27 13	Electricity Metering
26 27 26	Wiring Devices
26 28 16	Enclosed Switches and Circuit Breakers

DIVISION 31	-	EARTHWORK
31 23 00.00 20		Excavation and Fill

DIVISION 33	-	UTILITIES
33 30 00		Sanitary Sewerage Utilities
33 32 15	-	Odor Control System

DIVISION 01

GENERAL REQUIREMENTS

SECTION 01 00 00

GENERAL REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

The project includes all rehabilitation and improvements shown in the construction plans and listed within these specifications and bid documents. The general work includes the supply and installation of odor control system within the Utulei WWTP and other miscellaneous improvements. Contractor shall review the construction plans, specifications and Invitation for Bid documents thoroughly to conform to all requirements for this project. Contractor shall coordinate all work with WWTP personnel to ensure that plant operations are not effected during construction and to coordinate any temporary plant shut-downs required for construction.

1.2 REGULATIONS & PERMITS

The Contractor shall be familiar with all American Samoa Government (ASG) laws, ordinances and regulations and comply with all applicable portions. Contractor shall comply with the requirements of the PNRS review, Land Use Permit, and Nationwide Permit POH-2012-00024. Contractor shall secure all necessary permits before commencing work and shall pay any required permit fees.

1.3 SAFETY

The contractor shall follow all applicable OSHA safety requirements and be aware that this project will include work within confined spaces. Appropriate safety measures shall be provided for all construction workers and WWTP personnel while the plant remains operational during construction.

1.4 ARCHEOLOGICAL SITES

If, during construction, any previously unidentified archeological sites or remains (such as artifacts, shell, bone, or charcoal deposits, human burials, rock or coral alignments, paving, or walls) are encountered, the contractor shall stop work and immediately contact the APE who will contact David Herdrich of American Samoa Historic Preservation Office at 699-2316. All work in the immediate area shall also stop until ASHPO is able to assess the impact and make further recommendations for mitigative measures.

1.5 SOLID WASTE

Any solid waste generated as a result of construction at the site shall be disposed of at the Futiga landfill or scrap metal yard at Tafuna. Contact AS-EPA at 633-2304 for assistance. The contractor shall ensure that adequate solid waste storage and disposal is provided at the site. Solid waste and scrap metal will not be allowed to accumulate at the site. All solid waste shall be properly disposed of at the Futiga landfill or scrap metal yard at Tafuna, or at an AS-EPA approved site. The contractor must ensure that and all solid waste as a result

construction shall not be placed or stored within a zone from all wetlands, streams, or shoreline areas. Excess dirt, cinder, spoils, concrete, pavement, and/or excavated materials, must be properly disposed of at the Futiga landfill.

1.6 BEST MANAGEMENT PRACTICES

Contractor must ensure that storm water generated on the property during construction be contained. Drainage must not impact other property, including minimizing runoff to roads. A storm water control plan shall be submitted to AS-EPA and approved in writing prior to commencement of any construction activity. The plan must include the treatment of the storm water. Contractor shall complete a site specific Erosion Control plan in conformance with other specs section and PNRS permit requirements for the project site for submittal to the APE for submittal to AS-EPA for review and approval prior to the start of construction. The contractor shall install Best Management Practices in conformance with the other Specification Sections and the PNRS permit requirements to prevent erosion and the escape of soil to roadside, stream and neighbors. Erosion protection shall be provided and remain in place until soil is permanently stabilized. The work shall be discontinued during flooding, intense rainfall, storm surge, or high surf conditions where runoff and turbidity cannot be controlled. The work shall be conducted during the dry season or when any affected stream has minimal or no flow, to the extent practicable. The permittee shall make every effort to prevent soil erosion and the escape of debris to streams, coastal waters, and roads.

END OF SECTION 01 00 00

SECTION 01 11 00

SUMMARY OF WORK

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM E 2114 (2008) Standard Terminology for Sustainability Relative to the Performance of Buildings

B. GREEN BUILDING INITIATIVE (GBI)

1. Green Globes (2004) Green Globes(tm) US Green Building Rating System

C. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1. Energy Star (1992; R 2006) Energy Star Energy Efficiency Labeling System

D. U.S. GREEN BUILDING COUNCIL (USGBC)

1. LEED (2002; R 2005) Leadership in Energy and Environmental Design (tm) Green Building Rating System for New Construction (LEED-NC)

1.2 DEFINITIONS

Definitions pertaining to sustainable development are as defined in ASTM E 2114, Section 01 35 40.00 20 ENVIRONMENTAL MANAGEMENT and Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, and as specified.

- a. "Environmentally preferable products" have a lesser or reduced effect on the environment in comparison to conventional products and services. This comparison may consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, or disposal of the product.
- b. "Operational performance" is the functional behavior of the building as a whole or of the building components.

c. "Sustainability" is the balance of environmental, economic, and societal considerations.

1.3 SUBMITTALS

ASPA approval is required for submittals. Submittals determined by the APE as not requiring ASPA approval will be for Contractor Quality Control approval. Submittals shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

1.4 WORK COVERED BY CONTRACT DOCUMENTS

1.4.1 Project Description

The Project objective is the acquisition and installation of odor control equipment that will be able to reduce and control odor within the vicinity of Utulei WWTP.

The supply and installation will include the installation of odor control equipment on the Wet Well the Headwork and any provision using chemical for the digester. Also part of this installation is the Malaloa Lift Station which continue to a concern due to high level of H₂S been identified. The new force main that runs from Leloaloe to Malaloa has resulted in and increase in H₂S around Malaloa The equipment will run on our standard power requirements and we will make sure that the equipment is safe to operate..

This installation will greatly provide some relief to the public living around our Utulei WWTP because of odor. The a nuisance that this odor place on the health of our people who leaves around this area will be totally changes once the installation is completed and commission.

1.4.2 Location

The work shall be located at the Utulei WWTP, Tafuna, American Samoa, approximately as indicated. The exact location will be shown by the APE.

1.5 CONTRACT DRAWINGS

Refer attached drawing and they are provided for reference alone. Contractor is expected to make measurement and to make sure the sludge press is installed as per manufacturer instruction and installation manual.

1.6 WORK RESCHEDULING

Contractor shall allow for a maximum of 7 calendar days where construction activity is prohibitive. Further allowance for 7 calendar days of excavation and subsurface activity abeyance shall be imposed where other construction activities are permitted. ASPA will provide 24 hour notification each time the restrictions are invoked.

Normal duty hours for work shall be from 6:00 a.m. To 6:00 p.m., Monday through Friday. Requests for additional work shall require written approval from the APE 7 days in advance of the proposed work period.

1.7 ON-SITE PERMITS

1.7.1 Utility Outage Requests and Utility Connection Requests

Notify the APE at least 48 hours 72 hours prior to starting excavation work. Contractor is responsible for marking and verifying all utilities not marked.

Work shall be scheduled to hold outages to a minimum.

APE may permit utility outages at his discretion.

Requests for utility outages and connections shall be made in writing to the APE at least 7 calendar days in advance of the time required. Each request shall state the system involved, area involved, approximate duration of outage, and the nature of work involved.

1.8 LOCATION OF UNDERGROUND FACILITIES

Obtain digging permits prior to start of excavation by contacting the APE 15 calendar days in advance.

1.9 SALVAGE MATERIAL AND EQUIPMENT

Items designated by the APE to be salvaged shall remain the property of the ASPA.

The salvaged property shall be segregated, itemized, delivered, and off-loaded at the ASPA designated storage area.

Contractor shall maintain property control records for material or equipment designated as salvage. Contractor's system of property control may be used if approved by the APE. Contractor shall be responsible for storage and protection of salvaged materials and equipment until disposition by the APE.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION 01 11 00

SECTION 01 20 00.00 20

PRICE AND PAYMENT PROCEDURES

PART 1 GENERAL

1.1 REFERENCES

Not Used

1.2 SUBMITTALS

ASPA approval is required for submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Schedule of Prices

1.3 SCHEDULE OF PRICES

1.3.1 Data Required

Within 15 calendar days of notice of award, prepare and deliver to the APE a Schedule of Prices (construction contract) as directed by the APE. Provide a detailed breakdown of the contract price, giving quantities for each of the various kinds of work, unit prices, and extended prices. Costs shall be summarized and totals provided for each construction category.

1.3.2 Schedule Instructions

Payments will not be made until the Schedule of Prices has been submitted to and accepted by the APE.

1.4 PAYMENTS TO THE CONTRACTOR

Payments will be made on submission of itemized requests and as-built by the Contractor which comply with the requirements of this section, and will be subject to reduction for over-payments or increase for underpayments made on previous payments to the Contractor. Payments shall be made in accordance with ASPA's General Terms and Conditions.

1.4.1 Obligation of ASPA Payments

The obligation of the ASPA to make payments required under the provisions of this contract will, at the discretion of the APE, be subject to reductions and/or suspensions permitted under ASPA regulations including the following:

- a. Reasonable deductions due to defects in material or workmanship;

Supply and Installation of Odor Control

- b. Claims which the ASPA may have against the Contractor under or in connection with this contract;
- c. Release of payments shall be subjected to the submission of the as-built drawing with the pay application;
- c. Unless otherwise adjusted, repayment to the ASPA upon demand for overpayment made to the Contractor; and

1.4.2 Payment for Onsite and Offsite Materials

Progress payments may be made to the contractor for materials delivered on the site, under the following conditions:

- a. Materials delivered on the site but not installed, including completed preparatory work, and off-site materials to be considered for progress payment shall be major high cost, long lead, special order, or specialty items, not susceptible to deterioration or physical damage in storage or in transit to the construction site.
- b. Materials to be considered for progress payment prior to installation shall be specifically and separately identified in the Contractor's estimates of work submitted for the APE's approval in accordance with Schedule of Prices of this contract.
- c. Materials are adequately insured and protected from theft and exposure.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 20 00.00 20

SECTION 01 32 01.00 10

PROJECT SCHEDULE

PART 1 GENERAL

1.1 DEFINITIONS

AF	Actual Finish
APE	ASPA Project Engineer
AREA	Work Area Coding
AS	Actual Start
CATW	Category of Work Coding
CLIN	Contract Line Item
CPM	Critical Path Method
EF	Early Finish
ES	Early Start
FOW	Feature of Work Coding
NTP	Notice to Proceed
O & M	Operations & Maintenance
OD	Original Durations
PHAS	Phase of Work Coding
RD	Remaining Duration
REA	Request for Equitable Adjustment
RESP	Activity Responsibility Coding
SF	Start to Finish

1.2 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Schedule

1.3 QUALITY ASSURANCE

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating (activity status) and preparation of reports. The authorized representative shall be experienced in scheduling projects similar in nature to this project and shall be experienced in the use of the scheduling software that meets the requirements of this specification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Supply and Installation of Odor Control

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to ASPA's Contract Clauses. Show in the schedule the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project, including the design and construction sequences, is required. The scheduling of construction design and construction is the responsibility of the Contractor. Contractor management personnel shall actively participate in its development. Subcontractors and suppliers Designers, Subcontractors and suppliers working on the project shall also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool.

3.1.1 Approved Project Schedule

Use the approved Project Schedule to measure the progress of the work and to aid in evaluating time extensions. Make the schedule cost loaded and activity coded. The schedule will provide the basis for all progress payments. If the Contractor fails to submit any schedule within the time prescribed, the APE may withhold approval of progress payments until the Contractor submits the required schedule.

3.1.2 Schedule Status Reports

Provide a Schedule Status Report on at least a monthly basis. If, in the opinion of the APE, the Contractor falls behind the approved schedule, take steps necessary to improve its progress including those that may be required by the APE, without additional cost to the ASPA. In this circumstance, the APE may require the Contractor to increase the number of shifts, overtime operations, days of work, and/or the amount of construction plant, and to submit for approval any supplementary schedule or schedules as the APE deems necessary to demonstrate how the approved rate of progress will be regained.

3.1.3 Default Terms

Failure of the Contractor to comply with the requirements of the APE shall be grounds for a determination, by the APE, that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the APE may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of the contract

3.2 BASIS FOR PAYMENT AND COST LOADING

Use the schedule as the basis for determining contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update, or qualified scheduling personnel, will result in the inability of the APE to evaluate contract earned value for the purposes of payment. Failure of the Contractor to provide all required information will result in the disapproval of the preliminary, initial and subsequent schedule updates. In the event schedule revisions are directed by the APE and those revisions have not been included in subsequent revisions or updates, the APE may hold retainage up to the maximum allowed by contract, each payment period, until such revisions to the Project Schedule have been made. Activity cost loading shall be reasonable, as determined by the

Supply and Installation of Odor Control

APE. The aggregate value of all activities coded to a contract item shall equal the value of the item on the Schedule.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

The computer software system utilized to produce and update the Project Schedule shall be capable of meeting all requirements of this specification. Failure of the Contractor to meet the requirements of this specification will result in the disapproval of the schedule.

3.3.1 Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the Project Schedule. Prepare the Project Schedule using the Precedence Diagram Method (PDM).

3.3.2 Level of Detail Required

Develop the Project Schedule to an appropriate level of detail. Failure to develop the Project Schedule to an appropriate level of detail, as determined by the APE, will result in its disapproval. The APE will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2.1 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities shall have Original Durations (OD) greater than 20 work days or 30 calendar days. Procurement activities are defined herein.

3.3.2.2 Design and Permit Activities

Include design and permit activities with the necessary conferences and follow-up actions and design package submission dates. Include the design schedule in the project schedule, showing the sequence of events involved in carrying out the project design tasks within the specific contract period. This shall be at a detailed level of scheduling sufficient to identify all major design tasks, including those that control the flow of work. The schedule shall include review and correction periods associated with each item.

3.3.2.3 Procurement Activities

The schedule must include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days. A typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

3.3.2.4 Mandatory Tasks

The following tasks must be included and properly scheduled:

- a. Submission, review and acceptance of design packages.
- b. Submission of mechanical/electrical/information systems layout drawings.

Supply and Installation of Odor Control

- c. Submission and approval of O & M manuals.
- d. Submission and approval of as-built drawings.
- e. Submission and approval of data and installed equipment lists.
- f. Develop the schedule logic associated with testing and commissioning of mechanical systems to a level of detail as required by the APE.
- g. Controls testing plan submission.
- h. Controls testing.
- i. Performance Verification testing.
- j. Other systems testing, if required.
- k. Contractor's pre-final inspection.
- l. Correction of punchlist from Contractor's pre-final inspection.
- m. ASPA's pre-final inspection.
- n. Correction of punch list from ASPA's pre-final inspection.
- o. Final inspection

3.3.2.5 ASPA Activities

Show ASPA and other agency activities that could impact progress. These activities include, but are not limited to: approvals, design reviews, environmental permit approvals by regulators, inspections, and utility tie-in.

3.3.2.6 Activity Responsibility Coding (RESP)

Assign responsibility Code for all activities to the Prime Contractor, Subcontractor or ASPA agency responsible for performing the activity. Activities coded with an ASPA Responsibility code include, but are not limited to: ASPA approvals, ASPA design reviews and environmental permit approvals by State regulators. Code all activities not coded with an ASPA Responsibility Code to the Prime Contractor or Subcontractor responsible to perform the work. Activities shall not have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); and MECH (for the mechanical subcontractor); Unacceptable code values are abbreviations of the names of subcontractors.

3.3.2.7 Activity Work Area Coding

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew, from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding

Supply and Installation of Odor Control

include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities shall not have more than one Work Area Code. Not all activities are required to be Work Area coded. A lack of Work Area coding will indicate the activity is not resource or space constrained.

3.3.2.8 Contract Changes/Requests for Equitable Adjustment (REA) Coding

Assign Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by the APE, with a Contract Changes/REA Code. Key all Code values to the ASPA's modification numbering system. Any activity or sequence of activities added to the schedule as a result of alleged constructive changes made by the ASPA may be added to a copy of the current schedule, subject to the approval of the APE. Assign Activity codes for these activities with a Contract Changes/REA Code. Key the code values to the Contractor's numbering system. Approval to add these activities does not necessarily mean the ASPA accepts responsibility and, therefore, liability for such activities and any associated impacts to the schedule, but rather the ASPA recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities shall not be Responsibility Coded to the ASPA unless approved. An activity shall not have more than one Contract Changes/REA Code.

3.3.2.9 Contract Line Item (CLIN) Coding

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. An activity shall not contain more than one CLIN Item Code. CLIN Item code all activities, even when an activity is not cost loaded.

3.3.2.10 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities based upon the phase of work in which the activity occurs. Code activities to either a Design Phase or a Construction Phase. Code fast track design and construction phases proposed by the Contractor to allow filtering and organizing the schedule by fast track design and construction packages. If the contract specifies construction phasing with separately defined performance periods, identify a Construction Phase Code to allow filtering and organizing the schedule accordingly. Each activity shall be identified with a single project phase and have only one Phase of Work code.

3.3.2.11 Category of Work Coding (CATW)

Assign Category of Work Code to all Activities based upon the category of work to which the activity belongs. Category of Work Code must include, but is not limited to: design, design submittal, design reviews, review conferences, permits, construction submittals, construction submittal approvals, Acceptance, Procurement, Fabrication, Delivery, Weather Sensitive Installation, Non-Weather Sensitive Installation, Start-Up, Test and Turnover. Assign a Category of Work Code to each activity. Each activity shall have only one Category of Work Code.

3.3.2.12 Definable Features of Work Coding (FOW1, FOW2, FOW3)

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 00.00 10 QUALITY CONTROL. An activity shall not have more

Supply and Installation of Odor Control

than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

3.3.3 Scheduled Project Completion and Activity Calendars

The schedule interval shall extend from NTP date to the required contract completion date. The contract completion activity (End Project) shall finish based on the required contract duration in the accepted contract proposal, as adjusted for any approved contract time extensions. The first scheduled work period shall be the day after NTP is received by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a 7 day calendar when the contract assigns calendar day durations for the activity such as an ASPA Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The ASPA will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

3.3.3.1 Project Start Date Conqueror

The schedule shall start no earlier than the date on which the NTP was acknowledged. Include as the first activity in the project schedule an activity called "Start Project" (or NTP). The "Start Project" activity shall have an "ES" constraint date equal to the date that the NTP was acknowledged, and a zero day duration.

3.3.3.2 Schedule Constraints and Open Ended Logic

Constrain completion of the last activity in the schedule by the contract completion date. Schedule calculations shall result in a negative float when the calculated early finish date of the last activity is later than the contract completion date. Include as the last activity in the project schedule an activity called "End Project". The "End Project" activity shall have an "LF" constraint date equal to the contract completion date for the project, and with a zero day duration or by using the "project must finish by" date in the scheduling software. The schedule shall have no constrained dates other than those specified in the contract. The use of artificial float constraints such as "zero fee float" or "zero total float" are typically prohibited. There shall only be 2 open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

3.3.3.3 Early Project Completion

In the event the Preliminary or Initial project schedule calculates an early completion date of the last activity prior to the contract completion date, identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. The last activity shall have a late finish constraint equal to the contract completion date and the schedule will calculate positive float. The ASPA will not approve an early completion schedule with zero float on the longest path. The ASPA is under no obligation to accelerate activities for which it is responsible to support a proposed early contract completion.

3.3.4 Interim Completion Dates

Supply and Installation of Odor Control

Constrain contractually specified interim completion dates to show negative float when the calculated early finish date of the last activity in that phase is later than the specified interim completion date.

3.3.4.1 Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity shall have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero day duration.

3.3.4.2 End Phase

Include as the last activity for a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity shall have an "LF" constraint date equal to the specified completion date for that phase and a zero day duration.

3.3.4.3 Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" hammock activity shall be logically tied to the earliest and latest activities in the phase.

3.3.5 Default Progress Data Disallowed

Do not automatically update Actual Start and Finish dates with default mechanisms that may be included in the scheduling software. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process shall match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the Daily Quality Control report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's updated schedule and the inability of the APE to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity shall be independent functions. Disable program features which calculate one of these parameters from the other.

3.3.6 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the APE. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the APE.

3.3.7 Negative Lags and Start to Finish Relationships

Lag durations contained in the project schedule shall not have a negative value. Do not use Start to Finish (SF) relationships.

3.3.8 Calculation Mode

Schedule calculations shall retain the logic between predecessors and successors even
Supply and Installation of Odor Control

when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

3.3.9 Milestones

The schedule must include milestone activities for each significant project event including but not limited to: milestone activities for each fast track design package released for construction; design complete; foundation/substructure construction complete; superstructure construction complete; building dry-in or enclosure complete to allow the initiation of finish activities; permanent power complete; and building systems commissioning complete.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The data CD, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS.

3.4.1 Preliminary Project Schedule Submission

Submit the Preliminary Project Schedule, defining the Contractor's planned operations for the first 90 calendar days for approval within 15 calendar days after the NTP is acknowledged. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. Detail it for the first 90 calendar days. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required Plan and Program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, the planned submissions of all early design packages, permitting activities, design review conference activities and other non-construction activities intended to occur within the first 90 calendar days. Schedule any construction activities planned for the first 90 calendar days after NTP. Constrain planned construction activities by ASPA acceptance of the associated design package(s) and all other specified Program and Plan approvals. Activity code any activities that are summary in nature after the first 90 calendar days with Responsibility Code (RESP) and Feature of Work code (FOW1, FOW2, FOW3).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after NTP. The schedule shall demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. The Initial Schedule shall be at a reasonable level of detail as determined by the APE. Include in the design-build schedule detailed design and permitting activities, including but not limited to identification of individual design packages, design submission, reviews and conferences; permit submissions and any required ASPA actions; and long lead item acquisition prior to design completion. Also cover in the preliminary design-build schedule the entire construction effort with as much detail as is known at the time but, as a minimum, include all construction start and completion

Supply and Installation of Odor Control

milestones, and detailed construction activities through the dry-in milestone, including all activity coding and cost loading. Include the remaining construction, including cost loading, but it may be scheduled summary in nature. As the design proceeds and design packages are developed, fully detail the remaining construction activities concurrent with the monthly schedule updating process. Constrain construction activities by ASPA acceptance of associated designs. When the design is complete, incorporate into the then approved schedule update all remaining detailed construction activities that are planned to occur after the dry-in milestone.

3.4.3 Design Package Schedule Submission

With each design package submitted to the ASPA, submit a frag-net schedule extracted from the then current Preliminary, Initial or Updated schedule which covers the activities associated with that Design Package including construction, procurement and permitting activities.

3.4.4 Periodic Schedule Updates

Based on the result of the meeting, specified in Periodic Schedule Update Meetings, submit periodic schedule updates. These submissions will enable the APE to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and project schedule data, which in the judgment of the APE or authorized representative is necessary for verifying the Contractor's progress, the Contractor shall be deemed not to have provided an estimate upon which progress payment may be made. Update the schedule to include detailed, lower WBS level construction activities as the design progresses, but not later than the submission of the final, un-reviewed design submission for each separate design package. The APE may require submission of detailed schedule activities for any distinct construction that is started prior to submission of a final design submission, if such activity is authorized.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Data

Provide two sets of data flash drive containing the project schedule in the backup format. Each flash drive shall also contain all previous update backup files. File medium shall be flash drive. Label each flash drive indicating the type of schedule (Preliminary, Initial, Update), full contract number, Data Date and file name. Each schedule shall have a unique file name as determined by the Contractor.

3.5.2 Narrative Report

Provide a Narrative Report with the Preliminary, Initial, and each Periodic Update of the project schedule, as the basis of the progress payment request. The Narrative Report shall include: a description of activities along the 2 most critical paths where the total float is less than or equal to 20 work days, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the ASPA, the Contractor's

Supply and Installation of Odor Control

thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis. Identify and explain why any activities that, based their calculated late dates, should have either started or finished during the update period but did not.

3.5.3 Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the APE. The Narrative Report shall specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

3.5.4 Schedule Reports

The format, filtering, organizing and sorting for each schedule report shall be as directed by the APE. Typically reports shall contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested. One or all of these reports may be requested for each schedule submission.

3.5.4.1 Activity Report

A list of all activities sorted according to activity number.

3.5.4.2 Logic Report

A list of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.4.4 Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report shall reflect the earnings of specific activities based on the agreements made in the schedule update meeting defined herein. Provided that the Contractor has furnished a complete schedule update, this report shall serve as the basis of determining progress payments. Group activities by CLIN item number and sort by activity number. This report shall: sum all activities coded to a particular CLIN and provide a CLIN item percent earned value; and complete and sum CLIN items to provide a total project percent complete. The printed report shall contain, for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

3.5.5 Network Diagram

The network diagram is required for the Preliminary, Initial and Periodic Updates. The Supply and Installation of Odor Control

network diagram shall depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The APE will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.5.1 Continuous Flow

Diagrams shall show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.5.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.5.3 Critical Path

Clearly show the critical path.

3.5.5.4 Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area and/or responsibility.

3.5.5.5 S-Curves

Earnings curves showing projected early and late earnings and earnings to date.

3.6 PERIODIC SCHEDULE UPDATE MEETINGS

Conduct periodic schedule update meetings for the purposes of reviewing the Contractor's proposed out of sequence corrections, determining causes for delay, correcting logic, maintaining schedule accuracy and determining earned value. Meetings shall occur at least monthly within five days of the proposed schedule data date and after the Contractor has updated the schedule with ASPA concurrence respecting actual start dates, actual finish dates, remaining durations and percent complete for each activity it intend to status. Provide a computer with the scheduling software loaded and a projector during the meeting which allows all meeting participants to view the proposed schedule update during the meeting. The meeting and resultant approvable schedule update shall be a condition precedent to a formal submission of the update as described in Submission Requirements and to the submission of an invoice for payment. The meeting will be a working interactive exchange which will allow the ASPA and the Contractor the opportunity to review the updated schedule on a real time and interactive basis. The Contractor's authorized scheduling representative will organize, sort, filter and schedule the update as requested by the ASPA. The meeting will last no longer than 8 hours. A rough draft of the proposed activity logic corrections and narrative report shall be provided to the ASPA 48 hours in advance of the meeting. The Contractor's Project Manager and Authorized Scheduler shall attend the meeting with the Authorized Representative of the APE.

3.6.1 Update Submission Following Progress Meeting

Submit a complete update of the project schedule containing all approved progress, Supply and Installation of Odor Control

revisions, and adjustments, pursuant to paragraph Submission Requirements not later than 4 working days after the periodic schedule update meeting, reflecting only those changes made during the previous update meeting.

3.6.2 Status of Activities

Update information, including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete shall be subject to the approval of the ASPA prior to the meeting. As a minimum, address the following items on an activity by activity basis during each progress meeting.

3.6.2.1 Start and Finish Dates

Accurately show the status of the AS and/or AF dates for each activity currently in-progress or completed since the last update. The ASPA may allow an AF date to be assigned with the percent complete less than 100% to account for the value of work remaining but not restraining successor activities. Only assign AS dates when actual progress occurs on an activity.

3.6.2.2 Remaining Duration

Update the estimated RD for all incomplete activities independent of Percent Complete. Remaining Durations may exceed the activity OD or may exceed the activity's prior update RD if the ASPA considers the current OD or RD to be understated based on current progress, insufficient work crews actually manning the job, unrealistic OD or deficiencies that must be corrected that restrain successor activities.

3.6.2.3 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete. To allow for proper schedule management, cost load the correction of punch list from ASPA pre-final inspection activity not less than 1 percent of the total contract value, which activities may be declared 100 percent complete upon completion and correction of all punch list work identified during ASPA pre-final inspection(s).

3.6.2.4 Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, Contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, and other changes that have been made pursuant to contract provisions. The ASPA will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

3.6.2.5 Other Changes

Other changes required due to delays in completion of any activity or group of activities include: 1) delays beyond the Contractor's control, such as strikes and unusual weather. 2) delays encountered due to submittals, Government Activities, deliveries or work stoppages

Supply and Installation of Odor Control

which make re-planning the work necessary. 3) Changes required to correct a schedule that does not represent the actual or planned prosecution and progress of the work.

3.7 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the contract performance period, completion date, or any interim milestone date, furnish the following for a determination by the APE: justification, project schedule data, and supporting evidence as the APE may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is a condition precedent to any approvals by the ASPA. In response to each Request For Proposal issued by the ASPA, submit a schedule impact analysis demonstrating whether or not the change contemplated by the ASPA impacts the critical path.

3.7.1 Justification of Delay

The project schedule shall clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. APE's determination as to the number of allowable days of contract extension shall be based upon the project schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.7.2 Submission Requirements

Submit a justification for each request for a change in the contract completion date of less than 2 weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request shall be in accordance with the requirements of other appropriate Contract Clauses and shall include, as a minimum:

- a. A list of affected activities, with their associated project schedule activity number.
- b. A brief explanation of the causes of the change.
- c. An analysis of the overall impact of the changes proposed.
- d. A sub-network of the affected area.

Identify activities impacted in each justification for change by a unique activity code contained in the required data file.

3.7.3 Additional Submission Requirements

The APE may request an interim update with revised activities for any requested time extension of over 2 weeks. Provide this disk within 4 days of the APE's request.

3.8 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions to the APE within 2 weeks of the NTP being issued. The APE will approve proposed revisions to the schedule prior to inclusion of those changes within the project

Supply and Installation of Odor Control

schedule. If the Contractor fails to submit the proposed revisions, the APE may furnish the Contractor with suggested revisions to the project schedule. Include these revisions in the project schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the APE, advise the APE within 2 weeks of receipt of the revisions. Regardless of the objections, continue to update the schedule with the APE's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within 2 weeks of receipt of the APE's proposed revisions, the Contractor will be deemed to have concurred with the APE's proposed revisions. The proposed revisions will then be the basis for an equitable adjustment for performance of the work.

3.9 WEEKLY PROGRESS MEETINGS

- a. Meet weekly with the ASPA (or as otherwise mutually agreed to) between the meetings described in paragraph Periodic Schedule Update Meetings for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. The then current and approved schedule update shall be used for the purposes of this meeting and for the production and review of reports. The Contractor's Project Manager and the Authorized Representative of the APE shall attend. The weekly progress meeting will address the status of RFI's, RFP's and Submittals.
- b. Provide a bar chart produced by the scheduling software, organized by Total Float and Sorted by Early Start Date, and a two week "look-ahead" schedule by filtering all schedule activities to show only current ongoing activities and activities schedule to start during the upcoming two weeks, organized by Work Area Code (AREA) and sorted by Early Start Date.
- c. The ASPA and the Contractor shall jointly review the reports. If it appears that activities on the longest path(s) which are currently driving the calculated completion date (driving activities), are not progressing satisfactorily and therefore could jeopardize timely project completion, corrective action must be taken immediately. Corrective action includes but is not limited to: increasing the number of work crews; increasing the number of work shifts; increasing the number of hours worked per shift; and determining if ASPA responsibility coded activities require ASPA corrective action.

3.10 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, shall not be considered for the exclusive use of either the ASPA or the Contractor.

END OF SECTION 01 32 01.00 10

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

The APE may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Contractor's Quality Control (CQC) System Manager and the APE, if applicable, to check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the contract requirements are to be clearly identified. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

Submittals requiring ASPA approval are to be scheduled and made prior to the acquisition of the material or equipment covered thereby. Contractor is to understand the fact that American Samoa is a very remote location and long lead times for shipping materials and equipment are normal. Contractor must exercise extreme care and diligence in obtaining approvals of all materials and equipment with enough advance notice in order to maintain the construction schedule. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

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 start of construction (work) issuance of contract notice to proceed or commencing work on site or the start of the next major phase of the construction on a multi-phase contract, includes schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

Supply and Installation of Odor Control

Certificates of insurance

Surety bonds

List of proposed Subcontractors

List of proposed products

Construction Progress Schedule

Network Analysis Schedule (NAS)

Submittal register

Schedule of prices

Health and safety plan

Work plan

Quality Control (QC) plan

Environmental protection plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

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 into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

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

Supply and Installation of Odor Control

workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards by which the ensuring 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, analysis or other data pertaining to part of work. Design submittals, design substantiation submittals and extensions of design submittals.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system to be provided has been tested in accord with specified requirements. (Testing must have been within three years of date of contract award for the project.)

Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports.

Daily logs and checklists.

Final acceptance test and operational test procedure.

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system or material attesting that product, system or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel qualifications.

Confined space entry permits.

Text of posted operating instructions.

SD-08 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-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 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-11 Closeout Submittals

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

Cost breakout for all assets 30 days prior to facility turnover.

1.1.2 Approving Authority

Office or designated person authorized to approve submittal.

1.1.3 Work

Supply and Installation of Odor Control

As used in this section, on- and off-site construction required by contract documents, including labor necessary to produce submittals, except those SD-01 Pre-Construction Submittals noted above, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.2 SUBMITTALS

ASPA (American Samoa Power Authority) approval is required for submittals. Submit the following in accordance with this section.

SD-01 Preconstruction Submittals

Submittal Register

1.3 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.3.1 Required Submittals

All Submittals which are required for the project shall require ASPA approval. Most submittals fall under this category.

1.3.2 Information Only

Submittals not requiring ASPA approval will be for information only. They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.3.3 Administrative Submittals

Meetings, Schedules, RFIs and Contractual Submittals will require ASPA review and approval.

1.3.4 Closeout Submittals

All Submittals required to close out the project will require ASPA approval and acceptance before the project can be given substantial completion.

1.4 FORWARDING SUBMITTALS REQUIRING ASPA APPROVAL

1.4.1 Submittals Required from the Contractor

As soon as practicable after award of contract, and before procurement of fabrication, forward to the APE submittals required in the technical sections of this specification, including shop drawings, product data and samples. One copy of the transmittal form for each and every submittal shall be forwarded to the APE.

1.4.1.1 O&M Data

Supply and Installation of Odor Control

All O&M Data and Manuals shall be submitted to both the APE for review and incorporation into ASPA's master O&M Manual. The O&M Data and Manuals required as part of this project shall be handover to ASPA;

ATTN: Project Engineer/Manager
American Power Authority
Tafuna

The APE or his authorized representative will review and approve O&M Data to verify the submittals comply with the contract requirements. The Contractor shall submit data specified for a given item within 30 calendar days after the item is delivered to the contract site.

In the event the Contractor fails to deliver O&M Data within the time limits specified, the APE may withhold from progress payments 50 percent of the price of the item with which such O&M Data are applicable.

1.5 PREPARATION

1.5.1 Transmittal Form

Transmit each submittal, except sample installations to the office of APE. Transmit submittals with transmittal form prescribed by APE and standard for project. On the transmittal form identify Contractor, indicate date of submittal, and include information prescribed by transmittal form and required in paragraph entitled, "Identifying Submittals," of this section. Process transmittal forms to record actions regarding sample.

1.5.2 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 ASPA approval.

Identify 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 drawings 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.

1.5.3 Format for SD-02 Shop Drawings

Shop drawings are not to be less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless other form is required. Drawings are to be suitable for reproduction and be of a quality to produce clear, distinct lines and letters with dark lines on a white background.

Present 8 1/2 by 11 inches sized shop drawings as part of the bound volume for submittals required by section. Present larger drawings in sets.

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph entitled, "Identifying Submittals," of this section.

Number drawings in a logical sequence. Contractors may use their own number system. Each drawing is to bear the number of the submittal in a uniform location adjacent to the title block. Place the ASPA contract number in the margin, immediately below the title block, for each drawing.

Reserve a blank space, no smaller than one inch on the right hand side of each sheet for the ASPA disposition stamp. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Include the nameplate data, size and capacity on drawings. Also include applicable federal, military, industry and technical society publication references.

1.5.4 Format of SD-03 Product Data and SD-08 Manufacturer's Instructions

Present product data submittals for each section as a complete, bound volume. Include table of contents, listing page and catalog item numbers for product data.

Indicate, by prominent notation, each product which is being submitted; indicate specification section number and paragraph number to which it pertains.

Supplement product data with material prepared for project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for project, with information and format as required for submission of SD-07 Certificates.

Provide product data in English dimensions. Where product data are included in preprinted catalogs with metric units only, submit English dimensions on separate sheet.

Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry and technical society publication references. Should manufacturer's data require supplemental information for clarification, submit as specified or SD-07 Certificates.

Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the APE. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal and marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will [not] be accepted for expedition of construction effort.

Submit manufacturer's instructions prior to installation.

1.5.5 Format of SD-04 Samples

Furnish samples in sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately same size as specified:

- a. Sample of Equipment or Device: Full size.
- b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.
- c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
- d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.
- e. Sample of Non-Solid Materials: Pint. Examples of non-solid materials are sand and paint.
- f. Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes and quantities of samples are to represent their respective standard unit.
- g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at time of use. Recording of Sample Installation: Note and preserve the notation of area constituting sample installation but remove notation at final cleanup of project.

When color, texture or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.5.6 Format of SD-05 Design Data and SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inches paper. Provide a bound volume for submittals containing numerous pages.

1.5.7 Format of SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Provide reports on 8 1/2 by 11 inches paper in a complete bound volume. Indicate by prominent notation, each report in the submittal. Indicate specification number and paragraph number to which it pertains. 1.5.8 Format of SD-10 Operation and Maintenance Data (O&M) Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.5.8 Format of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

When submittal includes a document which is to be used in project or become part of project record, other than as a submittal, do not apply Contractor's approval stamp to document, but to a separate sheet accompanying document.

Provide all dimensions in administrative submittals in metric. Where data are included in preprinted material with English units only, submit metric dimensions on separate sheet.

1.6 QUANTITY OF SUBMITTALS

1.6.1 Number of Copies of SD-02 Shop Drawings

Submit six copies of submittals of shop drawings requiring review and approval only by QC organization and seven copies of shop drawings requiring review and approval by APE.

1.6.2 Number of Copies of SD-03 Product Data and SD-08 Manufacturer's Instructions

Submit in compliance with quantity requirements specified for shop drawings.

1.6.3 Number of Samples SD-04 Samples

- A. Submit two samples, or two sets of samples showing range of variation, of each required item. One approved sample or set of samples will be retained by approving authority and one will be returned to Contractor.
- B. Submit one sample panel or provide one sample installation where directed. Include components listed in technical section or as directed.
- C. Submit one sample installation, where directed.
- D. Submit one sample of non-solid materials.

1.6.4 Number of Copies SD-05 Design Data and SD-07 Certificates

Submit in compliance with quantity requirements specified for shop drawings.

1.6.5 Number of Copies SD-06 Test Reports and SD-09 Manufacturer's Field Reports

Submit in compliance with quantity and quality requirements specified for shop drawings other than field test results that will be submitted with QC reports.

1.6.6 Number of Copies of SD-10 Operation and Maintenance Data

Submit three copies of O&M Data to the APE for review and approval.

1.6.7 Number of Copies of SD-01 Preconstruction Submittals and SD-11 Closeout Submittals

Unless otherwise specified, submit four sets of administrative submittals.

1.7 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Approval of the APE is not required on information only submittals. The ASPA 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 APE 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 ASPA laboratory or for check testing by the ASPA in those instances where the technical specifications so prescribe.

1.9 SUBMITTAL REGISTER AND DATABASE

Prepare and maintain submittal register, as the work progresses. Use electronic submittal register spreadsheet prepared by the contractor, or any other format agreed upon between ASPA and the contractor. Maintain a submittal register for the project in accordance with Section 01 45 00.10 10 QUALITY CONTROL.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the ASPA.

The Contractor is required to complete the submittal register and submit it to the APE for approval within 30 calendar days after Notice to Proceed. The approved submittal register will serve as a scheduling document for submittals and will be used to control submittal actions throughout the contract period. Coordinate the submit dates and need dates with dates in the Contractor prepared progress schedule. Submit monthly or until all submittals have been satisfactorily completed, updates to the submittal register showing the Contractor action codes and actual dates with ASPA action codes. Revise the submittal register when the progress schedule is revised and submit both for approval. Contractor to note that American Samoa is in a remote island location and can have long delivery times.

1.9.1 Use of Submittal Register

Submit submittal register as an electronic database, using a spreadsheet program approved by the APE. Submit with QC plan and project schedule. Verify that all submittals required for project are listed and add missing submittals. Coordinate and complete the following fields on the register database submitted with the QC plan and the project schedule:

Activity Number: Activity number from the project schedule.

Contractor Submit Date: Scheduled date for approving authority to receive submittals.

Contractor Approval Date: Date Contractor needs approval of submittal.

Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.9.2 Contractor Use of Submittal Register

Update the following fields with each submittal throughout contract.

Transmittal Number: Contractor assigned list of consecutive numbers.

Action Code: Date of action used to record Contractor's review when forwarding submittals to QC.

List date of submittal transmission.

List date approval received.

1.9.3 Approving Authority Use of Submittal Register

Update the following fields.

Transmittal Number: Contractor assigned list of consecutive numbers.

Supply and Installation of Odor Control

List date of submittal receipt.

List Date related to review actions.

List date returned to Contractor.

1.9.4 Action Codes

Entries for columns are to be used are as follows (others may be prescribed by Transmittal Form):

1.9.4.1 ASPA Review Action Codes

"A" - "Approved as submitted"; "Completed"

"B" - "Approved, except as noted on drawings"; "Completed"

"C" - "Approved, resubmission required"; "Resubmit"

"D" - "Returned by correspondence"; "Completed"

"E" - "Disapproved (See attached)"; "Resubmit"

"F" - "Receipt acknowledged"; "Completed"

"G" - "Other (Specify)"; "Resubmit"

"X" - "Receipt acknowledged, does not comply"; "Resubmit"

1.9.4.2 Contractor Action Codes

NR - Not Received

AN - Approved as noted

A - Approved

RR - Disapproved, Revise, and Resubmit

1.9.5 Copies Delivered to the ASPA

Deliver one copy of submittal register updated by Contractor to ASPA (American Samoa Power Authority) with each invoice request. Deliver in electronic format, unless a paper copy is requested by APE.

1.10 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

Supply and Installation of Odor Control

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 resubmitted 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 APE 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."
- e. Except as specified otherwise, allow review period, beginning with receipt by approving authority, that includes at least 15 working days for submittals for QC Manager approval and 20 working days for submittals for APE approval. Period of review for submittals with APE approval begins when ASPA (American Samoa Power Authority) receives submittal from QC organization.
- f. Period of review for each resubmittal is the same as for initial submittal.

Within 30 calendar days of notice to proceed, provide, for approval by the APE, the following schedule of submittals:

- a. A schedule of shop drawings and technical submittals required by the specifications and drawings. Indicate the specification or drawing reference requiring the submittal; the material, item, or process for which the submittal is required; the "SD" number and identifying title of the submittal; the Contractor's anticipated submission date and the approval need date.
- b. A separate schedule of other submittals required under the contract but not listed in the specifications or drawings. Schedule will indicate the contract requirement reference; the type or title of the submittal; the Contractor's anticipated submission date and the approved need date (if approval is required).

1.10.1 Reviewing, Certifying, Approving Authority

Conform to provisions of this section, unless explicitly stated otherwise for submittals listed or specified in this contract.

Submit complete submittals for each definable feature of work. Submit at the same time

Supply and Installation of Odor Control

components of definable feature interrelated as a system.

When acceptability of a submittal is dependent on conditions, items, or materials included in separate subsequent submittals, submittal will be returned without review.

Approval of a separate material, product, or component does not imply approval of assembly in which item functions.

1.10.2 QC Organization Responsibilities

- a. Note date on which submittal was received from Contractor on each submittal.
- b. Review each submittal; and check and coordinate each submittal with requirements of work and contract documents.
- c. Review submittals for conformance with project design concepts and compliance with contract documents.
- d. Act on submittals, determining appropriate action based on QC organization's review of submittal.
 - (1) When QC Manager is approving authority, take appropriate action on submittal from the possible actions defined in paragraph entitled, "Approved/Accepted Submittals," of the section."
 - (2) When the APE is approving authority or when variation has been proposed, forward submittal to ASPA with certifying statement or return submittal marked "not reviewed" or "revise and resubmit" as appropriate. The QC organization's review of submittal determines appropriate action.
- e. Ensure that material is clearly legible.
- f. Stamp each sheet of each submittal with QC certifying statement or approving statement, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only.
 - (1) When approving authority is the APE, QC organization will certify submittals forwarded to APE with the following certifying statement:

"I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated with contract Number _____, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is submitted for ASPA (American Samoa Power Authority) approval.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Certified by QC Manager _____, Date _____"

(Signature)

- (2) When approving authority is QC Manager, QC Manager will use the following approval statement when returning submittals to Contractor as "Approved" or "Approved as Noted."

"I hereby certify that the (material) (equipment) (article) shown and marked in this submittal and proposed to be incorporated with contract Number _____, is in compliance with the contract drawings and specification, can be installed in the allocated spaces, and is approved for use.

Certified by Submittal Reviewer _____, Date _____
(Signature when applicable)

Approved by QC Manager _____, Date _____"
(Signature)

- g. Sign certifying statement or approval statement. The QC organization member designated in the approved QC plan is the person signing certifying statements. The use of original ink for signatures is required. Stamped signatures are not acceptable.
- h. Update submittal register as submittal actions occur and maintain the submittal register at project site until final acceptance of all work by APE.
- i. Retain a copy of approved submittals at project site, including Contractor's copy of approved samples.

1.10.3 ASPA (American Samoa Power Authority) Reviewed Design

The ASPA will review design submittals for conformance with the technical requirements of the solicitation. Any submittals without the Contractor's stamp will be returned without review,

1.11 ASPA (American Samoa Power Authority) APPROVING AUTHORITY

When approving authority is APE, the ASPA (American Samoa Power Authority) will:

- a. Note date on which submittal was received from QC Manager.
- 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 entitled, "Review Notations," of this section and with markings appropriate for action indicated.

Upon completion of review of submittals requiring ASPA (American Samoa Power Authority) approval, stamp and date approved submittals. Three (3) copies of the approved submittal will be retained by the APE and Three (3) copies of the submittal will be returned to the Contractor.

1.11.1 Review Notations

APE review will be completed within 10 business days after date of submission. 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.

1.12 DISAPPROVED OR REJECTED SUBMITTALS

Contractor shall make corrections required by the APE. 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 APE following typical ASPA procedures as agreed to in the contract. Contractor is responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in ASPA requiring rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, the Contractor shall 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.

1.13 APPROVED/ACCEPTED SUBMITTALS

The APE approval or acceptance of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing and other information are satisfactory. Design, general method of construction, materials, detailing and other information appear to meet the Solicitation and Accepted Proposal.

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 dimensions, the design of adequate connections and details, and the satisfactory construction of all work design, dimensions, all design extensions, such as the design of adequate connections and details, etc., and the satisfactory construction of all work.

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

1.14 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. ASPA reserves 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 APE 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 APE does not relieve the Contractor of his responsibilities under the contract.

1.15 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment for materials incorporated in the work will be made if all required ASPA (American Samoa Power Authority) approvals have not been obtained. No payment will be made for any materials incorporated into the work for any conformance review submittals or information only submittals found to contain errors or deviations from the Solicitation or Accepted Proposal.

1.16 PROGRESS SCHEDULE

1.16.1 Bar Chart

1. Submit the progress chart, for approval by the APE, at the Preconstruction

Conference in one reproducible format and 4 copies.

2. Prepare the progress chart in the form of a bar chart utilizing form "Construction Progress Chart" or comparable format acceptable to the APE.
3. Include no less than the following information on the progress chart:
 - A. Break out by major headings for primary work activity.
 - B. A line item breaks out under each major heading sufficient to track the progress of the work.
 - C. A line item showing contract finalization task which includes punch list, clean-up and demolition, and final construction drawings.
 - D. A materials bar and a separate labor bar for each line item. Both bars will show the scheduled percentage complete for any given date within the contract performance period. Labor bar will also show the number of men (man-load) expected to be working on any given date within the contract performance period.
 - E. The estimated cost and percentage weight of total contract cost for each materials and labor bar on the chart.
 - F. Separate line items for mobilization and drawing submittal and approval. (These items are to show no associated costs.)
4. Update the progress schedule in one reproduction and 4 copies every 30 calendar days throughout the contract performance period and submit as part of project billing.

1.16.2 Project Network Analysis

Submit the initial progress schedule within 21 calendar days of notice to proceed. Schedule is to be updated and resubmitted monthly beginning 7 calendar days after return of the approved initial schedule. Updating to entail complete revision of the graphic and data displays incorporating changes in scheduled dates and performance periods. Redlined updates will only be acceptable for use as weekly status reviews.

Contractor to provide a single point contact from his on-site organization as his Schedule Specialist. Schedule Specialist is to have the responsibility of updating and coordinating the schedule with actual job conditions. Contractor to note that American Samoa is a remote island location and can have long delivery times. Schedule Specialist to participate in weekly status meetings and present current information on the status of purchase orders, shop drawings, off-site fabrication, materials deliveries, Subcontractor activities, and any problem which may impact the contract performance period.

Include the following in the project network analysis:

Supply and Installation of Odor Control

1. Graphically display with the standard network or arrow diagram capable of illustrating the required data. Drafting to be computer generated on standard 24 by 36 inch (nominal size) drafting sheets or on small 11 by 17 inch minimum sheets with separate overview and detail breakouts. Provide a project network analysis that is legible with a clear, consistent method for continuations and detail referencing. Clearly delineate the critical path on the display. Clearly indicate the contract milestone date on the project network analysis graphic display.
2. Data is to be presented as a separate printout on paper or, where feasible, may be printed on the same sheet as the graphic display. Data is to be organized in a logical coherent display capable of periodic updating.
3. Include within the data verbal activity descriptions with a numerical ordering system cross referenced to the graphic display. Additionally, costs (broken down into separate materials and costs), duration, early start date, early finish date, late start date, late finish date, and float are to be detailed for each activity. A running total of the percent completion based on completed activity costs versus total contract cost is to be indicated. A system for indicating scheduled versus actual activity dates and durations is also to be provided.
4. Sufficient detail to facilitate the Contractor's control of the job and to allow the APE to readily follow progress for portions of the work should be shown within the schedule.

1.17 STATUS REPORT ON MATERIALS ORDERS

Within 30 calendar days after notice to proceed, submit, for approval by the APE, an initial material status report on all materials orders. Contractor to note that American Samoa is a remote island location and can have long delivery times. This report will be updated and re-submitted every 30 calendar days as the status on material orders changes.

Report to include list, in chronological order by need date, materials orders necessary for completion of the contract. The following information will be required for each material order listed:

- A. Material name, supplier, and invoice number.
- B. Bar chart line item or CPM activity number affected by the order.
- C. Delivery date needed to allow directly and indirectly related work to be completed within the contract performance period.
- D. Current delivery date agreed on by supplier.
- E. When item d exceeds item c, the effect that delayed delivery date will have on contract completion date.
- F. When item d exceeds item c, a summary of efforts made by the Contractor to expedite the delayed delivery date to bring it in line with the needed delivery date, including efforts made to place the order (or subcontract) with other suppliers.

1.18 STAMPS

Stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirement and contain the QC information based on the previous sections of this specification. Format of stamp shall be agreed upon by the APE at the project kickoff meeting and used throughout the project duration.

1.19 REQUEST FOR INFORMATION (RFI)

A Request for Information (RFI) shall be submitted by the contractor to the APE for confirmation of any project questions. The APE shall review each RFI and provide a response to the contractor within seven (7) days. The contractor shall develop an RFI form which shall be used throughout the project and contain the same format. The format shall be agreed upon between the contractor and the APE during the pre-construction meeting.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 33 00

SECTION 01 35 26
SAFETY REQUIREMENTS

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.

A. AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)

1. ASSE/SAFE A10.32 (2004) Fall Protection
2. ASSE/SAFE A10.34 (2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
3. ASSE/SAFE Z359.1 (2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components

B. ASME INTERNATIONAL (ASME)

4. ASME B30.22 (2010) Articulating Boom Cranes
5. ASME B30.3 (2009) Tower Cranes
6. ASME B30.5 (2007) Mobile and Locomotive Cranes

C. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. NFPA 10 (2010) Standard for Portable Fire Extinguishers
2. NFPA 241 (2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations
3. NFPA 51B (2009; TIA 09-1) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
4. NFPA 70 (2011) National Electrical Code

5. NFPA 70E (2009; Errata 09-1) Standard for Electrical Safety in the Workplace

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

1. 10 CFR 20 Standards for Protection Against Radiation
2. 29 CFR 1910 Occupational Safety and Health Standards
3. 29 CFR 1910.146 Permit-required Confined Spaces
4. 29 CFR 1919 Gear Certification
5. 29 CFR 1926 Safety and Health Regulations for Construction
6. 29 CFR 1926.500 Fall Protection

1.2 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP)

Activity Hazard Analysis (AHA)

Crane Critical Lift Plan (if applicable)

Proof of qualification for Crane Operators (if applicable)

SD-06 Test Reports

Reports (Submit reports as their incidence occurs, in accordance with the requirements of the paragraph entitled, "Reports.")

Accident Reports

Crane Reports

SD-07 Certificates

Confined Space Entry Permit

Supply and Installation of Odor Control

Hot work permit

License Certificates

1.3 DEFINITIONS

1. **Competent Person for Fall Protection.** A person who is capable of identifying hazardous or dangerous conditions in the personal fall arrest system or any component thereof, as well as their application and use with related equipment, and has the authority to take prompt corrective measures to eliminate the hazards of falling.
2. **High Visibility Accident.** Any mishap which may generate publicity and/or high visibility.
3. **Medical Treatment.** Treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even through provided by a physician or registered personnel.
4. **Recordable Injuries or Illnesses.** Any work-related injury or illness that results in:
 - (1) Death, regardless of the time between the injury and death, or the length of the illness;
 - (2) Days away from work (any time lost after day of injury/illness onset);
 - (3) Restricted work;
 - (4) Transfer to another job;
 - (5) Medical treatment beyond first aid;
 - (6) Loss of consciousness; or
 - (7) A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (1) through (6) above.

Weight Handling Equipment (WHE) Accident. A WHE accident occurs when any one or more of the six elements in the operating envelope fails to perform correctly during operation, including operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; and/or collision, including unplanned contact between the load, crane, and/or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, roll over, etc.) Any mishap meeting the criteria described above shall be documented in the Contractor Significant Incident Report (CSIR) form submitted within five days both as provided by the APE.

1.4 REGULATORY REQUIREMENTS

Supply and Installation of Odor Control

Contractor is solely responsible for safety as listed in this section. In addition to the detailed requirements included in the provisions of this contract, comply with all federal, and local laws, ordinances, criteria, rules and regulations, including the approved PNRS Permit which shall be obtained by the Contractor from the APE. Submit matters of interpretation of standards to the APE for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern. Contractor to provide site security as required during construction. The project site shall be kept clean and areas of construction shall be restored as soon as possible to prevent accidents. Contractor shall protect ASPA's property during construction and is responsible to repair any damages that may occur during construction. Contractor shall be responsible for worker's conduct. Equipment and vehicles shall be operated and maintained in accordance with safety standards to protect workers and the general public.

1.5 SITE QUALIFICATIONS, DUTIES AND MEETINGS

1.5.1 Personnel Qualifications

The contractor shall provide a Safety oversight team that includes a minimum of one (1) Competent Person at each project site to function as the Safety and Health Officer (SSHO). The SSHO shall be at the work site at all times, unless specified differently in the contract, to perform safety and occupational health management, surveillance, inspections, and safety enforcement for the Contractor, and their training, experience, and qualifications shall be as required by the APE. A Competent Personal shall be provided for all of the hazards identified in the Contractor's Safety and Health Program in accordance with the accepted Accident Prevention Plan, and shall be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. The credentials of the Competent Persons(s) shall be approved by the APE.

All construction personnel shall conduct themselves with proper etiquette, standard construction protocol, and professional behavior. Good conduct amongst construction personnel is required to ensure proper behavior, a good work atmosphere, job safety and proper protection of ASPA's property and/or other Government and private property. ASPA reserves the right to request the contractor to ensure their personnel acts in such a manner, or require personnel who continually fail to meet these standards leave the jobsite. The contractor shall be responsible for the activity and conduct of their personnel.

1.5.1.1 Competent Person for Confined Space Entry

Provide a competent person for confined space. All confined space and enclosed space work shall comply with NFPA 306, OSHA 29 CFR 1915, Subpart B, 1910.147 for general industry

1.5.1.2 Crane Operators

Provide proof of current qualification as a crane operator.

1.5.2 Personnel Duties

1.5.2.1 Site Safety and Health Officer (SSHO)

Supply and Installation of Odor Control

- a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection, identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily quality control report.
- b. Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and sub-contractors.
- c. Maintain applicable safety reference material on the job site.
- d. Attend the pre-construction conference, pre-work meetings including preparatory inspection meeting, and periodic in-progress meetings.
- e. Implement and enforce accepted APPS and AHAs.
- f. Maintain a safety and health deficiency tracking system that monitors outstanding deficiencies until resolution. Post a list of unresolved safety and health deficiencies on the safety bulletin board.
- g. Ensure sub-contractor compliance with safety and health requirements. Failure to perform the above duties will result in dismissal of the superintendent, QC Manager, and/or SSHO, and a project work stoppage. The project work stoppage will remain in effect pending approval of a suitable replacement.
- h. Maintain a list of hazardous chemicals on site and their material safety data sheets.

1.5.3 Meetings

1.5.3.1 Preconstruction Conference

- a. Contractor representatives who have a responsibility or significant role in accident prevention on the project shall attend the preconstruction conference. This includes the project superintendent, site safety and health officer, quality control supervisor, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).
- b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that will be developed and implemented during the performance of the contract. This list of proposed AHAs will be reviewed at the conference and an agreement will be reached between the Contractor and the ASPA's representative as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, review, and acceptance of AHAs to preclude project delays.
- c. Deficiencies in the submitted APP will be brought to the attention of the Contractor at the preconstruction conference, and the Contractor shall revise the plan to correct deficiencies and re-submit it for acceptance. Do not begin work until there is an accepted APP.

Supply and Installation of Odor Control

1.5.3.2 Safety Meetings

Conduct and document meetings. Attach minutes showing contract title, signatures of attendees and a list of topics discussed to the Contractors' daily quality control report.

1.6 ACCIDENT PREVENTION PLAN (APP)

Use a qualified person to prepare the written site-specific APP. Specific requirements for some of the APP elements are described below. The APP shall be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP shall interface with the Contractor's overall safety and health program. Include any portions of the Contractor's overall safety and health program referenced in the APP in the applicable APP element and made site-specific. The ASPA considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP shall be signed by the person and firm (senior person) preparing the APP, the Contractor, the on-site superintendent, the designated site safety and health officer, the Contractor Quality control Manager, and any designated CSP and/or CIH. Submit the APP to the APE 15 calendar days prior to the date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once accepted by the APE, the APP and attachments will be enforced as part of the contract. Disregarding the provisions of this contract or the accepted APP will be cause for stopping of work, at the discretion of the APE, until the matter has been rectified. Once work begins, changes to the accepted APP shall be made with the knowledge and concurrence of the APE, project superintendent, SSHO and quality control manager. Should any severe hazard exposure, i.e. imminent danger, become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the APE within 24 hours of discovery. Eliminate/remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSE/SAFE A10.34,) and the environment. Copies of the accepted plan will be maintained at the APE's office and at the job site. Continuously reviewed and amended the APP, as necessary, throughout the life of the contract. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered.

1.6.1 Contents

Confined Space Entry Plan. Develop a confined and/or enclosed space entry plan in accordance with applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive 2.100, and any other federal, state and local regulatory requirements identified in this contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

Crane Critical Lift Plan. Prepare and sign weight handling critical lift plans for lifts over 75

Supply and Installation of Odor Control

percent of the capacity of the crane or hoist (or lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane or hoist; lifts of personnel; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. Submit 15 calendar days prior to on-site work and include the requirements of following:

- (1) For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.550(g).

Fall Protection and Prevention (FP&P) Program Documentation. The program documentation shall be site specific and address all fall hazards in the work place and during different phases of construction. Address how to protect and prevent workers from falling to lower levels when they are exposed to fall hazards above 6 feet. A qualified person for fall protection shall prepare and sign the program documentation. Include fall protection and prevention systems, equipment and methods employed for every phase of work, responsibilities, assisted rescue, self-rescue and evacuation procedures, training requirements, and monitoring methods. Revise the Fall Protection and Prevention Program documentation every six months for lengthy projects, reflecting any changes during the course of construction due to changes in personnel, equipment, systems or work habits. Keep and maintain the accepted Fall Protection and Prevention Program documentation at the job site for the duration of the project. Include the Fall Protection and Prevention Program documentation in the Accident Prevention Plan (APP).

Site Demolition Plan. The safety and health aspects prepared in accordance with Section 02 41 00 DEMOLITION and referenced sources

1.7 ACTIVITY HAZARD ANALYSIS (AHA)

Submit the Activity Hazard Analysis (AHA) for review at least 15 calendar days prior to the start of each phase. Format subsequent AHAs as amendments to the APP. The analysis should be used during daily inspections to ensure the implementation and effectiveness of the activity's safety and health controls. The AHA list will be reviewed periodically (at least monthly) at the Contractor supervisory safety meeting and updated as necessary when procedures, scheduling, or hazards change. Develop the activity hazard analyses using the project schedule as the basis for the activities performed. Any activities listed on the project schedule will require an AHA. The AHAs will be developed by the contractor, supplier or subcontractor and provided to the prime contractor for submittal to the APE.

1.8 DISPLAY OF SAFETY INFORMATION

Within 1 calendar days after commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the APE, that is accessible and includes all mandatory information for employee and visitor review, shall be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board:

- A. Confined space entry permit.
- B. Hot work permit.

Supply and Installation of Odor Control

1.9 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in the article "References." Maintain applicable equipment manufacturer's manuals.

1.10 EMERGENCY MEDICAL TREATMENT

Contractors will arrange for their own emergency medical treatment. ASPA has no responsibility to provide emergency medical treatment.

1.11 REPORTS

1.11.1 Accident Reports

- a. Conduct an accident investigation for recordable injuries and illnesses, as defined in 1.3.g and property damage accidents resulting in at least \$2,000 in damages, to establish the root cause(s) of the accident, and provide the report to the APE within 5 calendar day(s) of the accident. The APE will provide copies of any required or special forms.

1.11.2 Accident Notification

Notify the APE as soon as practical, but not later than four hours, after any accident meeting the definition of Recordable Injuries or Illnesses or High Visibility Accidents, property damage equal to or greater than \$2,000, or any weight handling equipment accident. Within notification include contractor name; contract title; type of contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (to include type of construction equipment used, PPE used, etc.). Preserve the conditions and evidence on the accident site until the ASPA investigation team arrives on-site and ASPA investigation is conducted.

1.11.3 Crane Reports

Submit crane inspection reports as specified herein with Daily Reports of Inspections.

1.11.4 Certificate of Compliance

Provide a Certificate of Compliance for each crane entering an activity under this contract. State within the certificate that the crane and rigging gear meet applicable OSHA regulations (with the Contractor citing which OSHA regulations are applicable, e.g., cranes used in construction, demolition, or maintenance comply with 29 CFR 1926. Certify on the Certificate of Compliance that the crane operator(s) is qualified and trained in the operation of the crane to be used. Also certify that all of its crane operators working on the activity have been trained in the proper use of all safety devices (e.g., anti-two block devices). Post certifications on the crane.

1.12 HOT WORK

Submit and obtain a written permit prior to performing "Hot Work" (welding, cutting, etc.) or operating other flame-producing/spark producing devices, from the ASPA or any

Supply and Installation of Odor Control

governmental agency identified by the APE. CONTRACTORS ARE REQUIRED TO MEET ALL CRITERIA BEFORE A PERMIT IS ISSUED. The Contractor will provide at least two (2) twenty (20) pound 4A:20 BC rated extinguishers for normal "Hot Work". All extinguishers shall be current inspection tagged, approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch shall be trained in accordance with NFPA 51B and remain on-site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit. When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and place in memory the emergency phone number. ANY FIRE, NO MATTER HOW SMALL, SHALL BE REPORTED TO THE APE IMMEDIATELY.

1.13 FACILITY OCCUPANCY CLOSURE

Streets, walks, and other facilities occupied and used by the ASPA shall not be closed or obstructed without written permission from the APE.

1.14 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must:

- a. Secure outside equipment and materials and place materials that could be damaged in protected areas.
- b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.
- c. Ensure that temporary erosion controls are adequate.

1.15 CONFINED SPACE ENTRY REQUIREMENTS.

Contractors entering and working in confined spaces performing general industry work are required to follow the requirements of OSHA 29 CFR Part 1926.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND/OR OTHER WORK

Comply with NFPA 241, the APP, the AHA, Federal and/or local OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

3.1.1 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of

Supply and Installation of Odor Control

radioactive material and devices such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint are prohibited. The APE, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. The Radiation Safety Officer (RSO) must be notified prior to excepted items of radioactive material and devices being brought on base.

3.1.2 Unforeseen Hazardous Material

The design should have identified materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR Part 1910.1000). If [additional] material, not indicated, that may be hazardous to human health upon disturbance during construction operations is encountered, stop that portion of work and notify the APE immediately. Within 14 calendar days the ASPA will determine if the material is hazardous. If material is not hazardous or poses no danger, the ASPA will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the ASPA will issue a modification pursuant to "FAR 52.243-4, Changes" and "FAR 52.236-2, Differing Site Conditions."

3.2 PRE-OUTAGE COORDINATION MEETING

Contractors are required to apply for utility outages at least 7 days in advance. As a minimum, the request should include the location of the outage, utilities being affected, duration of outage and any necessary sketches. Special requirements for electrical outage requests are contained elsewhere in this specification section. Once approved, and prior to beginning work on the utility system requiring shut down, attend pre-outage coordination meeting with the APE to review the scope of work and the lock-out/tag-out procedures for worker protection. No work will be performed on energized electrical circuits unless proof is provided that no other means exist.

3.3 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Contractor shall ensure that each employee is familiar with and complies with these procedures. APE will, at the Contractor's request, apply lockout/tagout tags and take other actions that, because of experience and knowledge, are known to be necessary to make the particular equipment safe to work on for ASPA owned and operated systems. No person, regardless of position or authority, shall operate any switch, valve, or equipment that has an official lockout/tagout tag attached to it, nor shall such tag be removed except as provided in this section. No person shall work on any energized equipment including, but not limited to activities such as erecting, installing, constructing, repairing, adjusting, inspecting, un-jamming, setting up, trouble shooting, testing, cleaning, dismantling, servicing and maintaining machines equipment of processes until an evaluation has been conducted identifying the energy source and the procedures which will be taken to ensure the safety of personnel. When work is to be performed on electrical circuits, only qualified personnel shall perform work on electrical circuits. A supervisor who is required to enter an area protected by a lockout/tagout tag will be considered a member of the protected group provided he notifies the holder of the tag stub each time he enters and departs from the protected area. Identification markings on building light and power distribution circuits shall not be relied on for established safe work conditions. Before clearance will be given on any equipment other than electrical (generally referred to as mechanical apparatus), the apparatus, valves, or

systems shall be secured in a passive condition with the appropriate vents, pins, and locks. Pressurized or vacuum systems shall be vented to relieve differential pressure completely. Vent valves shall be tagged open during the course of the work. Where dangerous gas or fluid systems are involved, or in areas where the environment may be oxygen deficient, system or areas shall be purged, ventilated, or otherwise made safe prior to entry.

3.3.1 Tag Placement

Lockout/tagout tags shall be completed in accordance with the regulations printed on the back thereof and attached to any device which, if operated, could cause an unsafe condition to exist. If more than one group is to work on any circuit or equipment, the employee in charge of each group shall have a separate set of lockout/tagout tags completed and properly attached. When it is required that certain equipment be tagged, the ASPA will review the characteristics of the various systems involved that affect the safety of the operations and the work to be done; take the necessary actions, including voltage and pressure checks, grounding, and venting, to make the system and equipment safe to work on; and apply such lockout/tagout tags to those switches, valves, vents, or other mechanical devices needed to preserve the safety provided. This operation is referred to as "Providing Safety Clearance."

3.3.2 Tag Removal

When any individual or group has completed its part of the work and is clear of the circuits or equipment, the supervisor, project leader, or individual for whom the equipment was tagged shall turn in his signed lockout/tagout tag stub to the APE. That group's or individual's lockout/tagout tags on equipment may then be removed on authorization by the APE.

3.4 FALL HAZARD PROTECTION AND PREVENTION PROGRAM

Establish a fall protection and prevention program, for the protection of all employees exposed to fall hazards. Within the program include company policy, identify responsibilities, education and training requirements, fall hazard identification, prevention and control measures, inspection, storage, care and maintenance of fall protection equipment and rescue and evacuation procedures.

3.4.1 Training

Institute a fall protection training program. As part of the Fall Hazard Protection and Prevention Program, provide training for each employee who might be exposed to fall hazards. Provide training by a competent person for fall protection.

3.4.2 Fall Protection Equipment and Systems

Enforce use of the fall protection equipment and systems designated for each specific work activity in the Fall Protection and Prevention Plan and/or AHA at all times when an employee is exposed to a fall hazard. Protect employees from fall hazards. In addition to the required fall protection systems, safety skiff, personal floatation devices, life rings etc., are required when working above or next to hazardous water. Personal fall arrest systems are required when working from an articulating or extendible boom, swing stages, or suspended platform. In addition, personal fall arrest systems are required when operating other equipment such as scissor lifts if the work platform is capable of being positioned outside the wheelbase. The

Supply and Installation of Odor Control

need for tying-off in such equipment is to prevent ejection of the employee from the equipment during raising, lowering, or travel. Fall protection must comply with 29 CFR 1926.500, Subpart M, and ASSE/SAFE A10.32.

3.4.2.1 Personal Fall Arrest Equipment

Personal fall arrest equipment, systems, subsystems, and components shall meet ASSE/SAFE Z359.1. Only a full-body harness with a shock-absorbing lanyard or self-retracting lanyard is an acceptable personal fall arrest body support device. Body belts may only be used as a positioning device system (for uses such as steel reinforcing assembly and in addition to an approved fall arrest system). Harnesses shall have a fall arrest attachment affixed to the body support (usually a Dorsal D-ring) and specifically designated for attachment to the rest of the system. Only locking snap hooks and carabiners shall be used. Webbing, straps, and ropes shall be made of synthetic fiber. The maximum free fall distance when using fall arrest equipment shall not exceed 6 feet. The total fall distance and any swinging of the worker (pendulum-like motion) that can occur during a fall shall always be taken into consideration when attaching a person to a fall arrest system.

3.4.4 Existing Anchorage

Certified (or re-certified) by a qualified person for fall protection existing anchorages, to be used for attachment of personal fall arrest equipment in accordance with ASSE/SAFE Z359.1. Existing horizontal lifeline anchorages must be certified (or re-certified) by a registered professional engineer with experience in designing horizontal lifeline systems.

3.4.5 Horizontal Lifelines

Design, install, certify and use under the supervision of a qualified person horizontal lifelines for fall protection as part of a complete fall arrest system which maintains a safety factor of 2 (29 CFR 1926.500).

3.4.6 Guardrails and Safety Nets

Design, install and use guardrails and safety nets as required.

3.4.7 Rescue and Evacuation Procedures

When personal fall arrest systems are used, the contractor must ensure that the mishap victim can self-rescue or can be rescued promptly should a fall occur. Prepare a Rescue and Evacuation Plan and include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility. Include the Rescue and Evacuation Plan within the Activity Hazard Analysis (AHA) for the phase of work, in the Fall Protection and Prevention (FP&P) Plan, and the Accident Prevention Plan (APP).

3.5 SCAFFOLDING

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access

Supply and Installation of Odor Control

scaffold platforms greater than 20 feet maximum in height by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet maximum in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Stationary scaffolds must be attached to structural building components to safeguard against tipping forward or backward. Give special care to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material is prohibited. The first tie-in shall be at the height equal to 4 times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors shall have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.6 NOT USED

3.7 EQUIPMENT

3.7.1 Material Handling Equipment

- a. Material handling equipment such as forklifts shall not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.
- b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.
- c. Operators of forklifts or power industrial trucks shall be licensed in accordance with OSHA.

3.7.2 Weight Handling Equipment

- a. Equip cranes and derricks.
- b. Notify the APE 15 days in advance of any cranes entering the activity so that necessary quality assurance spot checks can be coordinated. Contractor's operator shall remain with the crane during the spot check.
- c. Comply with the crane manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.
- d. Comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes and floating derricks.

Supply and Installation of Odor Control

- e. Under no circumstance shall a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.
- f. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard and follow the requirements of ASME B30.5 or ASME B30.22 as applicable.
- g. Do not crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane.
- h. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.
- i. All employees must keep clear of loads about to be lifted and of suspended loads.
- j. Use cribbing when performing lifts on outriggers.
- k. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.
- l. A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.
- m. Certification records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review by APE personnel.
- n. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane shall be available for review by APE personnel.
- o. Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

3.8 EXCAVATIONS

Perform soil classification by a competent person in accordance with 29 CFR 1926.

3.8.1 Utility Locations

Prior to digging, the appropriate digging permit must be obtained. All underground utilities in the work area must be positively identified by locating service and coordinated with the ASPA. Any markings made during the utility investigation must be maintained throughout the contract.

3.8.2 Utility Location Verification

The Contractor must physically verify underground utility locations by hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come

Supply and Installation of Odor Control

within three feet of the underground system. Digging within 2 feet of a known utility must not be performed by means of mechanical equipment; hand digging shall be used. If construction is parallel to an existing utility expose the utility by hand digging every 100 feet if parallel within 5 feet of the excavation.

3.8.3 Shoring Systems

Trench and shoring systems must be identified in the accepted safety plan and AHA. Manufacture tabulated data and specifications or registered engineer tabulated data for shoring or benching systems shall be readily available on-site for review. Job-made shoring or shielding must have the registered professional engineer stamp, specifications, and tabulated data. Extreme care must be used when excavating near direct burial electric underground cables.

3.8.4 Trenching Machinery

Operate trenching machines with digging chain drives only when the spotters/laborers are in plain view of the operator. Provide operator and spotters/laborers training on the hazards of the digging chain drives with emphasis on the distance that needs to be maintained when the digging chain is operating. Keep documentation of the training on file at the project site.

3.9 UTILITIES WITHIN CONCRETE SLABS

Utilities located within concrete slabs or pier structures, bridges, and the like, are extremely difficult to identify due to the reinforcing steel used in the construction of these structures. Whenever contract work involves concrete chipping, saw cutting, or core drilling, the existing utility location must be coordinated with station utility departments in addition to a private locating service. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the contractor from meeting this requirement.

3.10 ELECTRICAL

3.10.1 Conduct of Electrical Work

Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Positive cable identification must be made prior to submitting any outage request for electrical systems. Arrangements are to be coordinated with the APE and Station Utilities for identification. The APE will not accept an outage request until the Contractor satisfactorily documents that the circuits have been clearly identified. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator will be allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method. When working in energized substations, only qualified electrical workers will be permitted to enter. When work requires Contractor to work near energized circuits as defined by the NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety shoes, insulating gloves with leather protective sleeves, fire retarding shirts, coveralls, face shields, and safety

Supply and Installation of Odor Control

glasses. In addition, provide electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA.

3.10.2 Portable Extension Cords

Size portable extension cords in accordance with manufacturer ratings for the tool to be powered and protected from damage. Immediately removed from service all damaged extension cords. Portable extension cords shall meet the requirements of NFPA 70E and OSHA electrical standards.

3.11 WORK IN CONFINED SPACES

Comply with the requirements in Section OSHA 29 CFR 1910.146 and OSHA 29 CFR 1926.21(b) (6). Any potential for a hazard in the confined space requires a permit system to be used.

- a. Entry Procedures. Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. All hazards pertaining to the space shall be reviewed with each employee during review of the AHA.
- b. Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its' action level.
- c. Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

END OF SECTION 01 35 26

SECTION 01 35 40.00 20

ENVIRONMENTAL MANAGEMENT

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.

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI Z400.1/Z129.1 (2004) Hazardous Industrial Chemicals - Material Safety Data Sheets - Preparation

B. ASTM INTERNATIONAL (ASTM)

1. ASTM D 4840 (1999; R 2010) Sampling Chain-Of-Custody Procedures
2. ASTM D 5663 (1997; R 2003) Validating Recycled Content in Packaging Paper and Paperboard
3. ASTM E 1991 (2005) Environmental Life Cycle Assessment of Building Materials/Products
4. ASTM E 2114 (2008) Standard Terminology for Sustainability Relative to the Performance of Buildings

C. INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

1. ISO 14040 (2006) Environmental Management - Life Cycle Assessment - Principles and Framework

D. NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

2. NIST BEES 4.0 (2007) Building for Environmental and Economic Sustainability

E. U.S. DEPARTMENT OF AGRICULTURE (USDA)

1. Biomass R&D Act (2000) Biomass Research and Development Act
2. U.S. Farm Bill (2002) U.S. Farm Bill of May 2002

F. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1. NPDES (1972; R 2005) National Pollutant Discharge Elimination System

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

1. 40 CFR Protection of Environment
2. 40 CFR 261 Identification and Listing of Hazardous Waste

1.2 DEFINITIONS

Definitions pertaining to sustainable development are as defined in ASTM E 2114 and as specified.

- a. "Chain-of-custody" is a process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
- b. "Pollution and environmental damage" is caused by the presence of chemical, physical, or biological elements or agents. Human health or welfare is adversely affected; ecological balances are unfavorably altered; the utility of the environment for aesthetic, cultural, or historical purposes degrades.

1.3 PRECONSTRUCTION MEETING

After award of Contract and prior to commencement of the work, the Contractor shall schedule and conduct a meeting with the APE to discuss the proposed Environmental Protection Plan and to develop a mutual understanding relative to the details of environmental protection. The requirements for this meeting may be fulfilled during the coordination and mutual understanding meeting as specified in Section 01 45 00.00 10 QUALITY CONTROL.

1.4 SUBMITTALS

ASPA approval is required for submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan

Supply and Installation of Odor Control

Instructor Qualifications

Submit reference data to demonstrate instructors' individual and firm's capabilities and experience.

SD-06 Test Reports

Field Quality Control Reports

SD-07 Certificates

Environmental Regulatory Requirements

For ASPA's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with environmental regulations bearing on performance of the work.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-11 Closeout Submittals

Training Program

Submit two copies of instructional program outline for demonstration and training, including a schedule of dates, times, length of instruction, instructors' names, learning objective, and teaching outline for each training module. At completion of training, submit one complete training manual for ASPA's use, and a list of participants with each participant's results of performance-based test for each training module. For ASPA's records, submit Contractor 40 CFR employee training records (upon request of the APE).

Protection of Natural Resources

1.5 CONTRACTOR'S ENVIRONMENTAL MANAGER

Designate an on-site Environmental Manager responsible for overseeing the environmental goals for the project and implementing procedures for environmental protection.

1.5.1 Duties

The Environmental Manager shall be responsible for the following:

- a. Compliance with applicable federal, state, and local environmental regulations, including maintaining required documentation.
- b. Implementation of the Waste Management Plan.

Supply and Installation of Odor Control

- c. Implementation of the Indoor Air Quality (IAQ) Management Plan.
- d. Implementation of the Environmental Protection Plan.
- e. Environmental training for Contractor personnel in accordance with their position requirements.
- f. Monitoring and documentation of environmental procedures.

1.5.2 Qualifications

Minimum 5 years construction experience on projects of similar size and scope; minimum 2 years experience with environmental procedures similar to those of this project; familiarity with Environmental Management Systems (EMSs); familiarity with environmental regulations applicable to construction operations.

1.6 ENVIRONMENTAL REGULATORY REQUIREMENTS

The Contractor shall be responsible for knowing federal, state, and local regulatory requirements pertaining to legal disposal of all construction and demolition waste materials. Comply with all applicable regulations and maintain records of permits, licenses, certificates, and other environmental regulatory requirement correspondences.

1.7 ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

1.7.1 Material Safety Data Sheets (MSDS)

Submit an MSDS for each product specified in other sections or required by OSHA to have an MSDS. MSDS shall be prepared within the previous five years. Include information for MSDS Sections 1 through 16 in accordance with ANSI Z400.1/Z129.1 and as follows:

- a. Section 11: Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects. Provide written description of the process used in evaluating chemical hazards relative to preparation of the MSDS.
- b. Section 12: Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in the event of an accidental release.
- c. Section 13: Include data regarding the proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not the product is considered to be "hazardous waste" according to 40 CFR 261.
- d. Section 14: Identify hazard class for shipping.
- e. Section 15: Identify federal, state, and local regulations applicable to the material.
- f. Section 16: Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts.

1.8 ENVIRONMENTAL PROTECTION PLAN

Prepare and submit an Environmental Protection Plan not less than 10 days before the preconstruction meeting. At a minimum, address the following elements in accordance with this section:

- a. Identification and contact information for Environmental Manager.
- b. General site information, including preconstruction description and photographs.
- c. Summary of training program.
- d. Procedures to address water resources.
- e. Procedures to address land resources.
- f. Procedures to address air resources.
- g. Procedures to address fish and wildlife resources.
- h. Monitoring and quality control procedures.

Revise and resubmit Plan as required by the APE. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

1.9 ENVIRONMENTAL DEMONSTRATION AND TRAINING

Contractor shall provide environmental training for workers performing work on the project site.

1.9.1 Instructor Qualifications

Training shall be given by a firm or individual experienced in providing training or education similar in content and extent to that indicated for this project.

1.9.2 Coordination

Coordinate instruction schedule with ASPA operations. Adjust schedule as required to minimize disruption of ASPA operations. Coordinate instruction with demonstration and training of general building systems.

1.9.3 Training Program

Develop a training program for all site workers that includes the following topics:

- a. Overview of environmental and sustainability issues related to the building industry.
- b. Overview of environmental and sustainability issues related to the project.

Supply and Installation of Odor Control

- c. Compliance with applicable federal, state, and local environmental regulations.
- d. Review of site specific procedures and management plans implemented during construction, including the Waste Management Plan, Indoor Air Quality (IAQ) Management Plan, Environmental Protection Plan, and procedures for noise and acoustics management.

1.9.3.1 Scheduling

Provide instruction at mutually agreeable time[s].

PART 2 PRODUCTS

2.1 ENVIRONMENTALLY PREFERABLE PRODUCTS

Consider raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and disposal of products, and provide products and materials with the least effect on the environment, determined by LCA analysis, released toxins, and other methods.

2.1.1 Prohibited Materials

The use of the following materials is prohibited:

- a. Products containing asbestos.
- b. Products containing urea formaldehyde.
- c. Products containing polychlorinated biphenyls.
- d. Products containing chlorinated fluorocarbons.
- e. Solder or flux containing more than 0.2 percent lead and domestic water pipe or pipe fittings containing more than 8 percent lead.
- f. Paint containing more than 0.06 percent lead.

2.1.2 Packaging

Where Contractor has the option to provide one of the listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging, and to manufacturers with policies that take back product packaging.

2.1.3 Substitutions

Notify the APE when Contractor is aware of materials, equipment, or products that meet the aesthetic and programmatic intent of Contract Documents, but which are more environmentally responsible than materials, equipment, or products specified or indicated in

Supply and Installation of Odor Control

the Contract Documents. Submit the following for initial review by the APE:

- a. Product data including manufacturer's name, address, and phone number.
- b. Description of environmental advantages of proposed substitution over specified product.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

Comply with applicable regulations and these specifications. Preserve the natural resources within the project boundaries and outside the limits of permanent work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the APE. Where violation of environmental procedures requirements will irreversibly damage the site, documentation of progress at regulate intervals shall be required (as determined by APE).

3.1.1 General Disturbance

Confine demolition and construction activities to work area limits indicated on the Drawings. Remove debris, rubbish, and other waste materials resulting from demolition and construction operations from site. Transport materials with appropriate vehicles and dispose of them off site to areas that are approved for disposal by governing authorities having jurisdiction. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways. Remove spillage and sweep, wash, or otherwise clean project site, streets, or highways. Burning is prohibited.

3.1.2 Water Resources

Comply with requirements of the existing NPDES Permit. Prevent oily or other hazardous substances from entering the ground, drainage areas, or local bodies of water. Store and service construction equipment at areas designated for collection of oil wastes. Prevent ponding of stagnant water conducive to mosquito breeding habitat. Prevent run-off from site during demolition and construction operations.

3.1.3 Land Resources

Prior to construction, identify land resources to be preserved within the work area. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without permission from the APE. Protect items to remain as required.

3.1.3.1 Erodible Soils

Plan and conduct earthwork to minimize the duration of exposure of unprotected soils, except where the constructed feature obscures borrow areas, quarries, and waste material areas. Clear areas in reasonably sized increments only as needed to use the areas developed. Form earthwork to final grade as shown. Immediately protect side slopes and back slopes upon completion of rough grading.

Supply and Installation of Odor Control

3.1.3.2 Erosion and Sedimentation Control Devices

Construct or install temporary and permanent erosion and sedimentation control features as required.

3.1.3.3 Tree and Plant Protection

Protect existing vegetation to remain. Prior to start of construction, tag each tree and plant scheduled to remain. In the event of damage to tree or plant, the ASPA may, at the APE's discretion, deduct the indicated value of the damaged tree or plant from the Contract Sum.

3.1.4 Air Resources

Comply with Indoor Air Quality (IAQ) Management Plan and as follows:

- a. Prevent creation of dust, air pollution, and odors.
- b. Sequence construction to avoid unnecessary disturbance to site.
- c. Use mulch, water sprinkling, temporary enclosures, and other appropriate methods as needed to limit dust and dirt rising and scattering in air. Do not use water when it may create hazardous or other adverse conditions such as flooding and pollution.
- d. Store volatile liquids, including fuels and solvents, in closed containers. Do not store with materials that have a high capacity to adsorb VOC emissions or in occupied spaces.
- e. Properly maintain equipment to reduce gaseous pollutant emissions.

3.1.5 Fish and Wildlife Resources

Manage and control construction activities to minimize interference with and damage to fish and wildlife. Do not disturb fish and wildlife. Do not alter water flows or otherwise significantly disturb the native habitat related to the project and critical to the survival of fish and wildlife, except as indicated or specified.

3.2 FIELD QUALITY CONTROL

Comply with requirements of agencies having jurisdiction and as specified herein. Provide field practices, shipping, and handling of samples in accordance with ASTM D 4840. Provide Field Quality Control Reports in accordance with approved Environmental Protection Plan.

END OF SECTION 01 35 40.00 20

SECTION 01 35 45.00 10

CHEMICAL DATA QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

A. ASTM International (ASTM):

1. ASTM D 3921 (2011) Standard Test Method for Oil and Grease and Petroleum Hydrocarbons in Water
2. ASTM D 4547 (2009) Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds
3. ASTM D 5314 (2006) Standard Guide for Soil Gas Monitoring in the Vadose Zone
4. ASTM D 5765 (2010) Standard Practice for Solvent Extraction of Total Petroleum Hydrocarbons from Soils and Sediments Using Closed Vessel Microwave Heating
5. ASTM D 5831 (2009) Standard Test Method for Screening Fuels in Soils
6. ASTM D 7678 (2011) Standard Test Method for Total Petroleum Hydrocarbons (TPH) in Water and Wastewater with Solvent Extraction using Mid-IR Laser Spectroscopy

B. Scientific Engineering Response and Analysis Services (SERAS):

1. SERAS SOP 2042 (2001) Soil Gas Sampling

C. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA):

1. EPA 540/R 94-008 (1999) USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review
2. EPA SW-846.3-3 (1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

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

1. 40 CFR 261 Identification and Listing of Hazardous Waste

- | | | |
|----|------------|--|
| 2. | 40 CFR 262 | Standards Applicable to Generators of Hazardous Waste |
| 3. | 40 CFR 268 | Land Disposal Restrictions |
| 4. | 49 CFR 172 | Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements |
| 5. | 49 CFR 178 | Specifications for Packagings |

1.2 MEASUREMENT AND PAYMENT

- A. The work consists of excavation, documentation, sampling, and temporary storage of an unknown amount of cubic yards of contaminated material as specified in Section 02 61 13 TOTAL PETROLEUM HYDROCARBON (TPH) CONTINGENCY PLAN. Separate payment will not be made for providing and maintaining the chemical data quality requirements including the chemical data quality management, chemical data validation, minimum chemical data reporting requirements, and chemical data quality submittal requirements; these costs shall be included in the applicable unit prices contained in the bidding schedule.

1.3 CHEMISTRY REQUIREMENTS

- A. Chemical Data Quality Control (CDQC) shall be as defined in EPA SW-846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods". Tables and charts defining Design Analysis (DA), Record of Decision, and remedial technology specific chemistry shall be according to or consistent with EPA SW-846 and SERAS SOP 2042.

B. Data Quality Objectives (DQO)

Sample acquisition, chemical analysis and chemical parameter measurements shall be performed so that the resulting data meet and support data use requirements. The chemical data shall be acquired, documented, verified and reported to ensure that the specified precision, accuracy, representativeness, comparability, completeness and sensitivity requirements are achieved.

C. Sampling, Analysis and Measurement

a. Soil/Sediment and Ground/Surface Water Samples

Soil/sediment and ground/surface water samples shall be collected and analyzed and/or shipped to a primary laboratory for analysis at a minimum of one hundred foot (100') intervals along the sewer line and force main installation trenches along known areas of contamination (in-situ soil sample in bottom of the trench). Excavated soils which are contained nearby shall be sampled at a minimum of every fifty cubic yards (50 CY) of excavated soils along the sewer line and force main installation trenches along known areas of contamination. Potentially contaminated groundwater which is dewatered from

the trench shall be sampled at a minimum of every three thousand (3,000) gallons of contained water along the sewer line and force main installation trenches along known areas of contamination. For additional areas of soil and water hydrocarbon contamination in areas which have not been identified, soil/sediment and ground/surface water samples shall be collected at the same minimum frequencies (or one applicable test of the contaminated area does not exceed the sampling frequencies listed).

The Contractor can use a photoionization detector (PID) with field test kits to confirm the presence or absence of Total Petroleum Hydrocarbons (TPH) as described in EPA SW-846, Methods 3815, 5030, 5035, 8015, 8021, 8260 and any other applicable tests. Record the location of all tests conducted on a site plan in the Closure Report as described in Section 02 61 13 TOTAL PERTOLEUM HYDROCARBON (TPH) CONTINGENCY PLAN.

The Contractor can propose alternate test methods approved by EPA to determine if TPH is present or absent at the potentially contaminated sites and/or use an Analytical Testing Laboratory if preferred.

1.4 SUBMITTALS

ASPA approval is required for submittals. Submittals shall be the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sampling and Analysis Plan (SAP)

The SAP including the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP), no later than 30 days after receipt of notice to proceed.

SD-06 Test Reports

QA Sample Collection and Analysis

The QA Laboratory Advance Notification (QALAN) shall be provided to the QA laboratory at least 10 business days before the initial shipment of samples.

Chemistry Data Package

The chemistry data package shall be provided as an attachment to the CDFR every two weeks of the project (that includes work in contaminated areas).

Chemical Data Final Report (CDFR)

The CDFR, within 30 days of completing work at the site, before final payment. Each report shall be labeled with the contract number, project name and location.

1.5 QUALITY ASSURANCE ELEMENTS

Supply and Installation of Odor Control

A. Follow the QA elements necessary to monitor and ensure the quality of chemical data produced.

B. Laboratory Validation Requirements

Contractor can use testing laboratories that have attained U.S. EPA validation and are consistent with contract required chemical data quality. The Contractor may propose laboratories that shall subsequently be validated by the U.S. EPA, or select currently validated U.S. EPA laboratories. Identify all proposed project laboratories no later than the coordination meeting. If a proposed analytical laboratory cannot meet specified analytical requirements or achieve the required validation, select another laboratory.

C. QA Sample Collection and Analysis

Collect and transport QA samples to the QA laboratory. Samples for all analyses (except volatiles) shall be taken as splits of homogenized samples. Samples for volatiles shall be collected as discrete duplicates/triplicates. Samples shall be collected at a rate of 20 percent per matrix per analysis per sampling event.

- i. Submit the QA Laboratory Advance Notification (QALAN) to the QA laboratory. The QALAN shall include a list of laboratory-related DQO. The DQO shall include, but shall not be limited to, identification of extraction and analysis method numbers, a list of analytes with required limits, estimated number of tests, approximate sampling dates, and requested completion date for QA testing. Notify the APE and the QA laboratory immediately of any changes.
- ii. Provide all labor and field supplies, including sample containers and shipping coolers, for collecting and shipping samples for QA testing. In the presence of the APE or their designated representative, properly collect, label, and package the QA samples, fill out all chain-of-custody forms, and ship the samples by one-day delivery service to the designated QA laboratory for analysis. Notify the laboratory when all sampling is completed and shall clearly mark the chain-of-custody form accompanying the final shipment "FINAL" in 1 inch high lettering.
- iii. Allow 60 calendar days for laboratory analysis of QA samples, data review, and submission of the chemical quality assurance report. The elapsed time shall begin when the Contractor's last sample arrives at the QA laboratory, provided that the Contractor's completed chemistry data package is received within 30 calendar days thereafter. Otherwise, allow 30 calendar days from the date the completed chemistry data package is received at the laboratory. The Contractor may, as an option, continue activities based on initial sampling and QC results, before receipt of QA test results. Where QA results are unacceptable due to Contractor negligence (e.g. improper sample collection and/or handling by the Contractor), or where QA sample results conflict with the Contractor's primary sample results, further sampling and testing shall be performed as directed by the APE. All costs for such additional sampling and testing

due to Contractor negligence, including both QC and QA testing and analysis, and for any required remedial actions in the work, shall be borne by the Contractor. ASPA acceptance of final disposition of any excavated soil shall not occur until the Contractor's sampling and QC results have been confirmed by QA results. This includes all final stockpiling, wasting, backfilling, and related construction. No payment will be made for laboratory sampling and testing before receipt and acceptance by ASPA of the QA samples and the completed Chemical Data Final Report (CDFR), properly formulated according to these specifications.

D. Review of Primary Laboratory Data

Secure independent data review of the entire primary data set.

E. Validation of Data

Validate 20 percent of the data in accordance with EPA 540/R 94-008.

The data validation strategy shall be established at the beginning of the project to be consistent with project DQO.

1.6 QUALIFICATIONS

A. Chemical Quality Control Officer

As a minimum, the Contractor's Chemical Quality Control Officer shall have: a bachelor's degree in Chemistry; 15 years of experience related to investigations, studies, design and remedial actions; and 10 field seasons (or one continuous calendar year experience) in calibration and operation of various field monitoring devices as well as standard analytical chemistry methods common for analyzing soil, water, air and other materials for chemical contamination assessment, including hazardous waste manifesting. The Chemical Quality Control Officer shall ensure that all chemistry related objectives including responsibilities for DQO definitions, sampling and analysis, project requirements for data documentation and validation, and final project reports are attained. The Chemical Quality Control officer need not be present onsite during routine sampling, but shall be available for consultation with ASPA and Contractor personnel.

B. Project Chemist/Environmental Sampler

As a minimum, the Contractor's Senior Chemist and Environmental Sampler shall have: a bachelor's degree in Chemistry; 10 years of experience related to investigations, studies, design and remedial actions; 5 years of experience in the development and preparation of SAP and work plans; 5 years of experience in and knowledge of EPA methods for collecting environmental and hazardous waste samples; 5 years of experience in operation of field screening equipment (e.g. PID, FID, infrared spectrometer, immunoassay, etc.); 2 field seasons of experience with the particular field screening techniques for use on this project; and 2 years of experience in the operation of an HTRW commercial laboratory with standard analytical chemistry methods common for analyzing soil, water, air and other

materials for chemical contamination assessment, including data for hazardous waste manifesting. The project chemist and environmental sampler shall ensure that all chemistry related goals of the program are attained and review the sampling results, and provide recommendations for the Contractor's sampling program. The project chemist and environmental sampler shall be onsite during all sampling events and shall also be available for consultation with ASPA personnel.

1.7 COORDINATION MEETING

- A. After the preconstruction conference, before any sampling or testing, the Contractor and the APE will meet to discuss the CQC Plan and the SAP. The coordination meeting will be simultaneous to any CQC coordination meeting required in Section 01 45 00.00 10 QUALITY CONTROL unless otherwise indicated or directed. A list of definable features that involve chemical measurements shall be agreed upon. At a minimum, each matrix (soil, water, air, containerized wastes, radioactive wastes, instrumental chemical parameter measurement, etc.) shall be a definable work feature. Management of the chemical data quality system including project DQO, project submittals, chemical data documentation, chemical data assessment, required sampling and analysis protocols, and minimum data reporting requirements shall be agreed upon. The meeting will serve to establish an interrelationship between the Contractor's chemical data quality management and ASPA's chemical quality assurance requirements. Minutes of the meeting will be documented by ASPA and shall be signed by both the Contractor and the APE. The minutes will include any or all unresolved chemical issues along with the conditions for resolution and will become a part of the contract file.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Provide chemical sample acquisition, sample analysis, instrumental measurements of chemical parameters for chemical data quality control. An effective chemical data quality control system shall be established that meets the requirements for the chemical measurement DQO applicable to the project. The system shall cover chemical measurements pertaining to and required for Contractor and subcontractor produced chemical data. Control field screening, sampling, and testing in conjunction with remedial activities to meet all DQO; minimize the amount of excavated material requiring temporary storage; prevent dilution of contaminated soils with clean soils; and ensure completion of work within the required time.

3.2 QUALITY CONTROL PLAN

- A. In addition to the quality control requirements specified in Section 01 45 00.00 10 QUALITY CONTROL, the CQC Plan shall incorporate the qualifications, authority and responsibilities of all chemical quality management and support personnel.

Chemical measurements including sampling and/or chemical parameter measurement will not be permitted to begin until after production and acceptance of the CQC Plan, and ASPA approval of the SAP.

B. Chemistry Elements of the CQC Plan

To cover contract related chemical measurements by the Contractor and all subcontractors, the CQC Plan shall include the following as a minimum.

i. Qualifications

Names, education, experience qualifications, authorities, and decision-making responsibilities of all chemical quality management and support personnel. The CQC Plan shall contain a copy of a letter from the project QC manager designating and authorizing a Chemical Quality Control Officer and chemical quality control organization staff.

ii. Authority and Responsibility

A diagram, flow chart, or figure clearly depicting the chemical data quality management and support staff and the authority and responsibility of each for chemical sampling and analysis, procedures for corrective actions, deliverables and submittals, deviations and changes, chemical quality documentation, data validation, minimum data reporting requirements, and DQO for chemical parameter measurement by the Contractor and subcontractors. The contents of this section of the CQC Plan shall be included in the applicable "Project Organization" elements of the FSP and the QAPP.

3.3 SAMPLING AND ANALYSIS PLAN

- A. The SAP shall be prepared in accordance with CDQC requirements. The SAP shall be a single document that contains two distinct elements: FSP and QAPP. The SAP shall confirm the Contractor's understanding of the contract requirements for chemical data quality control, and shall describe procedures for field sampling and sample submittal for analysis, field chemical parameter measurement, data documentation, data assessment and data reporting requirements. The SAP shall delineate the methods the Contractor intends to use to accomplish the chemical quality control items to assure accurate, precise, representative, complete, legally defensible and comparable data. The SAP shall describe all chemical parameter measurements for all matrices for all phases of the remediation contract. As a single interrelated document, the SAP shall be provided to field and laboratory personnel. The Contractor may propose original/innovative approaches to chemical parameter measurements for cost reduction and remediation efficiency by abbreviated sampling, contingency sampling and/or contingency analysis, indicator or tracer analysis, onsite analytical services, equivalency or screening methods. The SAP shall clearly identify the Contractor obtained laboratories. Furnish copies of the ASPA approved SAP to all laboratories and the Contractor's field sampling crew. The SAP shall address all levels of the investigation with enough detail to become a document which may be used as an audit guide for field and laboratory work.

B. Field Sampling Plan (FSP)

The FSP shall contain necessary technical detail and direction for the field personnel to understand sampling and field measurement requirements. The FSP shall provide a comprehensive description and full detail for personnel to perform all onsite activities required to attain project DQO, including: locations of samples, sampling procedures for onsite and offsite chemical analysis, summaries of analyses to be performed on samples, shipment of samples for offsite analyses, performance of onsite and offsite instrumental parameter measurements, data documentation and reporting requirements.

C. Quality Assurance Project Plan (QAPP)

The QAPP shall contain necessary technical detail and direction for field and laboratory personnel to understand project sample analysis, quality control and data reporting requirements, analytical methods, required detection limits, QC requirements, and data validation and reporting requirements.

3.4 CHEMISTRY DATA PACKAGE

A. The chemistry data package shall be produced and provided as an attachment to the CDFR. The chemistry data package shall contain information to demonstrate that the project's DQO have been fulfilled. The QA function will compare QA sample results to corresponding primary sample results, will assess the Contractor's compliance with the SAP, and will recommend corrective action as necessary.

3.5 CONTROL OF CHEMICAL DATA QUALITY

a. Contractor chemical data quality control shall ensure that a quality control program is in place that assures sampling and analytical activities and the resulting chemical parameter measurement data comply with the DQO and the requirements of the SAP. Utilize the three-phase control system that includes a preparatory, initial and follow-up phase for each definable feature of work. The Contractor's three-phase chemical data control process shall ensure that data reporting requirements are achieved and shall be implemented according to Section 01 45 00.00 10 QUALITY CONTROL. The three-phase chemical data control process shall be combined with that under Section 01 45 00.00 10 QUALITY CONTROL.

3.6 ANALYTICAL TESTING LABORATORIES

A. If used, propose the analytical laboratories to be used for the primary samples analyses. Laboratory validation requirements shall be in accordance with paragraph Laboratory Validation Requirements. The Contractor may utilize its own laboratory or utilize subcontract laboratories to achieve the primary required sample analyses.

B. Laboratory Analytical Requirements

Provide the specified chemical analyses by the Contractor's laboratory. Provide chemical analyses to achieve the project DQO for all parameters specified by the

methods. EPA SW-846.3-3 methods are generally the methods employed for the analytical testing of environmental samples. These methods are flexible and shall be adapted to individual project-specific requirements.

C. Laboratory Performance

Provide continued acceptable analytical performance and shall establish a procedure to address data deficiencies noted by review and/or quality assurance sample results. Provide and implement a mechanism for providing analytical labs with the SAP or QAPP portion of the SAP, for monitoring the lab's performance and for performing corrective action procedures. Acquire analytical services with additional U.S. EPA validated laboratories in the event a project lab loses its validation status during the project.

3.7 CHEMICAL DATA FINAL REPORT (CDFR)

A. The CDFR shall be produced including a summary of quality control practices employed and all chemical parameter measurement activities after project completion. As a minimum, the CDFR shall contain the following:

- i. Summary of project scope and description.
- ii. Summary of any deviations from the design chemical parameter measurement specifications.
- iii. Summary of chemical parameter measurements performed as contingent measurements.
- iv. Summary discussion of resulting data including achieving data reporting requirements.
- v. Summary of achieving project specific DQO.
- vi. Presentation and evaluation of the data to include an overall assessment on the quality of the data for each method and matrix.
- vii. Internal QC data generated during the project, including tabular summaries correlating sample identifiers with all blank, matrix spikes, surrogates, duplicates, laboratory control samples, and batch identifiers.
- viii. A list of the affected sample results for each analyte (indexed by method and matrix) including the appropriate data qualifier flag (J, B, R, etc.), where sample results are negatively impacted by adverse quality control criteria.
- ix. Summary of field and laboratory oversight activities, providing a discussion of the reliability of the data, QC problems encountered, and a summary of the evaluation of data quality for each analysis and matrix as indicated by the laboratory QC data and any other relevant findings.
- x. Conclusions and recommendations.

- xi. Appendices containing: (1) Chemistry data package, and (2) Results of the Chemical Quality Assurance Report (CQAR). The CQAR is an ASPA produced document achieved through the inspection and analysis of QA samples and corresponding project sample data. The CQAR will include review of all QC parameters such as holding times, detection limits, method blanks, surrogate recoveries, matrix spikes and duplicates, and inter-laboratory and intra-laboratory data comparisons.

3.8 DOCUMENTATION

- A. Documentation records shall be provided as factual evidence that required chemical data has been produced and chemical data quality has been achieved. The documentation shall comply with the requirements specified in paragraphs SAMPLING AND ANALYSIS PLAN, CHEMISTRY DATA PACKAGE, and CHEMICAL DATA FINAL REPORT.

3.9 NOTIFICATION OF NON-COMPLIANCE

- A. The APE will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice.

END OF SECTION 01 35 45.00 10

SECTION 01 45 00.00 10

QUALITY CONTROL

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM D 3740 (2010) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
2. ASTM E 329 (2009) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

B. U.S. ENVIRONMENTAL PROTECTION AGENCY (USEPA)

1. EPA QA/R-2 EPA Requirements for Quality Management Plans

1.2 PAYMENTS

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all associated costs will be included in the applicable Bid Schedule unit or lump-sum prices.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. Cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the

Supply and Installation of Odor Control

quality of work and is subject to removal by the APE for non-compliance with the quality requirements specified in the contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent must maintain a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the APE.

3.2 QUALITY CONTROL PLAN

Submit no later than 45 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clauses to ensure quality construction. The ASPA will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents, and subcontractors:

- a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager who reports to the project superintendent.
- b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Copies of these letters must be furnished to the ASPA.
- d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.
- e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the APE must be used.)
- f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

- g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- h. Reporting procedures, including proposed reporting formats.
- i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. ASPA reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, notify the APE in writing of any proposed change. Proposed changes are subject to acceptance by the APE.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, Post award Conference, before start of construction, and prior to acceptance by the ASPA of the CQC Plan, meet with the APE and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 45 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the ASPA's Quality Assurance. Minutes of the meeting will be prepared by the ASPA, signed by both the Contractor and the APE and will become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and contract compliance. The Safety and Health Manager must receive direction and authority from the CQC System Manager and serve as a member of the CQC staff. Personnel identified in the technical

provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure contract compliance. The CQC staff will be subject to acceptance by the APE. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization shall be responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the APE.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must have a minimum of 10 years construction experience on construction similar to this contract. This CQC System Manager must be on the site at all times during construction and be employed by the prime Contractor. The CQC System Manager must be assigned as System Manager but may have duties as project superintendent in addition to quality control. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

In addition to CQC personnel specified elsewhere in the contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical and environmental. These individuals may be employees of the prime or subcontractor; be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; have the necessary education and/or experience in accordance with the experience matrix listed herein. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

3.4.4 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the APE for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 23 08 00.00 10 COMMISSIONING OF HVAC SYSTEMS are included in the contract, the submittals required by those sections must be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

Supply and Installation of Odor Control

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control must be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

- a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by ASPA personnel until final acceptance of the work.
- b. Review of the contract drawings.
- c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.
- d. Review of provisions that have been made to provide required control inspection and testing.
- e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- f. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
- g. Review of the appropriate activity hazard analysis to assure safety requirements are met.
- h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the APE.
- j. Discussion of the initial control phase.
- k. ASPA must be notified at least 24 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC

report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

- a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.
- b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.
- c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.
- d. Resolve all differences.
- e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.
- f. The ASPA must be notified at least 24 hours in advance of beginning the initial phase. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for future reference and comparison with follow-up phases.
- g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a

product which conforms to contract requirements. Upon request, furnish to the ASPA duplicate samples of test specimens for possible testing by the ASPA. Testing includes operation and/or acceptance tests when specified. Procure the services of an ASPA approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

- a. Verify that testing procedures comply with contract requirements.
- b. Verify that facilities and testing equipment are available and comply with testing standards.
- c. Check test instrument calibration data against certified standards.
- d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.
- e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the APE, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the APE. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

ASPA reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel must meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of \$2,000 to reimburse ASPA for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 Onsite Laboratory

The ASPA reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the ASPA.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC Manager near the end of the work, or any increment of the work established by a time stated in the SPECIAL CONTRACT REQUIREMENTS Clause, "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the ASPA that the facility is ready for the ASPA Pre-Final inspection.

3.8.2 Pre-Final Inspection

ASPA will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. An ASPA Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the ASPA, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and ASPA's Representative must be in attendance at the final acceptance inspection. Additional ASPA personnel including, but not limited to, those from wastewater operations department, and other administration may also be in attendance. The final acceptance inspection will be formally scheduled by the APE based upon results of the Pre-Final inspection. Notify the APE at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the APE to bill the Contractor for the ASPA's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

- a. Contractor/subcontractor and their area of responsibility.
- b. Operating plant/equipment with hours worked, idle, or down for repair.
- c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

- d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.
- e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.
- f. Submittals and deliverables reviewed, with contract reference, by whom, and action taken.
- g. Offsite surveillance activities, including actions taken.
- h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
- i. Instructions given/received and conflicts in plans and/or specifications.
- j. Provide documentation of design quality control activities. For independent design reviews, provide, as a minimum, identification of the Independent Technical Review (ITR) team, the ITR review comments, responses and the record of resolution of the comments.
- k. Contractor's verification statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. Furnish the original and one copy of these records in report form to the ASPA daily within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 NOTIFICATION OF NONCOMPLIANCE

The APE will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the APE may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION 01 45 00.00 10

SECTION 01 50 00

TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SUMMARY

Requirements of this Section apply to, and are a component of, each section of the specifications.

1.2 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.

A. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C511 (2007) Standard for Reduced-Pressure Principle Backflow Prevention Assembly

B. FOUNDATION FOR CROSS-CONNECTION CONTROL AND HYDRAULIC RESEARCH (FCCCHR)

1. FCCCHR List (continuously updated) List of Approved Backflow Prevention Assemblies
2. FCCCHR Manual (1988e9) Manual of Cross-Connection Control

C. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. NFPA 241 (2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations
2. NFPA 70 (2011) National Electrical Code

D. U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

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

E. U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

1. MUTCD (2009) Manual of Uniform Traffic Control Devices

1.3 SUBMITTALS

ASPA approval is required for submittals. Submittals shall be the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction site plan

Traffic control plan

SD-03 Product Data

1.4 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 is desired. Show locations of safety and construction fences, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas.

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, a copy of the wage decision contained in the contract, Wage Rate Information poster, and other information approved by the APE. Locate the bulletin board at the project site in a conspicuous place easily accessible to all employees, as approved by the APE.

2.1.2 Project and Safety Signs

Post a project sign if directed by the APE. 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 Barricades

Erect and maintain temporary barricades to limit public access to hazardous areas in accordance with MUTCD requirements. Whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic barricades will be

Supply and Installation of Odor Control

required. Securely place barricades clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

2.2.2 Fencing

- a. Provide fencing along the construction site at all open excavations and tunnels to control access by unauthorized people. Fencing must be installed to be able to restrain a force of at least 250 pounds against it.
- b. In addition, prior to the start of work, 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. The safety fence shall match the base standard color (or bright orange where it protects excavated areas), shall be made of high density polyethylene grid or approved equal a minimum of 42 inches high, supported and tightly secured to steel posts located on minimum 10 foot centers. Remove the fence from the work site upon completion of the contract.

2.2.4 Temporary Wiring

Provide temporary wiring in accordance with NFPA 241 and NFPA 70, Article 305-6(b), Assured Equipment Grounding Conductor Program. Include frequent inspection of all equipment and apparatus.

2.2.5 Backflow Preventers

Reduced pressure principle type conforming to the applicable requirements AWWA C511. Provide backflow preventers complete with 150 pound flanged cast iron, mounted gate valve and strainer, stainless steel or bronze, internal parts. The particular make, model/design, and size of backflow preventers to be installed must be included in the latest edition of the List of Approved Backflow Prevention Assemblies issued by the FCCCHR List and be accompanied by a Certificate of Full Approval from FCCCHR List. After installation conduct Backflow Preventer Tests and provide test reports verifying that the installation meets the FCCCHR Manual Standards.

2.3 CONSTRUCTION SURVEY AND STAKING

2.3.1 Contractor Survey and Staking

Contractor shall confirm the conditions shown in the survey information in the construction plans. The survey benchmarks and elevation datum used is shown on the plans. If site conditions differ than that shown in the plans, alert the APE of the condition for review. If site conditions prevent construction in the alignment or location as shown in the plans due to conflict of existing utilities, facilities or other items, contractor shall propose a site-specific revision for the APE's review and approval. Alternately, the contractor can request the APE to advise them on the appropriate course of action in case of conflicts.

Contractor shall be responsible for additional site survey work, utility toning, and flagging as required to construct the facilities and improvements shown in the construction plans. Contractor shall be responsible to confirm the locations of all above ground and below

ground utilities by survey, toning or exploration methods and shall be responsible for any damage to existing facilities and repair as needed. The locations of underground utilities and features have been shown on the construction plans based on the research and record plans available to the engineer to the best of their knowledge, but may not represent the actual locations of the installed facilities.

A final construction survey will be required for the preparation of the as-built plans as required in Section 01 78 23 Closeout Submittals. This as-built survey shall be conducted by a component surveyor provided by the contractor to record the as-built location of all facilities and improvements installed. The contractor shall record this information onto the construction plans to show any deviation from the plans provided to the contractor. The contractor as-built survey and information turned over to ASPA shall be accurate to within 0.1'. The as-built survey information must be recorded during construction for any underground improvements to ensure that the accurate locations of these facilities are recorded before being buried. All items which are shown on the construction plans and built by the contractor shall be included in the as-built survey.

PART 3 EXECUTION

3.1 EMPLOYEE PARKING

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

3.2 AVAILABILITY AND USE OF UTILITY SERVICES

3.2.1 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.

3.2.2 Payment for Utility Services

- a. ASPA will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed will be charged to or paid for by the Contractor at reasonable rates determined by the APE. Carefully conserve any utilities furnished without charge.
- b. Reasonable amounts of the following utilities will be made available to the Contractor without charge.
- c. The point at which the ASPA will deliver such utilities (water and electrical) or services and the quantity shall be coordinated with the APE. Pay all costs incurred in connecting, converting, and transferring the utilities to the work. Make connections, including providing backflow-preventing devices on connections to domestic water lines.

3.2.3 Meters and Temporary Connections

At the Contractor's expense and in a manner satisfactory to the APE, provide and maintain necessary temporary connections, distribution lines, and meter bases (ASPA will provide meters) required to measure the amount of each utility used for the purpose of determining charges. Notify the APE, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The ASPA will provide a meter and make the final hot connection after inspection and approval of the Contractor's temporary wiring installation. The Contractor will not make the final electrical connection.

3.2.4 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of \$50.00 will be required. The last monthly bills for the fiscal year will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current fiscal year.

3.2.5 Final Meter Reading

Before completion of the work and final acceptance of the work by the ASPA, notify the APE, in writing, 5 working days before termination is desired. The ASPA will take a final meter reading, disconnect service, and remove the meters. Then remove all the temporary distribution lines, meter bases, and associated paraphernalia. Pay all outstanding utility bills before final acceptance of the work by the ASPA.

3.2.6 Water

Make connections to existing facilities to provide water for construction purposes. Water used will be furnished by the ASPA.

3.2.7 Sanitation

- a. Provide and maintain within the construction area minimum field-type sanitary facilities approved by the APE and periodically empty wastes into the municipal sanitary sewage system, or remove waste to a commercial facility. Obtain approval from the system owner prior to discharge into any municipal, district, or commercial sanitary sewer system. Any penalties and / or fines associated with improper discharge will be the responsibility of the Contractor. Coordinate with the APE and follow station regulations and procedures when discharging into the station sanitary sewer system. Maintain these conveniences at all times without nuisance. Include provisions for pest control and elimination of odors. ASPA toilet facilities may not be available to Contractor's personnel.
- b. Provide temporary sewer and sanitation facilities that are self-contained units with both urinals and stool capabilities. Ventilate the units to control odors and fumes and empty and clean them at least once a week or more often if required by the APE. The doors shall be self-closing. The exterior of the unit shall match the base standard color. Locate the facility behind the construction fence or out of the public

view.

3.2.8 Telephone

Make arrangements and pay all costs for telephone facilities desired.

3.2.9 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 APE.

3.2.10 Fire Protection

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

3.3 TRAFFIC PROVISIONS

3.3.1 Maintenance of Traffic

- A. Conduct operations in a manner that will not close any thoroughfare or interfere in any way with traffic on highways except with written permission of the APE at least 15 calendar days prior to the proposed modification date, and provide a Traffic Control Plan detailing the proposed controls to traffic movement for approval. The plan must be in accordance with State and local regulations and the MUTCD, Part VI. 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 APE prior to starting any activity that will obstruct traffic.
- C. Provide, erect, and maintain, at contractors expense, lights, barriers, signals, passageways, detours, and other items, that may be required by the Life Safety Signage, overhead protection authority having jurisdiction.

3.3.2 Protection of Traffic

Maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the APE. 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

Supply and Installation of Odor Control

construction operations.

3.3.3 Rush Hour Restrictions

Do not interfere with the peak traffic flows preceding and during normal operations for Route 001 without notification to and approval by the APE.

3.3.4 Dust Control

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

3.4 CONTRACTOR'S TEMPORARY FACILITIES

3.4.1 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 APE. 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 APE.

3.4.2 Administrative Field Offices

Provide and maintain administrative field office facilities within the construction area at the designated site. ASPA office and warehouse facilities may not be available to the Contractor's personnel.

3.4.3 Storage Area

Construct a temporary 6 foot high chain link fence around trailers and materials. Include plastic strip inserts, 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 APE 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.

3.4.4 Supplemental Storage Area

Upon Contractor's request, the APE will designate another or supplemental area for the Contractor's use and storage of trailers, equipment, and materials. This area may not be in close proximity of the construction site but will be within the installation boundaries. Fencing of materials or equipment will not be required at this site; however, the Contractor is

Supply and Installation of Odor Control

responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area. Utilities will not be provided to this area by the ASPA.

3.4.5 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 APE, require exterior painting or maintenance will not be allowed on installation property.
- b. Paint using suitable paint and maintain the temporary facilities. Failure to do so will be sufficient reason to require their removal.

3.4.6 New Building

In the event a new building is constructed for the temporary project field office, it will be a minimum 12 feet in width, 16 feet in length and have a minimum of 7 feet headroom. Equip the building with approved electrical wiring, at least one double convenience outlet and the required switches and fuses to provide 110-120 volt power. Provide a work table with stool, desk with chair, two additional chairs, and one legal size file cabinet that can be locked. The building must be waterproof, supplied with a heater, have a minimum of two doors, electric lights, a telephone, a battery operated smoke detector alarm, a sufficient number of adjustable windows for adequate light and ventilation, and a supply of approved drinking water. Approved sanitary facilities must be furnished. Screen the windows and doors and provide the doors with dead bolt type locking devices or a padlock and heavy duty hasp bolted to the door. Door hinge pins will be non-removable. Arrange the windows to open and to be securely fastened from the inside. Protect glass panels in windows by bars or heavy mesh screens to prevent easy access. In warm weather, furnish air conditioning capable of maintaining the office at 50 percent relative humidity and a room temperature 20 degrees F below the outside temperature when the outside temperature is 95 degrees F. Any new building erected for a temporary field office must be maintained by the Contractor during the life of the contract and upon completion and acceptance of the work become the property of the Contractor and removed from the site. All charges for telephone service for the temporary field office will be borne by the Contractor, including long distance charges up to a maximum of \$75.00 per month.

3.4.7 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.

3.4.8 Storage Size and Location

The site available for storage must be proposed and shown in the contractor's work plan.

3.4.9 Storage in Existing Buildings

Supply and Installation of Odor Control

The Contractor will be working around existing buildings and/or structures; the storage of material will be allowed in a nearby area, as approved by the APE. Provide 8 foot high security fence with a lockable gate around the storage area. Remove at the completion of work.

3.4.10 Weather Protection of Temporary Facilities and Stored Materials

Take necessary precautions to ensure that roof openings and other critical openings in the building are monitored carefully. Take immediate actions required to seal off such openings when rain or other detrimental weather is imminent, and at the end of each workday. Ensure that the openings are completely sealed off to protect materials and equipment in the building from damage.

3.4.10.1 Building and Site Storm Protection

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

3.4.10.2 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 APE for weather and 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 APE for weather and Condition of Readiness (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 ASPA premises.

3.5 ASPA FIELD OFFICE

3.5.1 Quality Control Manager Records and Field Office

Provide on the jobsite an office with approximately 100 square feet of useful floor area for the exclusive use of the QC Manager. Provide a weather tight structure with adequate [heating and cooling, toilet facilities, lighting, ventilation, a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications facilities. Provide a window-mounted air conditioner rated at 9,000 Btus minimum or a window-mounted heat pump of the same minimum cooling ratings. Provide a door with a cylinder lock and windows with locking hardware. Make utility connections. File quality control records in the office and make available at all times to the ASPA. After completion of the work, remove the entire structure from the site.

3.5.2 Trailer-Type Mobile Office

The Contractor may, at its option, furnish and maintain a trailer-type mobile office acceptable to the APE 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.

3.6 PLANT COMMUNICATION

Whenever the Contractor has the individual elements of its plant so located that operation by normal voice between these elements is not satisfactory, the Contractor must install a satisfactory means of communication, such as telephone or other suitable devices and made available for use by ASPA personnel.

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. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 42 inches high, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location. 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 within the fenced area described above or at the supplemental storage area any materials resulting from demolition activities which are salvageable.

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 to the original or better condition, areas used by the Contractor for the storage of equipment or material, or other use. Gravel used to traverse grassed areas must be removed and the area restored to its original condition, including top soil and seeding as necessary.

END OF SECTION 01 50 00

SECTION 01 57 19.00 20

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.

A. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1. EPA 530/F-93/004 (1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)
2. EPA 833-R-060-04 (2000) Developing Your Storm Water Pollution Prevention Plan, a Guide for Construction Sites
3. EPA 823-B-94-005a (1994; 2nd Edition) Water Quality Standards Handbook

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

1. 29 CFR 1910 Occupational Safety and Health Standards
2. 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
3. 40 CFR 112 Oil Pollution Prevention
4. 40 CFR 122.26 Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
5. 40 CFR 241 Guidelines for Disposal of Solid Waste
6. 40 CFR 243 Guidelines for the Storage and Collection of Residential, Commercial, and Institutional Solid Waste
7. 40 CFR 258 Subtitle D Landfill Requirements
8. 40 CFR 260 Hazardous Waste Management System: General

9. 40 CFR 261	Identification and Listing of Hazardous Waste
10. 40 CFR 262	Standards Applicable to Generators of Hazardous Waste
11. 40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
12. 40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
13. 40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
14. 40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
15. 40 CFR 268	Land Disposal Restrictions
16. 40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
17. 40 CFR 271	Requirements for Authorization of State Hazardous Waste Programs
18. 40 CFR 272	Approved State Hazardous Waste Management Programs
19. 40 CFR 273	Standards For Universal Waste Management
20. 40 CFR 279	Standards for the Management of Used Oil
21. 40 CFR 280	Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks (UST)
22. 40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
23. 40 CFR 355	Emergency Planning and Notification

24. 40 CFR 372-SUBPART D	Specific Toxic Chemical Listings
25. 40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
26. 40 CFR 82	Protection of Stratospheric Ozone
27. 49 CFR 171	General Information, Regulations, and Definitions
28. 49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
29. 49 CFR 173	Shippers - General Requirements for Shipments and Packagings
30. 49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Sediment

Soil and other debris that have eroded and have been transported by runoff water or wind.

1.2.2 Solid Waste

Garbage, refuse, debris, sludge, or other discharged material, including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations. Types of solid waste typically generated at construction sites may include:

- a. Green waste: 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.
- b. Surplus soil: 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. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included.
- c. Debris: Non-hazardous solid material generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch particle size that is: a manufactured

object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders), broken or removed concrete, masonry, and rock asphalt paving; ceramics; roofing paper and shingles. 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.

- d. Wood: Dimension and non-dimension lumber, plywood, chipboard, hardboard. Treated and/or painted wood that meets the definition of lead contaminated or lead based contaminated paint is not included.
- e. Scrap metal: 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.
- f. Paint cans: Metal cans that are empty of paints, solvents, thinners and adhesives. If permitted by the paint can label, a thin dry film may remain in the can.
- g. Recyclables: Materials, equipment and assemblies such as doors, windows, door and window frames, plumbing fixtures, glazing and mirrors that are recovered and sold as recyclable. Metal meeting the definition of lead contaminated or lead based paint contaminated may be included as recyclable if sold to a scrap metal company. Paint cans may be included as recyclable if sold to a scrap metal company.
- h. Hazardous Waste: By definition, to be a hazardous waste a material must first meet the definition of a solid waste. Hazardous waste and hazardous debris are special cases of solid waste. They have additional regulatory controls and must be handled separately. They are thus defined separately in this document.

Material not regulated as solid waste are: 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.

1.2.3 Hazardous Debris

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

1.2.4 Chemical Wastes

This includes salts, acids, alkalizes, herbicides, pesticides, and organic chemicals.

1.2.5 Garbage

Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

1.2.6 Hazardous Waste

Any discarded material, liquid, solid, or gas, which meets the definition of hazardous material or is designated hazardous waste by the environmental Protection Agency or State Hazardous Control Authority as defined in 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, 40 CFR 268, 40 CFR 270, 40 CFR 271, 40 CFR 272, 40 CFR 273, 40 CFR 279, and 40 CFR 280.

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:

- a. Is regulated as a hazardous material per 49 CFR 173, or
- b. Requires a Material Safety Data Sheet (MSDS) per 29 CFR 1910.120, or
- c. During end use, treatment, handling, packaging, storage, transpiration, 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 instructions or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this instruction for "control" purposes. Such material include 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). Nonetheless, the exposure may occur incident to manufacture, storage, use and demilitarization of these items.

1.2.8 Waste Hazardous Material (WHM)

Any waste material which because of its quantity, concentration, or physical, chemical, or infectious characteristics may pose a substantial hazard to human health or the environment and which has been so designated. Used oil not containing any hazardous waste, as defined above, falls under this definition.

1.2.9 Oily Waste

Those materials which are, or were, mixed with used oil and have become separated from that used oil. 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, used oil 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:

- a. It is not prohibited in other State regulations or local ordinances
- b. The amount generated is "de minimus" (a small amount)

- c. It is the result of minor leaks or spills resulting from normal process operations
- d. All free-flowing oil has been removed to the practical 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, a hazardous waste determination must be performed 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.

1.2.10 Regulated Waste

Those solid waste that have specific additional Federal, state, or local controls for handling, storage, or disposal.

1.2.11 Class I Ozone Depleting Substance (ODS)

Class I ODS is defined in Section 602(a) of The Clean Air Act and includes the following chemicals:

- chlorofluorocarbon-11 (CFC-11)
- chlorofluorocarbon-12 (CFC-12)
- chlorofluorocarbon-13 (CFC-13)
- chlorofluorocarbon-111 (CFC-111)
- chlorofluorocarbon-112 (CFC-112)
- chlorofluorocarbon-113 (CFC-113)
- chlorofluorocarbon-114 (CFC-114)
- chlorofluorocarbon-115 (CFC-115)
- chlorofluorocarbon-211 (CFC-211)
- chlorofluorocarbon-212 (CFC-212)
- chlorofluorocarbon-213 (CFC-213)
- chlorofluorocarbon-214 (CFC-214)
- chlorofluorocarbon-215 (CFC-215)
- chlorofluorocarbon-216 (CFC-216)
- chlorofluorocarbon-217 (CFC-217)
- chlorofluorocarbon-500 (CFC-500)
- chlorofluorocarbon-502 (CFC-502)
- chlorofluorocarbon-503 (CFC-503)
- halon-1211
- halon-1301
- halon-2402
- carbon tetrachloride
- methyl bromide
- methyl chloroform

Class II ODS is defined in Section 602(s) of The Clean Air Act and includes the following chemicals:

- hydrochlorofluorocarbon-21 (HCFC-21)
- hydrochlorofluorocarbon-22 (HCFC-22)

hydrochlorofluorocarbon-31 (HCFC-31)
hydrochlorofluorocarbon-121 (HCFC-121)
hydrochlorofluorocarbon-122 (HCFC-122)
hydrochlorofluorocarbon-123 (HCFC-123)
hydrochlorofluorocarbon-124 (HCFC-124)
hydrochlorofluorocarbon-131 (HCFC-131)
hydrochlorofluorocarbon-132 (HCFC-132)
hydrochlorofluorocarbon-133 (HCFC-133)
hydrochlorofluorocarbon-141 (HCFC-141)
hydrochlorofluorocarbon-142 (HCFC-142)
hydrochlorofluorocarbon-221 (HCFC-221)
hydrochlorofluorocarbon-222 (HCFC-222)
hydrochlorofluorocarbon-223 (HCFC-223)
hydrochlorofluorocarbon-224 (HCFC-224)
hydrochlorofluorocarbon-225 (HCFC-225)
hydrochlorofluorocarbon-226 (HCFC-226)
hydrochlorofluorocarbon-231 (HCFC-231)
hydrochlorofluorocarbon-232 (HCFC-232)
hydrochlorofluorocarbon-233 (HCFC-233)
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hydrochlorofluorocarbon-235 (HCFC-235)
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hydrochlorofluorocarbon-242 (HCFC-242)
hydrochlorofluorocarbon-243 (HCFC-243)
hydrochlorofluorocarbon-244 (HCFC-244)
hydrochlorofluorocarbon-251 (HCFC-251)
hydrochlorofluorocarbon-252 (HCFC-252)
hydrochlorofluorocarbon-253 (HCFC-253)
hydrochlorofluorocarbon-261 (HCFC-261)
hydrochlorofluorocarbon-262 (HCFC-262)
hydrochlorofluorocarbon-271 (HCFC-271)

1.2.11.1 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and lamps (e.g., 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. Any solid waste to be disposed of on-island shall be transported to and AS-EPA approved site in accordance with the PNRS Permit requirements.

1.2.12 Wastewater

All wastewater shall be disposed of within the on-site treatment plant for normal processing and treatment under ASPA's WWTP system.

1.2.13 Storm Water

Storm water and onsite construction runoff shall be handled according to best management

practices and requirements provided in the PNRS Permit and AS-EPA requirements per section 3.2.2 of this specification.

1.3 SUBMITTALS

ASPA approval is required for submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preconstruction Survey

Solid Waste Management Plan and Permit

Regulatory Notifications

Environmental Management Plan

Storm Water Pollution Prevention Plan

Storm Water Notice of Intent (for NPDES coverage under the general permit for construction activities)

Dirt and Dust Control Plan

Contractor Hazardous Material Inventory Log

SD-06 Test Reports

Laboratory Analysis

Disposal Requirements

Erosion and Sediment Control Inspection Reports

Storm Water Inspection Reports for General Permit

Contractor 40 CFR employee training records

Solid Waste Management Report

SD-11 Closeout Submittals

Some of the records listed below are also required as part of other submittals. For the "Records" submittal, maintain on-site a separate three-ring Environmental Records binder and submit at the completion of the project. Make separate parts to the binder corresponding to each of the applicable sub items listed below.

Storm Water Pollution Prevention Plan compliance notebook

Supply and Installation of Odor Control

Waste Determination Documentation

Disposal Documentation for Hazardous and Regulated Waste

Contractor 40 CFR Employee Training Records

Solid Waste Management Permit

Solid Waste Management Report

Contractor Hazardous Material Inventory Log

Hazardous Waste/Debris Management

Regulatory Notifications

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 normal 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. Comply with Federal and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution. The Contractor may be required to promptly conduct tests and procedures for the purpose of assessing whether construction operations are in compliance with Applicable Environmental Laws. Analytical work shall be done by qualified laboratories; and where required by law, the laboratories shall be certified.

1.4.1 Conformance with the Environmental Management System

The Contractor shall perform work under this contract consistent with the policy and objectives identified in the installation's Environmental Management System (EMS). The Contractor shall perform work in a manner that conforms to objectives and targets, environmental programs and operational controls identified by the EMS. The Contractor will provide monitoring and measurement information as necessary to address environmental performance relative to environmental, energy, and transportation management goals. In the event an EMS non-conformance or environmental noncompliance associated with the contracted services, tasks, or actions occurs, the Contractor shall take corrective and/or preventative actions. In addition, the Contractor shall ensure that its employees are aware of their roles and responsibilities under the EMS and how these EMS roles and responsibilities affect work performed under the contract. The Contractor is responsible for ensuring that their employees receive applicable environmental and occupational health and safety training, and keep up to date on regulatory required specific training for the type of work to be conducted onsite. All on-site Contractor personnel, and their subcontractor personnel, performing tasks that have the potential to cause a significant environmental impact shall be competent on the basis of appropriate education, training or experience. Upon contract award, the APE's Representative will notify the installation's EMS coordinator to arrange EMS training. The installation's EMS coordinator shall identify training needs associated with environmental aspects and the EMS, and arrange training or take other action to meet these

needs. The Contractor shall provide training documentation to the APE. The EMS coordinator shall retain associated records.

1.5 QUALITY ASSURANCE

1.5.1 Preconstruction Survey

Perform a Preconstruction Survey of the project site with the APE, and take photographs showing existing environmental conditions in and adjacent to the site. Submit a report for the record.

1.5.2 Regulatory Notifications

The Contractor is responsible for all regulatory notification requirements in accordance with Federal, State and local regulations. Typically, regulatory notifications must be provided for the following (this listing is not all inclusive): demolition, renovation, NPDES defined site work, remediation of controlled substances (asbestos, hazardous waste, lead paint).

1.5.3 Environmental Brief

Attend an environmental brief to be included in the preconstruction meeting. Provide the following information: types, quantities, and use of hazardous materials that will be brought onto the activity; 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 APE and activity environmental staff to discuss the proposed Environmental Management Plan. Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, required permits, permit requirements, and other measures to be taken.

1.5.4 Environmental Manager

Appoint in writing an Environmental Manager for the project site. The Environmental Manager will be directly responsible for coordinating contractor compliance with Federal, State, local, and station requirements. The Environmental Manager will ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal); implement the Environmental Management Plan; ensure that all environmental permits are obtained, maintained, and closed out; ensure compliance with Storm Water Program Management requirements; ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCB transformers). This can be a collateral position; however the person in this position must be trained to adequately accomplish the following duties: ensure waste segregation and storage compatibility requirements are met; inspect and manage Satellite Accumulation areas; ensure only authorized personnel add wastes to containers; ensure all Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements; coordinate removal of waste containers; and maintain the Environmental Records binder and required documentation, including environmental permits compliance and close-out.

1.5.5 Contractor 40 CFR Employee Training Records

Supply and Installation of Odor Control

Prepare and maintain employee training records throughout the term of the contract meeting applicable 40 CFR requirements. Submit these training records to the APE at the conclusion of the project, unless otherwise directed.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTIONS

3.1 ENVIRONMENTAL MANAGEMENT PLAN

Prior to initiating any work on site, the Contractor will meet with the APE to discuss the proposed Environmental Protection Plan and develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The Contractor's Environmental Plan shall incorporate construction related objectives and targets from the installation's Environmental Management System. The Environmental Management Plan will be submitted in the following format and shall include the elements specified below.

a. Description of the Environmental Management Plan

(1) General overview and purpose

- (a)** A brief description of each specific plan required by environmental permit or elsewhere in this contract.
- (b)** The duties and level of authority assigned to the person(s) on the job site that oversee environmental compliance.
- (c)** 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.
- (d)** Communication and training procedures that will be used to convey environmental management requirements to contractor employees and subcontractors.
- (e)** Emergency contact information contact information (office phone number, cell phone number, and e-mail address).

(2) General site information

- (3)** A letter signed by an officer of the firm appointing the Environmental Manager and stating that he/she 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.

a. Management of Natural Resources

(1) Land resources

Supply and Installation of Odor Control

- (2) Tree protection
 - (3) Replacement of damaged landscape features
 - (4) Temporary construction
 - (5) Stream crossings
 - (6) Fish and wildlife resources
 - (7) Wetland areas
- b. Protection of Historical and Archaeological Resources
- (1) Objectives
 - (2) Methods
- c. Storm Water Management and Control
- (1) Ground cover
 - (2) Erodible soils
 - (3) Temporary measures
 - (a) Mechanical retardation and control of runoff
 - (b) Vegetation and mulch
 - (4) Effective selection, implementation and maintenance of Best Management Practices (BMPs).
- d. Protection of the Environment from Waste Derived from Contractor Operations
- (1) Control and disposal of solid and sanitary waste.
 - (2) Control and disposal of hazardous waste (Hazardous Waste Management Section)
- This item will consist of the management procedures for all hazardous waste to be generated. The elements of those procedures will coincide with the Activity Hazardous Waste Management Plan. A copy of the Activity Hazardous Waste Management Plan will be provided by the APE. As a minimum, include the following:
- (a) Procedures to be employed to ensure a written waste determination is made for appropriate wastes which are to be generated;

- (b) Sampling/analysis plan;
 - (c) Methods of hazardous waste accumulation/storage (i.e., in tanks and/or containers);
 - (d) Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted);
 - (e) Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268);
 - (f) Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and the like;
 - (g) Used oil management procedures in accordance with 40 CFR 279;
 - (h) Pollution prevention\hazardous waste minimization procedures;
 - (I) Plans for the disposal of hazardous waste by permitted facilities;
 - (j) Procedures to be employed to ensure all required employee training records are maintained.
- (f) Prevention of Releases to the Environment
- (1) Procedures to prevent releases to the environment
 - (2) Notifications in the event of a release to the environment
- (g) Regulatory Notification and Permits List what notifications and permit applications must be made. Demonstrate that those permits have been obtained by including copies of all applicable, environmental permits.

3.1.1 Environmental Protection Plan Review

Within thirty days after the Contract award date, submit the proposed Environmental Management Plan for further discussion, review, and approval. Commencement of work will not begin until the environmental management plan has been approved.

3.1.2 Licenses and Permits

Obtain licenses and permits pursuant to the "Permits and Responsibilities" FAR Clause 52.236-7. The following permits will be obtained by the APE:

- a. Land Use Permit (PNRS Permit)
- b. Notice of Verification for Nationwide Permit 12 and 3 coverage.

For permits obtained by the APE, whether or not required by the permit, the Contractor is responsible for conforming to all permit requirements and performing all quality control

inspections of the work in progress, and to submit notifications and certifications to the applicable regulatory agency via the APE.

As a part of the quality control plan, which is required to be submitted for approval by the quality control section, provide a sub item containing the name, appropriate professional registration or license number, address, and telephone number of the professionals or other qualified persons who will be performing the inspections and certifications for each permit.

3.2 PROTECTION OF NATURAL RESOURCES

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. Confine construction activities to within the limits of the work indicated or specified. If the work is near streams, lakes, or other waterways, conform to the national permitting requirements of the Clean Water Act. Do not disturb fish and wildlife. 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 indicated or specified. Except in areas to be cleared, do not remove, cut, deface, injure, or destroy trees or shrubs without the APE's permission. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the APE. Where such use of attached ropes, cables, or guys is authorized, the Contractor will be responsible for any resultant damage. Protect existing trees which are to remain and which may be injured, bruised, defaced, or otherwise damaged by construction operations. Remove displaced rocks from uncleared areas. By approved excavation, remove trees with 30 percent or more of their root systems destroyed. Remove trees and other landscape features scarred or damaged by equipment operations, and replace with equivalent, undamaged trees and landscape features. Obtain APE's approval before replacement. The APE's approval is required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain the APE's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition unless otherwise required by the APE.

3.2.1 Erosion and Sediment Control Measures

3.2.1.1 Burnoff

Burnoff of the ground cover is not permitted.

3.2.1.2 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified. Immediately protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

3.2.1.3 Temporary Protection of Erodible Soils

Use the following methods to prevent erosion and control sedimentation:

- a. Mechanical Retardation and Control of Runoff

Supply and Installation of Odor Control

Mechanically retard and control the rate of runoff from the construction site. This includes construction of diversion ditches, benches, berms, and use of silt fences and straw bales to retard and divert runoff to protected drainage courses.

b. Vegetation and Mulch

- (1) Provide temporary protection on sides and back slopes as soon as rough grading is completed or sufficient soil is exposed to require erosion protection. Protect slopes by accelerated growth of permanent vegetation, temporary vegetation, mulching, or netting. Stabilize slopes by hydro-seeding, anchoring mulch in place, covering with anchored netting, sodding, or such combination of these and other methods necessary for effective erosion control.
- (2) Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutriment during the seeding operation necessary to establish or reestablish a suitable stand of grass.

3.2.2 Erosion and Sediment Control Inspection Reports

Follow the requirements listed in the PNRS Permit. Submit "Erosion and Sediment Control Inspection Reports" (E&S) (form provided at the pre-construction conference) to the APE once every 7 calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain. Note erosion control inspection reports may be compiled as part of a storm water pollution prevention plan inspection reports if applicable.

3.2.2.1 Storm Water Pollution Prevention Plan

The Contractor shall submit a Storm Water Pollution Prevention Plan (SWPPP) for the project to the APE prior and gain approval prior to the commencement of work. The SWPPP will meet the requirements of the AS-EPA, territory, or PNRS requirements for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intent, Notice of Termination, and appropriate permit fees, via the APE, to the appropriate Federal or State agency for approval, a minimum of 14 calendar days prior to the start of any land disturbing activities. The Contractor shall maintain an approved copy of the SWPPP at the construction on-site office, and continually update as regulations require, reflecting current site conditions.

Coverage under this permit requires the contractor prepare a Storm Water Pollution Prevention Plan (SWPPP), prepare and submit a Registration Statement as a co-permittee with the APE, and provide the permit fee to the responsible state agency before any land disturbing activities begin. The contractor shall file for permit coverage on behalf APE and himself and file a Notice of Termination once construction is complete and the site is stabilized with a final sustainable cover. Under the terms and conditions of the permit, the Contractor may be required to install, inspect, maintain best management practices (BMPs), and submit stormwater BMP inspection reports and stormwater pollution prevention plan inspection reports. The Contractor shall ensure construction operations and management are constantly in compliance with the terms and conditions of the general permit for storm water discharges from construction activities.

- a. The SWPPP shall:

- (1) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.
- (2) Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.
- (3) Ensure compliance with terms of the EPA or State general permit for storm water discharge.
- (4) Select applicable best management practices from EPA 833-R-060-04.
- (5) Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.
- (6) Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 833-R-060-04. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. The SWPPP will meet the requirements of the EPA or State general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intent, Notice of Termination, and appropriate permit fees, via the APE, to the appropriate Federal or State agency for approval, a minimum of 14 calendar days prior to the start of construction. A copy of the approved SWPPP will be kept at the construction on-site office, and continually updated as regulations require reflecting current site conditions.

3.2.2.2 Storm Water Pollution Prevention Plan Compliance Notebook

The contractor shall create and maintain a three ring binder of documents that demonstrate compliance with the Stormwater Construction Activity permit. The binder shall include a copy of the permit Registration Statement, proof of permit fee payment, SWPPP and SWPPP update amendments, inspection reports, copies of correspondence with the AS-EPA as required in the PNRS Permit and a copy of the permit Notice of Termination. At the completion of the project the folder shall become the property of the ASPA. The compliance notebook shall be provided to Contracting Officer. An advance copy of the Registration Statement shall be provided to the APE immediately after the form is presented to the permitting agency.

3.2.3 Storm Water Drainage and Construction Dewatering

There will be no discharge of excavation ground water to the sanitary sewer, storm drains, or to the river without prior specific authorization of the Environmental Division in writing. Discharge of hazardous substances will not be permitted under any circumstances. Construction site runoff will be prevented from entering any storm drain or the river directly by the use of straw bales or other method suitable to the Environmental Division. Contractor will provide erosion protection of the surrounding soils. Construction Dewatering shall not be discharged to the sanitary sewer. If the construction dewatering is noted or suspected of being contaminated, it may only be released to the storm drain system if the discharge is specifically permitted. Authorization for any contaminated groundwater release shall be obtained in advance from the base Environmental Officer. Discharge of hazardous substances will not be permitted under any circumstances.

Supply and Installation of Odor Control

3.3 HISTORICAL AND ARCHAEOLOGICAL RESOURCES

Carefully protect in-place and report immediately to the APE any historical and archaeological items or human skeletal remains discovered in the course of work. Upon discovery, notify the APE. Stop work in the immediate area of the discovery until directed by the APE to resume work. The ASPA retains ownership and control over historical and archaeological resources.

3.4 SOLID WASTE MANAGEMENT PLAN and PERMIT

Provide to the APE written notification of the quantity of solid waste/debris that is anticipated 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 or as applicable, submit one copy of a State and local Solid Waste Management Permit or license showing such agency's approval of the disposal plan before transporting wastes off ASPA property.

3.4.1 Solid Waste Management Report

Monthly, submit a solid waste disposal report to the APE. 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. The Contractor will include copies of the waste handling facilities' weight tickets, receipts, bills of sale, and other sales documentation. In lieu of sales documentation, the Contractor may submit a statement indicating the disposal location for the solid waste which is signed by an officer of the Contractor firm authorized to legally obligate or bind the firm. The sales documentation or Contractor certification will include the receiver's tax identification number and business, EPA or State registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained by the Contractor for his own use, the Contractor will submit on the solid waste disposal report the information previously described in this paragraph. Prices paid or received will not be reported to the APE unless required by other provisions or specifications of this Contract or public law.

3.4.2 Control and Management of Solid Wastes

Pick up solid wastes, and place in covered containers which are regularly emptied. Do not prepare or cook food on the project site. Prevent contamination of the site or other areas when handling and disposing of wastes. At project completion, leave the areas clean. Recycling is encouraged and can be coordinated with the APE and the activity recycling coordinator. Remove all solid waste (including non-hazardous debris) from ASPA property and dispose off-site at an approved landfill (Futiga landfill). Solid waste disposal off-site must comply with most stringent local, State, and Federal requirements including 40 CFR 241, 40 CFR 243, and 40 CFR 258. Manage spent hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, as per environmental law.

3.4.2.1 Dumpsters

Equip dumpsters with a secure cover and paint the standard base color. Keep cover closed at all times, except when being loaded with trash and debris. Locate dumpsters behind the construction fence or out of the public view. Empty site dumpsters at least once a week. or

Supply and Installation of Odor Control

as needed to keep the site free of debris and trash. If necessary, provide 55 gallon trash containers painted the darker base color to collect debris in the construction site area. Locate the trash containers behind the construction fence or out of the public view. Empty trash containers at least once a day. For large demolitions, large dumpsters without lids are acceptable but should not have debris higher than the sides before emptying.

3.5 WASTE DETERMINATION DOCUMENTATION

Complete a Waste Determination form (provided at the pre-construction conference) for all contractor derived wastes to be generated. Base the waste determination upon either a constituent listing from the manufacturer used in conjunction with consideration of the process by which the waste was generated, EPA approved analytical data, or laboratory analysis (Material Safety Data Sheets (MSDS) by themselves are not adequate). Attach all support documentation to the Waste Determination form. As a minimum, a Waste Determination form must be provided for the following wastes (this listing is not all inclusive): oil and latex based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and all containers of the original materials.

3.6 CONTRACTOR HAZARDOUS MATERIAL INVENTORY LOG

Documentation for any spills/releases, environmental reports or off-site transfers may be requested by the APE.

3.6.1 Disposal Documentation for Hazardous and Regulated Waste

Manifest, pack, ship and dispose of hazardous or toxic waste and universal waste that is generated as a result of construction in accordance with the generating facilities generator status under the Resource Conservation and Recovery Act. Contact the APE for the facility RCRA identification number that is to be used on each manifest.

Submit a copy of the applicable EPA and or State permit(s), manifest(s), or license(s) for transportation, treatment, storage, and disposal of hazardous and regulated waste by permitted facilities. Hazardous or toxic waste manifest must be reviewed, signed, and approved by the Navy before the Contractor may ship waste. To obtain specific disposal instructions the Contractor must coordinate with the Activity environmental office.

3.7 POLLUTION PREVENTION/HAZARDOUS WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of hazardous waste. Include procedures for pollution prevention/ hazardous waste minimization in the Hazardous Waste Management Section of the Environmental Management Plan. Consult with the activity Environmental Office for suggestions and to obtain a copy of the installation's pollution prevention/hazardous waste minimization plan for reference material when preparing this part of the plan. If no written plan exists, obtain information by contacting the APE. Describe the types of the hazardous materials expected to be used in the construction when requesting information.

3.8 WHM/HW MATERIALS PROHIBITION

No waste hazardous material or hazardous waste shall be disposed of on ASPA property. No

hazardous material shall be brought onto ASPA property that does not directly relate to requirements for the performance of this contract. The ASPA is not responsible for disposal of Contractor's waste material brought on the job site and not required in the performance of this contract. The intent of this provision is to dispose of that waste identified as waste hazardous material/hazardous waste as defined herein that was generated as part of this contract and existed within the boundary of the Contract limits and not brought in from offsite by the Contractor. Incidental materials used to support the contract including, but not limited to aerosol cans, waste paint, cleaning solvents, contaminated brushes, rags, clothing, etc. are the responsibility of the Contractor. The list is illustrative rather than inclusive. The Contractor is not authorized to discharge any materials to sanitary sewer, storm drain, or to the river or conduct waste treatment or disposal on ASPA property without written approval of the APE.

3.9 HAZARDOUS MATERIAL MANAGEMENT

No hazardous material shall be brought onto ASPA property that does not directly relate to requirements for the performance of this contract.

Include hazardous material control procedures in the Safety Plan. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Submit a MSDS and estimated quantities to be used for each hazardous material to the APE prior to bringing the material on base. Typical materials requiring MSDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. At the end of the project, provide the APE with the maximum quantity of each material that was present at the site at any one time, the dates the material was present, the amount of each material that was used during the project, and how the material was used. Ensure that hazardous materials are utilized in a manner that will minimize the amount of hazardous waste that is generated. Ensure that all containers of hazardous materials have NFPA labels or their equivalent. Keep copies of the MSDS for hazardous materials on site at all times and provide them to the APE at the end of the project. Certify that all hazardous materials removed from the site are hazardous materials and do not meet the definition of hazardous waste per 40 CFR 261.

3.10 PETROLEUM PRODUCTS AND REFUELING

Conduct the fueling and lubricating of equipment and motor vehicles in a manner that protects against spills and evaporation. Manage all used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while on-site exhibits a characteristic of hazardous waste. Used oil containing 1000 parts per million of solvents will be considered a hazardous waste and disposed of at Contractor's expense. Used oil mixed with a hazardous waste will also be considered a hazardous waste

3.10.1 Oily and Hazardous Substances

Prevent oil or hazardous substances from entering the ground, drainage areas, or navigable waters. In accordance with 40 CFR 112, surround all temporary fuel oil or petroleum storage tanks with a temporary berm or containment of sufficient size and strength to contain the contents of the tanks, plus 10 percent freeboard for precipitation. The berm will be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs.

3.10.2 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, the contractor shall immediately notify the APE. The contractor shall not disturb this material until authorized by the APE.

3.11 FUEL TANKS

Petroleum products and lubricants required to sustain up to 30 days of construction activity may be kept on site. Storage and refilling practices shall comply with 40 CFR Part 112. Secondary containment shall be provided and be no less than 110 percent of the tank volume plus five inches of free-board. If a secondary berm is used for containment then the berm shall be impervious to oil for 72 hours and be constructed so that any discharge will not permeate, drain, infiltrate, or otherwise escape before cleanup occurs. Drips pans are required and the tanks must be covered during inclement weather.

3.12 RELEASES/SPILLS OF OIL AND HAZARDOUS SUBSTANCES

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage (including wastewater being treated at the Utulei WWTP), regulated gas, petroleum, lubrication oil, and other substances regulated by environmental law. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release. In the event of any releases of oil and hazardous substances, chemicals, or gases; immediately (within 15 minutes) notify the Fire Department, and the APE. If the contractor's response is inadequate, ASPA may respond. If this should occur, the contractor will be required to reimburse the ASPA for spill response assistance and analysis.

The Contractor is responsible for verbal and written notifications as required by the federal 40 CFR 355, State, and local regulations. Spill response will be in accordance with 40 CFR 300 and applicable State and local regulations. Contain and clean up these spills without cost to the ASPA. If ASPA assistance is requested or required, the Contractor will reimburse the ASPA for such assistance. Provide copies of the written notification and documentation that a verbal notification was made within 20 days. Maintain spill cleanup equipment and materials at the work site. Clean up all hazardous and non-hazardous (WHM) waste spills. The Contractor shall reimburse the ASPA for all material, equipment, and clothing generated during any spill cleanup. The Contractor shall reimburse the ASPA for all costs incurred including sample analysis materials, equipment, and labor if the ASPA must initiate its own spill cleanup procedures, for Contractor responsible spills, when:

- a. The Contractor has not begun spill cleanup procedure within one hour of spill discovery/occurrence, or
- b. If, in the ASPA's judgment, the Contractor's spill cleanup is not adequately abating life threatening situation and/or is a threat to any body of water or environmentally sensitive areas.

3.13 CONTROL AND MANAGEMENT OF HAZARDOUS WASTES

Supply and Installation of Odor Control

3.13.1 Hazardous Waste/Debris Management

Identify all construction activities which will generate hazardous waste/debris. Provide a documented waste determination for all resultant waste streams. Hazardous waste/debris will be identified, labeled, handled, stored, and disposed of in accordance with all Federal, State, and local regulations including 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 40 CFR 265, 40 CFR 266, and 40 CFR 268. Hazardous waste will also be managed in accordance with the approved Hazardous Waste Management Section of the Environmental Protection Plan. Store hazardous wastes in approved containers in accordance with 49 CFR 173 and 49 CFR 178. Hazardous waste generated within the confines of ASPA facilities will be identified as being generated by the ASPA. Prior to removal of any hazardous waste from ASPA property, all hazardous waste manifests must be signed by activity personnel from the Station Environmental Office. No hazardous waste will be brought onto ASPA property. Provide to the APE a copy of waste determination documentation for any solid waste streams that have any potential to be hazardous waste or contain any chemical constituents listed in 40 CFR 372-SUBPART D. For hazardous wastes spills, verbally notify the APE immediately.

3.14 DUST CONTROL

Keep dust down at all times, including during nonworking periods. Sprinkle or treat, with dust suppressants, the soil at the site, haul roads, and other areas disturbed by operations. Dry power brooming will not be permitted. Instead, use vacuuming, wet mopping, wet sweeping, or wet power brooming. Air blowing will be permitted only for cleaning non particulate debris such as steel reinforcing bars. Only wet cutting will be permitted for cutting concrete blocks, concrete, and bituminous concrete. Do not unnecessarily shake bags of cement, concrete mortar, or plaster.

3.14.1 Dirt and Dust Control Plan

Submit truck and material haul routes along with a plan for controlling dirt, debris, and dust on base 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.

3.15 ABRASIVE BLASTING

3.15.1 Blasting Operations

Provide tarpaulin drop cloths and windscreens to enclose abrasive blasting operations to confine and collect dust, abrasive, agent, paint chips, and other debris in accordance with the requirements specified. Perform work involving removal of hazardous material in accordance with 29 CFR 1910.

3.15.2 Disposal Requirements

Submit analytical results of the debris generated from abrasive blasting operations per paragraph entitled Laboratory Analysis of this section. Hazardous waste generated from blasting operations will be managed in accordance with paragraph entitled "Hazardous Waste\Debris Management" of this section and with the approved HWMP. Disposal of non-hazardous abrasive blasting debris will be in accordance with paragraph entitled, "Control

and Disposal of Solid Wastes".

3.16 NOISE

Make the maximum use of low-noise emission products, as certified by the Environmental Protection Agency (EPA). Blasting or use of explosives will not be permitted without written permission from the APE, and then only during the designated times. Confine pile-driving operations to the period between 8 a.m. and 4 p.m., Monday through Friday, exclusive of holidays, unless otherwise specified.

3.17 MERCURY MATERIALS

Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, and mercury switches, in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed. Immediately report to the Environmental Office and the APE instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the APE. Cleanup of a mercury spill shall not be recycled and shall be managed as a hazardous waste for disposal.

END OF SECTION 01 57 19.00 20

01 57 20.00 10

ENVIRONMENTAL PROTECTION

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.

A. AMERICAN SAMOA CODE (ASC)

1. ASC Title 24 Natural Resources & Environmental Ecosystem Protection
2. ASC Title 25 Environmental Health
3. ASC Title 26 Environmental Safety & Land Management

B. U.S. ENVIRONMENTAL PROTECTION AGENCY (U.S. EPA)

1. EPA-305-B-04-003 Managing Your Environmental Responsibilities: A Planning guide for Construction and Development, April 2005
2. EPA-305-F-03-007 Federal Environmental Requirements for Construction
3. EPA-420-F-08-008 Low-Cost Ways to Cleaner Construction, February 2008
4. EPA-530-K-04-005 RCRA in Focus: Construction, Demolition and Renovation, September 2004
5. EPA-833-R-06-004 Developing Your Stormwater Pollution Prevention Plan, A Guide for Construction Sites, May 2007

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

1. 33 CFR 328 Definitions of Waters of the United States
2. 40 CFR 150 - 189 Pesticide Programs

3. 40 CFR 260	Hazardous Waste Management System: General
4. 40 CFR 261	Identification and Listing of Hazardous Waste
5. 40 CFR 262	Standards Applicable to Generators of Hazardous Waste
6. 40 CFR 279	Standards for the Management of Used Oil
7. 40 CFR 302	Designation, Reportable Quantities, and Notification
8. 40 CFR 355	Emergency Planning and Notification
9. 40 CFR 68	Chemical Accident Prevention Provisions
10. 49 CFR 171 - 178	Hazardous Materials Regulations

1.2 DEFINITIONS

1.2.1 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 and/or historically.

1.2.2 Environmental Protection

Contractor shall provide Environmental protection during construction in accordance with the requirements of AS-EPA and the PNRS permit conditions. 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.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means 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 etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Installation Pest Management Coordinator

Installation Pest Management Coordinator (IPMC) is the individual officially designated by the Installation Commander to oversee the Installation Pest Management Program and the Installation Pest Management Plan.

1.2.5 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual that resides at a Civil Works Project office and that is responsible for oversight of pesticide application on Project grounds.

1.2.6 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor must discharge water at a rate which 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. Land Application must be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.7 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.8 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.9 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the American Samoa" and would require a permit to discharge water from the governing agency.

1.2.10 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with US Army Corps of Engineer's personnel.

1.3 GENERAL REQUIREMENTS

Supply and Installation of Odor Control

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. Payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor, and payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations are the Contractor's responsibility. All costs associated with this section must be included in the contract price.

1.6 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Protection Plan

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan in accordance with AS-EPA requirements and the PNRS Permit requirements for review and approval by the APE. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential environmental issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the APE for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

Include in the environmental protection plan, but not limit it to, the following:

- a. Name(s) of person(s) within the Contractor's organization who are responsible for ensuring adherence to the Environmental Protection Plan.
- b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.
- c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.
- d. Description of the Contractor's environmental protection personnel training program.
- e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.
- f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.
- g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.
- h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or non-use. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.
- i. Drawing showing the location of borrow areas.
- j. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. Include in this plan, as a minimum:
 - (1) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify the APE in addition to the legally required State, and local reporting channels if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.
 - (2) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

- (3) Training requirements for Contractor's personnel and methods of accomplishing the training.
 - (4) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.
 - (5) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.
 - (6) The methods and procedures to be used for expeditious contaminant cleanup.
- k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.
- (1) Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.
 - (2) Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).
 - (3) Indicate in the report the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.
 - (4) A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in State, and local government sponsored recycling programs to reduce the volume of solid waste at the source.
- l. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.
- m. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. A copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.
- n. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of

lines. If a settling/retention pond is required, the plan must include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan must include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan must include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

- o. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include in the plan methods to assure the protection of known or discovered resources, identifying lines of communication between Contractor personnel and the APE.

1.7.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.8 PROTECTION FEATURES

Prior to start of any onsite construction activities, the Contractor and the APE will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including 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. This survey report will be signed by both the Contractor and the APE upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.9 SPECIAL ENVIRONMENTAL REQUIREMENTS

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

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings, plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the APE and may require an extended review, processing, and approval time. The APE reserves the right to disapprove alternate methods, even if they are more cost effective, if the APE determines that the proposed alternate method will have an adverse environmental impact.

1.11 NOTIFICATION

The APE will notify the Contractor in writing of any observed noncompliance with State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. After receipt of such notice, the Contractor will inform the APE of the proposed corrective action and take such action when approved by the APE. The APE 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 APE may take under the contract.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 ENVIRONMENTAL PERMITS AND COMMITMENTS

Obtaining and complying with all environmental permits and commitments required by State and local environmental laws and regulations is the Contractor's responsibility.

3.2 LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Identify any land resources to be preserved within the work area prior to the beginning of any construction. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval, except in areas indicated on the drawings or specified to be cleared. Ropes, cables, or guys will not be fastened to or attached to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times, as defined in the following subparagraphs. Remove stone, soil, or other materials displaced into uncleared areas.

3.2.1 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 which 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. The Contractor's personnel must be knowledgeable of the purpose for marking and/or protecting particular objects.

3.2.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved must be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.2.3 Erosion and Sediment Controls

Supply and Installation of Odor Control

Providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations is the Contractor's responsibility. Select and maintain the erosion and sediment controls such that water quality standards are not violated as a result of construction activities.

The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

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 APE. Temporary movement or relocation of Contractor facilities will be made only when approved. Erosion and sediment controls must be provided for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas must be controlled to protect adjacent areas.

3.3 WATER RESOURCES

Monitor all water areas affected by construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. For construction activities immediately adjacent to impaired surface waters, the Contractor must be capable of quantifying sediment or pollutant loading to that surface water when required by EPA or locally issued Clean Water Act permits. The contractor shall be responsible for any spills or non-conformance with PNRS permit or other environmental regulations or requirements.

3.3.1 Diversions and Dewatering Operations

Construction operations for dewatering, closure will be controlled at all times to maintain compliance with existing State water quality standards and designated uses of the surface water body. Comply with the American Samoa water quality standards and anti-degradation provisions.

3.3.2 Stream Crossings

Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the Federal and local governments.

3.3.3 Wetlands

Do not enter, disturb, destroy, or allow discharge of contaminants into any wetlands except as authorized herein. The protection of wetlands in accordance with paragraph ENVIRONMENTAL PERMITS AND COMMITMENTS is the Contractor's responsibility. Authorization to enter specific wetlands identified will not relieve the Contractor from any obligation to protect other wetlands within, adjacent to, or in the vicinity of the construction

site and associated boundaries.

3.4 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with all State air emission and performance laws and standards.

3.4.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; must be controlled at all times, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the State and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.4.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.4.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the local EPA.

3.4.4 Burning

Burning will not be allowed on the project site authorized in writing by the APE. The specific time, location, and manner of burning will be subject to approval.

3.5 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.5.1 Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Handling, storage, and disposal must be conducted to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off ASPA property and dispose of it in compliance with State and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill will be the minimum acceptable offsite solid waste disposal option. Verify that the selected

Supply and Installation of Odor Control

transporters and disposal facilities have the necessary permits and licenses to operate. State and local laws and regulations pertaining to the use of landfill areas.

3.5.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the ASPA. Collect chemical waste in corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.5.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262 in accordance with the hazardous waste management plan. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations is the Contractor's responsibility. Transport Contractor generated hazardous waste off Project site within 30 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the APE. Cleanup and cleanup costs due to spills are the Contractor's responsibility.

3.5.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all State and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the project site will be in accordance with all State and local laws and regulations.

3.5.5 Waste Water

Disposal of waste water will be as specified below.

- a. Waste water from construction activities, such as onsite material processing, concrete curing, concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction related waste water in accordance with all AS-EPA, Territorial, Federal and Local laws and regulations.
- b. For discharge of ground water, the Contractor will surface discharge in accordance with

all AS-EPA, Territorial, Federal and local laws and regulations.

- c. Contractor shall handle all municipal wastewater at the Utulei WWTP onsite and dispose of any wastewater required to be handled by pumping it back into the existing operations of the plant. Contractor shall coordinate such work with the plant personnel and the APE to ensure existing operations are not compromised.

3.6 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources will be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the APE so that the appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. Coordinate inspections for historical, archaeological and cultural determination with ASPA and their designated personnel.

3.7 BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The protection of threatened and endangered animal and plant species, including their habitat, is the Contractor's responsibility in accordance with State Regional, and local laws and regulations.

3.8 PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.9 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.10 MILITARY MUNITIONS

In the event military munitions, as defined in 40 CFR 260, are discovered or uncovered, the Contractor will immediately stop work in that area and immediately inform the APE.

3.11 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all

personnel prior to commencing construction activities. Additional meetings must be conducted for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.12 POST CONSTRUCTION CLEANUP

The Contractor will clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the APE, obliterate all signs 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. The disturbed area must be graded, filled and the entire area seeded unless otherwise indicated.

END OF SECTION 01 57 20.00 10

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM D 4439 (2004) Geosynthetics
2. ASTM D 4491 (1999a; R 2009) Water Permeability of Geotextiles by Permittivity
3. ASTM D 4533 (2004; R 2009) Trapezoid Tearing Strength of Geotextiles
4. ASTM D 4632 (2008) Grab Breaking Load and Elongation of Geotextiles
5. ASTM D 4751 (2004) Determining Apparent Opening Size of a Geotextile
6. ASTM D 4873 (2002; R 2009) Identification, Storage, and Handling of Geosynthetic Rolls and Samples

B. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

1. EPA 832-R-92-005 (1992) Storm Water Management for Construction Activities Developing Pollution Preventions and Plans and Best Management Practices

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

1. 40 CFR 122.26 Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)

1.2 SYSTEM DESCRIPTION

The work consists of implementing the storm water pollution prevention measures to prevent sediment from entering streams or water bodies as specified in this Section in conformance with the requirements of Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, and the requirements of PNRS permit.

1.3 EROSION AND SEDIMENT CONTROLS

The controls and measures required of the Contractor are described below.

1.3.1 Stabilization Practices

The stabilization practices to be implemented include temporary seeding, mulching, geotextiles, sod stabilization, erosion control mats, protection of trees, preservation of mature vegetation, etc. On the daily CQC Report, record the dates when the major grading activities occur, (e.g., excavation); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in paragraphs UNSUITABLE CONDITIONS and NO ACTIVITY FOR LESS THAN 21 DAYS, initiate stabilization practices as soon as practicable, but no more than 14 days, in any portion of the site where construction activities have permanently ceased.

1.3.1.1 Unsuitable Conditions

Where the initiation of stabilization measures by the fourteenth day after construction activity permanently ceases or is precluded by unsuitable conditions caused by the weather, initiate stabilization practices as soon as practicable after conditions become suitable.

1.3.1.2 No Activity for Less Than 21 Days

When the total time period in which construction activity is temporarily ceased on a portion of the site is 21 days minimum, stabilization practices do not have to be initiated on that portion of the site until 14 days have elapsed after construction activity temporarily ceased.

1.3.1.3 Burnoff

Burnoff of the ground cover is not permitted.

1.3.1.4 Protection of Erodible Soils

Immediately finish the earthwork brought to a final grade, as indicated or specified, and protect the side slopes and back slopes upon completion of rough grading. Plan and conduct earthwork to minimize the duration of exposure of unprotected soils.

1.3.2 Erosion, Sediment and Stormwater Control

- a. Submit "Erosion and Sediment Controls" (E&S) (form provided at the pre-construction conference) to the APE once every 7 calendar days and within 24 hours of a storm event that produces 0.5 inch or more of rain.
- b. Submit a Storm Water Pollution Prevention Plan (SWPPP) for the project to the APE prior to the commencement of work. The SWPPP shall meet the requirements of the EPA general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intents, Notice of Termination, and appropriate permit fees, via the APE, to the appropriate agency for approval, a minimum of 14 calendar days prior to the start of any land disturbing activities. Maintain an approved copy of the SWPPP at the construction on-site office, and

Supply and Installation of Odor Control

continually update as regulations require, to reflect current site conditions. Include within the SWPPP:

- (1) Identify potential sources of pollution which may be reasonably expected to affect the quality of storm water discharge from the site.
- (2) Describe and ensure implementation of practices which will be used to reduce the pollutants in storm water discharge from the site.
- (3) Ensure compliance with terms of the EPA general permit for storm water discharge.
- (4) Select applicable best management practices from EPA 832-R-92-005.
- (5) Include a completed copy of the Registration Statement, BMP Inspection Report Template and Notice of Termination except for the effective date.
- (6) Storm Water Pollution Prevention Measures and Notice of Intent 40 CFR 122.26, EPA 832-R-92-005. Provide a "Storm Water Pollution Prevention Plan" (SWPPP) for the project. The SWPPP will meet the requirements of the EPA general permit for storm water discharges from construction sites. Submit the SWPPP along with any required Notice of Intent, Notice of Termination, and appropriate permit fees, via the APE, to the appropriate American Samoa EPA for approval, a minimum of 14 calendar days prior to the start of construction.

A copy of the approved SWPPP will be kept at the construction on-site office, and continually updated as regulations require to reflect current site conditions.

1.3.3 Structural Practices

Implement structural 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 structural practices in a timely manner, during the construction process, to minimize erosion and sediment runoff. Include the devices based on details of installation and construction as shown on the drawings.

1.3.3.1 Silt Fences

Provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Properly install silt fences to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading). Install silt fences in the locations indicated on the drawings or as required by the APE. Obtain approval from the APE prior to final removal of silt fence barriers.

Seeding: Provide new seeding where ground is disturbed. Include topsoil or nutrient during the seeding operation necessary to reestablish a suitable stand of grass.

1.4 SUBMITTALS

Supply and Installation of Odor Control

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Storm Water Pollution Prevention Plan

SD-06 Test Reports

Storm Water Inspection Reports for General Permit

Erosion and Sediment Controls

SD-07 Certificates

Mill Certificate or Affidavit

Certificate attesting that the Contractor has met all specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

Identify, store and handle filter fabric in accordance with ASTM D 4873.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Filter Fabric

Provide geotextile that complies with the requirements of ASTM D 4439, and consists of polymeric filaments which are formed into a stable network such that filaments retain their relative positions. The filament shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of ester, propylene, or amide, and contains stabilizers and/or inhibitors added to the base plastic to make the filaments resistant to deterioration due to ultraviolet and heat exposure. Provide synthetic filter fabric that contains ultraviolet ray inhibitors and stabilizers to assure a minimum of six months of expected usable construction life at a temperature range of 0 to 120 degrees F. The filter fabric shall meet the following requirements:

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	445 N min.
Elongation (percent)		30 percent max.
Trapezoid Tear	ASTM D 4533	245 N min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

Supply and Installation of Odor Control

FILTER FABRIC FOR SILT SCREEN FENCE

PHYSICAL PROPERTY	TEST PROCEDURE	STRENGTH REQUIREMENT
Grab Tensile	ASTM D 4632	100 lbs. min.
Elongation (percent)		30 percent max.
Trapezoid Tear	ASTM D 4533	55 lbs. min.
Permittivity	ASTM D 4491	0.2 sec-1
AOS (U.S. Std Sieve)	ASTM D 4751	20-100

2.1.2 Silt Fence Stakes and Posts

Use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 by 2 inches when oak is used and 4 by 4 inches when pine is used, and have a minimum length of 1.5 m 5 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds/linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

Provide a mill certificate or affidavit attesting that the fabric and factory seams meet chemical, physical, and manufacturing requirements specified above. Specify in the mill certificate or affidavit the actual Minimum Average Roll Values and identify the fabric supplied by roll identification numbers. Submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the filter fabric.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Extend silt fences a minimum of 16 inches above the ground surface without exceeding 34 inches above the ground surface. Provide filter fabric from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, splice together filter fabric at a support post, with a minimum 6 inch overlap, and securely sealed. Excavate trench approximately 4 inches wide and 4 inches deep on the upslope side of the location of the silt fence. The 4 by 4 inch trench shall be backfilled and the soil compacted over the filter fabric. Remove silt fences upon approval by the APE.

3.2 FIELD QUALITY CONTROL

Maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Use the following procedures to maintain the protective measures.

3.2.1 Silt Fence Maintenance

Inspect the silt fences in accordance with paragraph, titled "Inspections," of this section. Any

required repairs shall be made promptly. Pay close attention to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, replace the fabric promptly. Remove sediment deposits when deposits reach one-third of the height of the barrier. Remove a silt fence when it is no longer required. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade.

3.4 INSPECTIONS

3.4.1 General

Inspect disturbed areas of the construction site, areas that have not been finally stabilized used for storage of materials exposed to precipitation, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Conduct inspections at least once every month where sites have been finally stabilized.

3.4.2 Inspections Details

Inspect disturbed areas [and areas used for material storage that are exposed to precipitation for evidence of, or the potential for, pollutants entering the drainage system. Observe erosion and sediment control measures identified in the Storm Water Pollution Prevention Plan to ensure that they are operating correctly. Inspect discharge locations or points to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Inspect locations where vehicles exit the site for evidence of offsite sediment tracking.

3.4.3 Inspection Reports

For each inspection conducted, prepare a report summarizing the scope of the inspection, name(s) and qualifications of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the Storm Water Pollution Prevention Plan, maintenance performed, and actions taken. Furnish the report to the APE within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT. A copy of the inspection report shall be maintained on the job site.

3.4.4 Monthly Inspection Report and Certification Form

Complete, sign, and submit the original form, on the first working day of each month, to the American Samoa EPA. Also furnish, on the first working day of each month, one copy of the form submitted to the APE as part of the Contractor's daily CQC Report and attach a copy of the completed form to the Plan. Unless otherwise notified by the APE, submit the Monthly Inspection Report and Certification Forms for an additional two months after the final completion of all storm water pollution prevention measures required in this contract have been implemented.

END OF SECTION 01 57 23

SECTION 01 58 00

PROJECT IDENTIFICATION

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.

A. AMERICAN WOOD PROTECTION ASSOCIATION (AWPA)

1. AWPA C1 (2003) All Timber Products - Preservative Treatment by Pressure Processes
2. AWPA C2 (2003) Lumber, Timber, Bridge Ties and Mine Ties- Preservative Treatment by Pressure Processes

1.2 SUBMITTALS

ASPA approval is required for submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Preliminary drawing indicating layout and text content and material

1.3 QUALITY ASSURANCE

1.3.1 Preliminary Sign Drawing

Provide a preliminary project sign drawing in accordance with the following package number being worked on as part of the East Side Villages Wastewater Collection System project as required in paragraph entitled "Submittals". The following submittal data is required to properly identify the appropriate sign content for approval by the APE.

1.4 PROJECT SIGN

Prior to initiating any work on site, provide two project identification sign at the location designated by the APE. Construct the sign in accordance with APE approved project sign. Maintain sign throughout the life of the project. Upon completion of the project, remove the sign from the site. Provide color rendering of the project. Reproduce the rendering on the signboard or enclose a copy of the rendering under a water-proof, transparent cover, and caulk for weather protection.

1.4.1 Project Identification Signboard

Provide preliminary drawing indicating layout and text content. The signboard shall be provided at a conspicuous location on the job site where directed by the APE.

- a. The field of the sign shall consist of a 4 by 8 foot sheet of grade B-B medium density overlaid exterior plywood. The contractor may use alternate sign materials, such as

plastic banners or digital graphic signs.

- b. Lumber shall be B or better Southern pine, or approved equal, pressure-preservative treated in accordance with AWPA C1 and AWPA C2. Nails shall be aluminum or galvanized steel.
- c. The entire signboard and supports shall be given one coat of exterior alkyd primer and two coats of exterior alkyd enamel paint. Supports shall be able to withstand the design wind loading at the site, a maximum wind speed of 160 mph. The lettering and sign work shall be performed by a skilled sign painter using paint known in the trade as bulletin colors. The colors, lettering sizes, and lettering styles shall be as directed by APE. Where preservative-treated lumber is required, utilize only cured pressure-treated wood which has had the chemicals leached from the surface of the wood prior to painting.

1.4.2 Construction Project Sign

Furnish the construction project sign package, maintain the sign during construction, and remove the signs from the job site upon completion of the project. The construction project sign package shall be for project identification.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 58 00

SECTION 01 74 19

CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM E 1609 (2001) Development and Implementation of a Pollution Prevention Program

1.2 ASPA POLICY

ASPA 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.

1.3 MANAGEMENT

Develop and implement a waste management program in accordance with ASTM E 1609 and as specified. 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. The Environmental Manager, as specified in Section 01 35 40.00 20 Environmental Management, shall be responsible for instructing workers and overseeing and documenting results of the Waste Management Plan for the project. 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 consideration shall be given to 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. The Contractor is responsible for implementation of 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.

1.4 SUBMITTALS

Supply and Installation of Odor Control

ASPA approval is required for submittals. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Waste Management Plan

SD-11 Closeout Submittals

Records

1.5 MEETINGS

Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the APE 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 01 45 00.00 10 QUALITY CONTROL. At a minimum, environmental and waste management goals and issues shall be discussed at the following additional meetings:

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

1.6 WASTE MANAGEMENT PLAN

A waste management plan shall be submitted within 15 days after notice to proceed and not less than 10 days before the preconstruction meeting. The plan shall demonstrate how the project waste diversion goal shall be met and shall include the following:

- a. Name of individuals on the Contractor's staff responsible for waste prevention and management.
- 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. Recycling facilities that will be used shall be identified 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 APE.
- 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 APE. 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 APE.

1.7 RECORDS

Records shall be maintained 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. Quantities may be measured by weight or by volume, but must be consistent throughout. List each type of waste separately noting the disposal or diversion date. Identify the landfill, recycling center, waste processor, or other organization used to process or receive the solid waste. Provide explanations for any waste not recycled or reused. With each application for payment, submit updated documentation for solid waste disposal and diversion, and submit manifests, weight tickets, receipts, and invoices specifically identifying the project and waste material. The records shall be made available to the APE during construction, and a copy of the records shall be delivered to the APE upon completion of the construction.

1.8 COLLECTION

Supply and Installation of Odor Control

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 recyclable materials shall be handled 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 35 40.00 20 ENVIRONMENTAL MANAGEMENT. Separate materials by one of the following methods:

1.8.1 Source Separated Method.

Waste products and materials that are recyclable shall be separated 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. Glass (colored glass allowed).
- h. Paper.
 - (1) Bond.
 - (2) Newsprint.

- (3) Cardboard and paper packaging materials.
- i. Plastic.
 - (1) Type 1: Polyethylene Terephthalate (PET, PETE).
 - (2) Type 2: High Density Polyethylene (HDPE).
 - (3) Type 3: Vinyl (Polyvinyl Chloride or PVC).
 - (4) Type 4: Low Density Polyethylene (LDPE).
 - (5) Type 5: Polypropylene (PP).
 - (6) Type 6: Polystyrene (PS).
 - (7) Type 7: Other. Use of this code indicates that the package in question is made with a resin other than the six listed above, or is made of more than one resin listed above, and used in a multi-layer combination.
- j. Gypsum.
- k. Non-hazardous paint and paint cans.
- l. Carpet.
- m. Ceiling tiles.
- n. Insulation.
- o. Beverage containers.

1.8.2 Co-Mingled Method.

Waste products and recyclable materials shall be placed into a single container and then transported to a recycling facility where the recyclable materials are sorted and processed.

1.8.3 Other Methods.

Other methods proposed by the Contractor may be used when approved by the APE.

1.9 DISPOSAL

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

1.91 Reuse.

First consideration shall be given 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 APE. Sale or donation of waste suitable for reuse shall be considered.

1.9.2 Recycle.

Waste materials not suitable for reuse, but having value as being recyclable, shall be made available for recycling. All fluorescent lamps, HID lamps, and mercury-containing thermostats removed from the site shall be recycled. Arrange for timely pickups from the site or deliveries to recycling facilities in order to prevent contamination of recyclable materials.

1.9.3 Compost

Consider composting on site if a reasonable amount of compostable material will be available. Compostable materials include plant material, sawdust, and certain food scraps.

1.9.4 Waste.

Materials with no practical use or economic benefit shall be disposed at a landfill or incinerator.

1.9.5 Return

Set aside and protect misdelivered and substandard products and materials and return to supplier for credit.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION 01 74 19

SECTION 01 78 00
CLOSEOUT SUBMITTALS

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM E 1971 (2005) Stewardship for the Cleaning of Commercial and Institutional Buildings

B. GREEN SEAL (GS)

1. GS-37 (2000; R 2009) Industrial and Institutional Cleaners

1.2 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

As-Built Record of Equipment and Materials

Warranty Management Plan

Warranty Tags

Final Cleaning

Spare Parts Data

SD-08 Manufacturer's Instructions

Preventative Maintenance

Condition Monitoring (Predictive Testing)

Inspection

Posted Instructions

Supply and Installation of Odor Control

SD-10 Operation and Maintenance Data

Operation and Maintenance Manuals

SD-11 Closeout Submittals

Record Drawings

Certification of EPA Designated Items

1.3 PROJECT RECORD DOCUMENTS

1.3.1 Record Drawings

Drawings showing final as-built conditions of the project. This paragraph covers record drawings complete, as a requirement of the contract. The terms "drawings," "contract drawings," "drawing files," "working record drawings" and "final record drawings" refer to contract drawings which are revised to be used for final record drawings showing as-built conditions. The manually prepared drawings must consist of 1 set of completed final as-built original transparency drawings, 2 sets of blue-line prints of the transparencies, and the approved marked working as-built prints.

1.3.1.1 Working Record and Final Record Drawings

Revise 2 sets of paper drawings by red-line process to show the as-built conditions during the prosecution of the project. Keep these working as-built marked drawings current on a weekly basis and at least one set available on the jobsite at all times. Changes from the contract plans which are made in the work or additional information which might be uncovered in the course of construction must be accurately and neatly recorded as they occur by means of details and notes. Prepare final record (as-built) drawings after the completion of each definable feature of work as listed in the Contractor Quality Control Plan (Foundations, Utilities, Structural Steel, etc., as appropriate for the project). The working as-built marked prints and final record (as-built) drawings will be jointly reviewed for accuracy and completeness by the APE and the Contractor prior to submission of each monthly pay estimate. If the Contractor fails to maintain the working and final record drawings as specified herein, the APE will deduct from the monthly progress payment an amount representing the estimated cost of maintaining the record drawings. This monthly deduction will continue until an agreement can be reached between the APE and the Contractor regarding the accuracy and completeness of updated drawings. Show on the working and final record 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 dimensions of any changes within the building structure.

- c. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures or utilities if any changes were made from contract plans.
- d. 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 fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.
- e. The topography, invert elevations and grades of drainage installed or affected as part of the project construction.
- f. Changes or modifications which result from the final inspection.
- g. Where contract drawings or specifications present options, show only the option selected for construction on the final as-built prints.
- h. If borrow material for this project is from sources on ASPA property, or if ASPA property is used as a spoil area, furnish a contour map of the final borrow pit/spoil area elevations.
- i. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems.
- j. Modifications (include within change order price the cost to change working and final record drawings to reflect modifications) and compliance with the following procedures.
 - (1) Follow directions in the modification for posting descriptive changes.
 - (2) Place a Modification Delta at the location of each deletion.
 - (3) For new details or sections which are added to a drawing, place a Modification Delta by the detail or section title.
 - (4) For minor changes, place a Modification Delta by the area changed on the drawing (each location).
 - (5) For major changes to a drawing, place a Modification Delta by the title of the affected plan, section, or detail at each location.
 - (6) For changes to schedules or drawings, place a Modification Delta either by the schedule heading or by the change in the schedule.
 - (7) The Modification Delta size shall be 1/2 inch diameter unless the area where the circle is to be placed is crowded. Smaller size circle shall be used for crowded areas.

1.3.1.2 Drawing Preparation

Modify the record drawings as may be necessary to correctly show the features of the project as it has been constructed by bringing the contract set into agreement with approved working

as-built prints, and adding such additional drawings as may be necessary. These working as-built marked prints must be neat, legible and accurate. These drawings are part of the permanent records of this project and must be returned to the APE after approval by the ASPA. Any drawings damaged or lost by the Contractor must be satisfactorily replaced by the Contractor at no expense to the ASPA.

1.3.1.3 Manually Prepared Drawings

Employ only personnel proficient in the preparation of manually prepared drawings to modify the original contract drawing or prepare additional new drawings. Additions and corrections to the contract drawings must be neat, clean and legible, shall be done to the same level of detail, and match the adjacent existing line work, and lettering being annotated in type, density, size and style. Drafting work must be done using the same medium (pencil, plastic lead or ink) that was employed on the original contract drawings and with graphite lead on paper base material. The APE will review record drawings for accuracy and conformance to the above specified drafting standards. Corrections, changes, additions, and deletions required must meet these standards. The title block to be used for any new record drawings must be similar to that used on the original drawings.

- a. When final revisions have been completed, Letter or stamp each drawing with the words "RECORD DRAWINGS / AS-BUILT CONDITIONS" followed by the name of the Contractor in letters at least 3/16 inch high. Mark original contract drawings either "Record" drawings denoting no revisions on the sheet or "Revised Record" denoting one or more revisions. Date all original contract drawings in the revision block.
- b. Within 10 days for contracts less than \$5 million and 20 days for contracts \$5 million and above after ASPA approval of all of the working record drawings for a phase of work, prepare the final record drawings for that phase of work and submit two sets of blue-line prints of these drawings for ASPA review and approval. The ASPA will promptly return one set of prints annotated with any necessary corrections. Within 7 days for contracts less than \$5 million and 10 days for contracts \$5 million and above, revise the drawings accordingly at no additional cost and submit one set of final prints for the completed phase of work to the ASPA. Within 10 days for contracts less than \$5 million and 20 days for contracts \$5 million and above of substantial completion of all phases of work, submit the final record drawing package for the entire project. Submit two blue-line prints of these drawings and the return of the approved marked record prints, complete in all details. Paper prints and reproducible drawings will become the property of the ASPA upon final approval. Failure to submit final record drawings and marked prints, as required herein, 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.

1.3.1.4 Payment

No separate payment will be made for record drawings required under this contract, and all costs accrued in connection with such drawings are considered a subsidiary obligation of the Contractor. As-Built drawings will be required before project completion can be considered by the APE.

1.3.2 As-Built Record of Equipment and Materials

Supply and Installation of Odor Control

Furnish one copy of preliminary record of equipment and materials used on the project 15 days prior to final inspection. This preliminary submittal will be reviewed and returned 2 days after final inspection with ASPA comments. Submit two sets of final record of equipment and materials 10 days after final inspection. Key the designations to the related area depicted on the contract drawings. List the following data:

RECORD OF DESIGNATED EQUIPMENT AND MATERIALS DATA

Description Specification Manufacturer Composition Where Section and Catalog, and Size Used Model, and Serial Number.

1.3.3 Final Approved Shop Drawings

Furnish final approved project shop drawings 30 days after transfer of the completed facility.

1.3.4 Construction Contract Specifications

Furnish final record (as-built) construction contract specifications, including modifications thereto, 30 days after transfer of the completed facility.

1.3.5 Real Property Equipment

Furnish a list of installed equipment furnished under this contract. Include all information usually listed on manufacturer's name plate. In the "EQUIPMENT-IN-PLACE LIST" include, as applicable, the following for each piece of equipment installed: description of item, location (by room number), model number, serial number, capacity, name and address of manufacturer, name and address of equipment supplier, condition, spare parts list, manufacturer's catalog, and warranty. Furnish a draft list at time of transfer. Furnish the final list 30 days after transfer of the completed facility.

1.4 SPARE PARTS DATA

Submit two copies of the Spare Parts Data list.

- a. Indicate manufacturer's name, part number, nomenclature, and stock level required for maintenance and repair. List those items that may be standard to the normal maintenance of the system.
- b. Supply the number of items specified within the individual technical sections of each relevant facility for spare parts inventory. Provision of spare parts does not relieve the Contractor of responsibilities listed under the contract guarantee provisions.

1.5 PREVENTATIVE MAINTENANCE

Submit Preventative Maintenance, Condition Monitoring (Predictive Testing) and Inspection schedules with instructions that state when systems should be retested.

- a. Define the anticipated length of each test, test apparatus, number of personnel identified by responsibility, and a testing validation procedure permitting the record operation capability requirements within the schedule. Provide a signoff blank for the Contractor and APE for each test feature; e.g., gpm, rpm, psi. Include a remarks column for the

testing validation procedure referencing operating limits of time, pressure, temperature, volume, voltage, current, acceleration, velocity, alignment, calibration, adjustments, cleaning, or special system notes. Delineate procedures for preventative maintenance, inspection, adjustment, lubrication and cleaning necessary to minimize corrective maintenance and repair.

- b. Repair requirements must inform operators how to check out, troubleshoot, repair, and replace components of the system. Include electrical and mechanical schematics and diagrams and diagnostic techniques necessary to enable operation and troubleshooting of the system after acceptance.

1.6 CERTIFICATION OF EPA DESIGNATED ITEMS

Submit the Certification of EPA Designated Items as required by FAR 52.223-9, "Certification and Estimate of Percentage of Recovered Material Content for EPA Designated Items". Include on the certification form the following information: project name, project number, Contractor name, license number, Contractor address, and certification. The certification will read as follows and be signed and dated by the Contractor. "I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

- 1) The product does not meet appropriate performance standards;
- 2) The product is not available within a reasonable time frame;
- 3) The product is not available competitively (from two or more sources);
- 4) The product is only available at an unreasonable price (compared with a comparable non-recycled content product)." Record each product used in the project that has a requirement or option of containing recycled (or biobased) content, noting total price, total value of post-industrial recycled content, total value of post-consumer recycled content, (total value of biobased content,) exemptions (1, 2, 3, or 4, as indicated), and comments. Recycled (and biobased) content values may be determined by weight or volume percent, but must be consistent throughout.

1.7 WARRANTY MANAGEMENT

1.7.1 Warranty Management Plan

Develop a warranty management plan which contains information relevant to the clause Warranty of Construction in the ASPA Contract Documents. At least 30 days before the planned pre-warranty conference, submit one set of the warranty management plan. Include within the warranty management plan all required actions and documents to assure that the ASPA 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 APE for approval prior to each monthly pay estimate. Assemble approved information in a binder and turn over to the ASPA 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. A joint 4 month and 9 month warranty inspection will be conducted, measured from time of acceptance, by the Contractor, APE and the Customer Representative. 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 roofs, HVAC balancing, pumps, motors, transformers, and for all commissioned systems such as fire protection and alarm systems, sprinkler systems, lightning protection systems, etc.
- d. A list for each warranted equipment, item, feature of construction or system indicating:
 - (1) Name of item.
 - (2) Model and serial numbers.
 - (3) Location where installed.
 - (4) Name and phone numbers of manufacturers or suppliers.
 - (5) Names, addresses and telephone numbers of sources of spare parts.
 - (6) 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.
 - (7) Cross-reference to warranty certificates as applicable.
 - (8) Starting point and duration of warranty period.
 - (9) Summary of maintenance procedures required to continue the warranty in force.
 - (10) Cross-reference to specific pertinent Operation and Maintenance manuals.
 - (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. The Contractor's plans for attendance at the 4 and 9 month post-construction warranty inspections conducted by the ASPA.

- f. Procedure and status of tagging of all equipment covered by extended warranties.
- g. Copies of instructions to be posted near selected pieces of equipment where operation is critical for warranty and/or safety reasons.

1.7.2 Performance and Pay Bonds

The Contractor's Performance and Pay Bonds 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 APE 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 ASPA 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 ASPA at the Contractor's expense, the APE 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 of the Contractor to respond will be cause for the APE to proceed against the Contractor.

1.7.3 Pre-Warranty Conference

Prior to contract completion, and at a time designated by the Contracting Officer, meet with the APE to develop a mutual understanding with respect to the requirements of this section. Communication procedures for Contractor notification of construction warranty defects, priorities with respect to the type of defect, reasonable time required for Contractor response, and other details deemed necessary by the APE for the execution of the construction warranty will be established/reviewed at this meeting. In connection with these requirements and at the time of the Contractor's quality control completion inspection, furnish the name, telephone number and address of a licensed and bonded company which is authorized to initiate and pursue construction warranty work action on behalf of the Contractor. This point of contact will be located within the local service area of the warranted construction, be continuously available, and be responsive to ASPA inquiry on warranty work action and status. This requirement does not relieve the Contractor of any of its responsibilities in connection with other portions of this provision.

1.7.4 Contractor's Response to Construction Warranty Service Requirements

Following oral or written notification by the APE, respond to construction warranty service requirements in accordance with the "Construction Warranty Service Priority List" and the three categories of priorities listed below. Submit a report on any warranty item that has been repaired during the warranty period. Include within the report the cause of the problem, date reported, corrective action taken, and when the repair was completed. If the Contractor does not perform the construction warranty within the timeframes specified, the ASPA will perform the work and backcharge the construction warranty payment item established.

- a. First Priority Code 1. Perform onsite inspection to evaluate situation, and determine course of action within 4 hours, initiate work within 6 hours and work continuously to completion or relief.
- b. Second Priority Code 2. Perform onsite inspection to evaluate situation, and determine course of action within 8 hours, initiate work within 24 hours and work continuously to completion or relief.
- c. Third Priority Code 3. All other work to be initiated within 3 work days and work continuously to completion or relief.
- d. The "Construction Warranty Service Priority List" is as follows:

Code 1-Life Safety Systems

- (1) Fire suppression systems.

Code 1-Electrical

- (1) Power failure (entire area or any building operational after 1600 hours).
- (2) Security lights

Code 2-Electrical

- (1) Power failure (no power to a room or part of building).
- (2) Receptacle and lights (in a room or part of building).

Code 1-Plumbing

- (2) Leaking water supply pipes.

Code 2-Water (Exterior)

- (1) No water to facility.

Code 3-All other work not listed above.

1.7.5 Warranty Tags

At the time of installation, tag each warranted item with a durable, oil and water resistant tag approved by the APE. Attach each tag with a copper wire and spray with a silicone waterproof coating. Also, submit two record copies of the warranty tags showing the layout and design. The date of acceptance and the QC signature must remain blank until the project is accepted for beneficial occupancy. Show the following information on the tag.

- a. Type of product/material_____.
- b. Model number_____.

- c. Serial number_____.
- d. Contract number_____.
- e. Warranty period_____ from_____ to_____.
- f. Inspector's signature_____.
- g. Construction Contractor_____.
- Address_____.
- Telephone number_____.
- h. Warranty contact_____.
- Address_____.
- Telephone number_____.
- i. Warranty response time priority code_____.
- j. WARNING - PROJECT PERSONNEL TO PERFORM ONLY OPERATIONAL MAINTENANCE DURING THE WARRANTY PERIOD.

1.8 OPERATION AND MAINTENANCE MANUALS

Submit 6 copies of the project operation and maintenance manuals 30 calendar days prior to testing the system involved. Update and resubmit data for final approval no later than 30 calendar days prior to contract completion. 4 copies shall be delivered to the APE and 2 copies shall be mailed to Lyon Associates, Inc. at:

ATTN: Samuela Tubui
 Project Engineer/Manager
 American Samoa Power Authority
 Tafuna

1.8.1 Configuration

Operation and Maintenance Manuals must be consistent with the manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Bind information in manual format and grouped by technical sections. Test data must be legible and of good quality. Light-sensitive reproduction techniques are acceptable provided finished pages are clear, legible, and not subject to fading. Pages for vendor data and manuals must have 0.3937-inch holes and be bound in 3-ring, loose-leaf binders. Organize data by separate index and tabbed sheets, in a loose-leaf binder. Binder must lie flat with printed sheets that are easy to read. Caution and warning indications must be clearly labeled. O&M information will fit into ASPA's master Operations and Maintenance Manual for the facility improvements.

1.8.2 Training and Instruction

Submit classroom and field instructions in the operation and maintenance of systems equipment where required by the technical provisions. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Contracting Officer will be given 7 calendar days written notice of scheduled instructional services. Instructional materials belonging to the manufacturer or vendor, such as lists, static exhibits, and visual aids, must be made available to the APE.

1.9 CLEANUP

Provide final cleaning in accordance with ASTM E 1971 and submit two copies of the listing of completed final clean-up items. Leave premises "broom clean." Comply with GS-37 for general purpose cleaning and bathroom cleaning. Use only nonhazardous cleaning materials, including natural cleaning materials, in the final cleanup. Clean interior and exterior glass surfaces exposed to view; remove temporary labels, stains and foreign substances; polish transparent and glossy surfaces; vacuum carpeted and soft surfaces. Clean equipment and fixtures to a sanitary condition. Clean filters of operating equipment and comply with the Indoor Air Quality (IAQ) Management Plan. Clean debris from roofs, gutters, downspouts and drainage systems. Sweep paved areas and rake clean landscaped areas. Remove waste and surplus materials, rubbish and construction facilities from the site. Recycle, salvage, and return construction and demolition waste from project in accordance with the Waste Management Plan. Promptly and legally transport and dispose of any trash. Do not burn, bury, or otherwise dispose of trash on the project site.

1.10 PROJECT COMPLETION

Substantial completion of the project construction shall be given by the APE after they have determined that all construction has been completed in accordance with the contract documents and ASPA's Standard Terms and Conditions. Final inspections and acceptance of the work and as-built or record drawings will need to be accepted by the APE prior to issuance of Substantial completion. Contract completion shall be determined by the APE after all terms in the contract documents have been met.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 78 00

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

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.

A. ASTM INTERNATIONAL (ASTM)

1. ASTM E 1971 (2005) Stewardship for the Cleaning of Commercial and Institutional Buildings

1.2 SUBMISSION OF OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance (O&M) Data specifically applicable to this contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors shall compile and prepare data and deliver to the Contractor prior to the training of ASPA personnel. The Contractor shall compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include an index preceding each submittal. ASPA and their project consultant will compile the project specific O&M information into their master O&M Manual for the overall project. Submit in accordance with this section and Section 01 33 00 SUBMITTAL PROCEDURES. 4 copies shall be delivered to the APE ;

ATTN: Samuela Tubui
Project Engineer/Manager
American Samoa Power Authority
Tafuna

1.2.1 Package Quality

Documents must be fully legible. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.2.2 Package Content

Data package content shall be as shown in the paragraph titled "Schedule of Operation and Maintenance Data Packages." Comply with the data package requirements specified in the individual technical sections, including the content of the packages and addressing each product, component, and system designated for data package submission, except as follows. Commissioned items without a specified data package requirement in the individual technical sections shall use Data Package 3. Commissioned items with a Data Package 1 or 2

requirement shall use instead Data Package 3.

1.2.3 Changes to Submittals

Manufacturer-originated changes or revisions to submitted data shall be furnished by the Contractor if a component of an item is so affected subsequent to acceptance of the O&M Data. Changes, additions, or revisions required by the APE for final acceptance of submitted data, shall be submitted by the Contractor within 30 calendar days of the notification of this change requirement.

1.2.4 Review and Approval

The Contractor's Commissioning Authority (CA) shall review the commissioned systems and equipment submittals for completeness and applicability. The ASPA shall verify that the systems and equipment provided meet the requirements of the Contract documents and design intent, particularly as they relate to functionality, energy performance, water performance, maintainability, sustainability, system cost, indoor environmental quality, and local environmental impacts. The CA shall communicate deficiencies to the APE. Upon a successful review of the corrections, the CA shall recommend approval and acceptance of these O&M manuals to the APE. This work shall be in addition to the normal review procedures for O&M data.

1.2.5 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.3 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.3.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.3.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.3.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.3.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown and Post-shutdown operating procedures including the control sequence for each procedure.

1.3.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include Control Diagrams with data to explain operation and control of systems and specific equipment.

1.3.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations and zones or portions of systems controlled.

1.3.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.3.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component or system. Describe conditions under which the item equipment should not be allowed to run.

1.3.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph titled "Operator Service Requirements":

- a. A table showing recommended lubricants for specific temperature ranges and applications.
- b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.
- c. A Lubrication Schedule showing service interval frequency.

1.3.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests and adjustments required to ensure proper and economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each

separate operation.

1.3.2.3 Cleaning Recommendations

Provide environmentally preferable cleaning recommendations in accordance with ASTM E 1971.

1.3.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.3.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.3.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams shall be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.3.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.3.3.4 Removal and Replacement Instructions

Include step-by-step procedures and a list required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings and adjustments required. Instructions shall include a combination of text and illustrations.

1.3.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. List spare parts and supplies that have a long lead-time to obtain.

1.3.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Corrective maintenance that requires completion or participation of the equipment manufacturer shall be identified and tabulated separately.

1.3.5 Appendices

Provide information required below and information not specified in the preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.3.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable technical sections.

1.3.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable technical sections.

1.3.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable technical sections.

1.3.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing shall show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Parts shown in the listings shall be grouped by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.3.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.3.5.6 Personnel Training Requirements

Provide information available from the manufacturers that are needed for use in training

designated personnel to properly operate and maintain the equipment and systems.

1.3.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.3.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.3.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each Subcontractor who installed the product or equipment, or system. For each item, also provide the name address and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.4 TYPES OF INFORMATION REQUIRED IN CONTROLS O&M DATA PACKAGES

Include Data Package 5 and the following for control systems:

- a. Narrative description on how to perform and apply all functions, features, modes, and other operations, including unoccupied operation, seasonal changeover, manual operation, and alarms. Include detailed technical manual for programming and customizing control loops and algorithms.
- b. Full as-built sequence of operations.
- c. Copies of all checkout tests and calibrations performed by the contractor.
- d. Full print out of all schedules and set points after testing and acceptance of the system.
- e. Full as-built print out of software program.
- f. Electronic copy on disk or CD of the entire program for this facility.
- g. Marking of all system sensors and thermostats on the as-built floor plan and mechanical drawings with their control system designations.

1.5 SCHEDULE OF OPERATION AND MAINTENANCE PACKAGES

Furnish the O&M data packages specified in individual technical sections. The minimum required information for each O&M package is as follows:

1.5.1 Package 1

- a. Safety precautions
- b. Cleaning recommendations
- c. Maintenance and repair procedures
- d. Warranty information
- e. Contractor information
- f. Spare parts and supply list

1.5.2 Package 2

- a. Safety precautions
- b. Normal operations
- c. Environmental conditions
- d. Lubrication data
- e. Preventive maintenance plan and schedule
- f. Cleaning recommendations
- g. Maintenance and repair procedures
- h. Removal and replacement instructions
- i. Spare parts and supply list
- j. Parts identification
- k. Warranty information
- l. Contractor information

1.5.3 Package 3

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations

- f. Environmental conditions
- g. Lubrication data
- h. Preventive maintenance plan and schedule
- i. Cleaning recommendations
- j. Troubleshooting guides and diagnostic techniques
- k. Wiring diagrams and control diagrams
- l. Maintenance and repair procedures
- m. Removal and replacement instructions
- n. Spare parts and supply list
- o. Product submittal data
- p. O&M submittal data
- q. Parts identification
- r. Warranty information
- s. Testing equipment and special tool information
- t. Testing and performance data
- u. Contractor information

1.5.4 Package 4

- a. Safety precautions
- b. Operator prestart
- c. Startup, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Emergency operations
- f. Operator service requirements
- g. Environmental conditions
- h. Lubrication data

- i. Preventive maintenance plan and schedule
- j. Cleaning recommendations
- k. Troubleshooting guides and diagnostic techniques
- l. Wiring diagrams and control diagrams
- m. Maintenance and repair procedures
- n. Removal and replacement instructions
- o. Spare parts and supply list
- p. Corrective maintenance man-hours
- q. Product submittal data
- r. O&M submittal data
- s. Parts identification
- t. Warranty information
- u. Personnel training requirements
- v. Testing equipment and special tool information
- w. Testing and performance data
- x. Contractor information

1.5.5 Package 5

- a. Safety precautions
- b. Operator prestart
- c. Start-up, shutdown, and post-shutdown procedures
- d. Normal operations
- e. Environmental conditions
- f. Preventive maintenance plan and schedule
- g. Troubleshooting guides and diagnostic techniques
- h. Wiring and control diagrams

- i. Maintenance and repair procedures
- j. Removal and replacement instructions
- k. Spare parts and supply list
- l. Product submittal data
- m. Manufacturer's instructions
- n. O&M submittal data
- o. Parts identification
- p. Testing equipment and special tool information
- q. Warranty information
- r. Testing and performance data
- s. Contractor information

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION 01 78 23

DIVISION 02
EXISTING CONDITIONS

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Description: The work includes demolition, removal, relocation and restoration work as indicated on the drawings and as specified herein. All materials resulting from demolition work, except as indicated or specified otherwise, shall become the property of the Contractor and shall be removed from the project site. Remove rubbish and debris from the job site daily, unless otherwise directed. Store materials which cannot be removed daily in areas specified by the ASPA Project Engineer (APE). The Contractor shall pay for all necessary permits and certificates that may be required in connection with this work.

1.2 SUBMITTALS

- A. Submit proposed demolition and removal procedures to the APE for approval before work is started in accordance with Section 01 33 00 Submittal Procedures. Procedures shall provide for coordination with other work in progress and a detailed description of methods and equipment to be used for each for operation, and sequence of operations. Demolished site work shall not be used as fill material on-site.

1.3 DUST CONTROL

- A. Prevent the spread of dust and debris and avoid the creation of a nuisance in the surrounding area. Do not use water if it will result in hazardous or objectionable conditions such as flooding or pollution. Contractor shall provide the APE with details of the proposed dust control method as required in Section 01 57 19.00 20 TEMPORARY ENVIRONMENTAL CONTROLS.

1.4 PROTECTION

- A. Existing Improvements: Protect existing improvements that are to remain in place.
- B. Trees: Protect trees within the project site which might be damaged during the demolition work.
- C. Public Safety: Where pedestrian and driver safety is endangered in the work or storage areas, use traffic barricades with flashing lights. Notify the APE prior to beginning of any such work. The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, and passageways, etc. Provide details on the proposed traffic control plan as required in Section 01 50 00 TEMPORARY CONSTRUCTION FACILITIES AND CONTROLS.
- D. Explosives: Use of explosives will not be permitted.

- E. Utility Service: Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. Prior to start of work, utilities serving each area of alteration or removal will be shut off, disconnected and sealed by the Contractor. Contractor shall coordinate electrical, communications, etc. service disconnection and removal of utility owned equipment and installation with ASPA.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Do not begin demolition until authorization is received from the APE. Remove rubbish and debris from the project site daily. Store materials that cannot be removed daily in areas specified by the APE.

3.2 SELECTION OF BORROW MATERIALS

- A. Select borrow material to meet the requirements and conditions of the particular fill for which it is to use. Source of fill materials shall be approved by the APE.

3.3 BACKFILL AND COMPACTION

- A. Place backfill and compact to a minimum 90 percent laboratory maximum density or as shown otherwise in the Construction plans.

3.4 EXISTING CONDITIONS DOCUMENTATION

- A. Before beginning any demolition or excavation work, survey the site, and examine the drawings and specifications to determine the extent of the work. Photographic and/or video imaging of the existing conditions is encouraged by the Contractor to prevent uncertainty of the existing condition just before demolition. The plans are based on best available information, but the details of the structures and locations of buried piping may differ. The Contractor shall be responsible for determining the configuration and location of all existing utilities.

3.5 EXISTING FACILITIES TO BE DEMOLISHED

- A. All existing utilities and facilities to be demolished, removed and disposed shall be as indicated on the drawings. Saw cutting and excavation works shall be conducted in accordance with section 01 35 26 Safety Requirements and along the limits required to provide connection to existing pavements and/or structures and restoration of existing conditions as shown in the plans.

3.6 RESTORATION

Supply and Installation of Sludge Press

- A. Restore concrete, asphalt concrete pavement, gravel base course and select backfill materials, and other items that were disturbed to their original conditions. All restoration work shall be in accordance with the appropriate specification section for concrete pavement, material finish, etc. and approved by the APE.

3.8 WORKMANSHIP

- A. Contractor shall use demolition equipment and methods that will not damage the structure, utilities, and other existing work to remain. Any damage which may occur due to demolition activities shall be the Contractor's sole responsibility. Do not interfere with existing and ongoing ASPA operations at the Fogagogo WWTP and coordinate all demolition work with plant personnel to avoid disruptions. Contractor responsible for disconnecting or turning off existing utilities above and below and protecting them for future use.

3.9 ELECTRICAL AND UTILITY DEMOLITION

- A. 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. 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.
- B. Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the APE.
- C. Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the APE. Do not interrupt existing utilities serving facilities occupied and used by ASPA except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.
- D. Remove existing utilities and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the APE. When utility lines are encountered that are not indicated on the drawings, the APE shall be notified prior to further work in that area.

END OF SECTION 02 41 00

DIVISION 03

CONCRETE

SECTION 03 05 15

PORTLAND CEMENT CONCRETE

PART 1 GENERAL

1.1 SUMMARY

- A. Description: This Section includes Portland cement concrete composed of Portland cement, fine aggregate, coarse aggregate, and water. The Work includes adding admixtures for the purpose of retarding or accelerating set, and other purposes as required or permitted.

1.2 REFERENCES

- A. American Concrete Institute (ACI):
1. ACI 121R Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
 2. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 3. ACI 301 Specification for Structural Concrete
 4. ACI 304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
 5. ACI 304.2R Placing Concrete by Pumping Methods
 6. ACI 305R Hot Weather Concreting
 7. ACI 305R Building Code Requirements for Structural Concrete
- B. ASTM International (ASTM):
1. ASTM C31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
 2. ASTM C33 Standard Specification for Concrete Aggregates
 3. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 4. ASTM C42 Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

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|-----|-----------|---|
| 5. | ASTM C94 | Standard Specification for Ready-Mixed Concrete |
| 6. | ASTM C114 | Standard Test Methods for Chemical Analysis of Hydraulic Cement |
| 7. | ASTM C136 | Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates |
| 8. | ASTM C143 | Standard Test Method for Slump of Hydraulic-Cement Concrete |
| 9. | ASTM C150 | Standard Specification for Portland Cement |
| 10. | ASTM C172 | Standard Practice for Sampling Freshly Mixed Concrete |
| 11. | ASTM E329 | Standard Specification for Agencies Engaged in Construction Inspection and/or Testing |
- C. State of Hawaii Department of Transportation Standard Specifications (HSS):
1. HSS Section 601 Structural Concrete
 2. HSS Section 701 Hydraulic Cement
 3. HSS Section 703 Aggregates
 4. HSS Section 711 Concrete Curing Materials and Admixtures
 5. HSS Section 712 Miscellaneous

1.3 SUBMITTALS

- A. General: Refer to Section 01 33 00 – SUBMITTAL PROCEDURES, Product Data, and Samples, for submittal requirements and procedures.
- B. Concrete Mix Designs: Submit mix designs as specified in Item 2.02 herein. Include laboratory test reports of trial strength tests.
- C. Product Data: Submit manufacturer's product data for proposed concrete admixtures.
- D. Samples: Furnish and deliver samples of cement and aggregates for testing and analysis. This requirement may be waived if certificates of compliance are furnished, as specified in Items 1.05C and 1.06A herein.
- E. Affidavits/Certificates: Submit evidence of compliance with specification requirements for cement, aggregate, and admixtures. Mill tests and manufacturers' certification of compliance with ASTM International (ASTM) specifications will be accepted in lieu of testing of cement and analysis of

aggregates.

- F. Batch Tickets: Submit a delivery ticket in accordance with HSS Subsection 601.03(E) – Transporting Mixed Concrete.

1.4 QUALITY CONTROL

- A. General: Refer to Section 01 45 00.00 10 – Quality Control, for quality control requirements and procedures.
- B. Select a qualified concrete supplier capable of meeting work requirements and the requirements of these Specifications.
- C. The concrete supplier shall be certified by the National Ready Mix Concrete Association and shall hold a valid certificate of conformance for concrete production facilities.
- D. Provide a Quality Assurance Program to ensure control and uniformity of materials, conformance with accepted mix designs, and prompt and proper delivery of concrete to the job site in accordance with the applicable requirements and recommendations of ACI 121R and ASTM C94.

1.5 TESTS AND ANALYSES OF MATERIALS

- A. Tests and Sample Analysis: Perform testing of cement, admixture, and analysis of aggregates. Mill tests and supplier's certification of compliance with ASTM specifications will be accepted in lieu of testing of cement and analysis of aggregates. Tests and services shall consist of the following:
 - 1. Testing of Portland cement in accordance with ASTM C150 and ASTM C114.
 - 2. Analysis of aggregates in accordance with ASTM C33, and sieve analysis of fine and coarse aggregates in accordance with ASTM C136.
 - 3. Conform to HSS Subsection 711.03(B) – Admixture Acceptance.
- B. Samples: Furnish and deliver identified samples of materials required for tests and analysis in the amounts required by the APE without charge. Deliver samples of cement and aggregates at least 30 days prior to use.

1.6 CLASSES OF CONCRETE

- A. Classes of concrete are designated by a numerical symbol indicating the minimum 28-day compressive strength in pounds per square inch (psi), as determined by ASTM C39.
- B. Each class of concrete may consist of one or more mixes determined by the maximum size of aggregate, cement factor, and types of admixtures or special aggregates used.

- C. Each mix within a class of concrete shall be considered a specific type, requiring acceptance of the mix design.
- D. The various classes of concrete are listed in Table 03 05 15-A at the end of this Section.

1.7 PROJECT CONDITIONS

- A. Batching, mixing, and delivering concrete in hot weather shall conform to the applicable requirements of ACI 305R.
- B. Maximum ambient temperature for placing concrete shall be 90 degrees Fahrenheit. If the ambient temperature exceeds 90 degrees Fahrenheit, the mix shall be cooled by an appropriate method such as icing the mixing water. Uniform concrete temperature of succeeding batches placed shall be maintained. The maximum allowable fresh concrete temperature shall be limited to 95 degrees Fahrenheit. Higher allowable concrete temperature would require written approval from the APE.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Portland Cement: Shall conform to the requirements of ASTM C150.
- B. Aggregates:
 - 1. Coarse Aggregate: Shall conform to the requirements of ASTM C33.
 - 2. Fine Aggregate: Shall conform to the requirements of ASTM C33.
- C. Admixtures: Shall conform to ASTM C 494/ C 494M. Type A water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures.
- D. Water

2.2 MIXES

- A. Design of concrete mixes, including recommended amounts of admixture and water to be used in the mixes, shall be obtained from a qualified independent testing laboratory or agency, or from a mill or ready-mix plant properly equipped to design concrete mixes. The laboratory, agency, mill, or ready-mix plant shall meet the applicable requirements of ASTM E329.
- B. Selection of mix proportions shall conform to the applicable requirements of ACI 211.1. Concrete shall comply with ACI 301 and ACI 318, as applicable. Ensure that mix designs will produce concrete suited for proper placement and finishing.

- C. Mix designs shall indicate brands, types, and quantities of admixtures included. If fly ash is proposed, it shall be identified as such (i.e., fly ash) and the mix design shall identify the percentage of cement replacement and locations in the structures where such mixes are proposed for use.
- D. Mix design for mass concrete shall have a percentage of fly ash replacement of cement by weight, to reduce the amount of heat generated during heat of hydration.
- E. If concrete is to be placed by pumping, concrete mixes shall be designed in accordance with the applicable requirements of ACI 304R and ACI 304.2R and shall include strengths and slumps.
- F. Mix designs shall indicate the location of each mix within the structure. Mix designs shall specify both coarse and fine aggregate sources.
- G. Upon receipt of acceptable mix designs from the prequalified testing laboratory, agency, or concrete supplier conforming to specified requirements, submit these accepted mix designs to the APE for review.
- H. Concrete mixes shall contain at a minimum the number of 94-pound sacks of cement per cubic yard specified in Table 03 05 15-A, regardless of the fact that the strengths specified may be obtained with lesser amounts of cement. Exception will only be made for mass concrete to reduce the heat of hydration, as specified herein.

PART 3 EXECUTION

3.1 BATCHING, MIXING, AND TRANSPORTING

- A. Batching Portland cement concrete shall be in accordance with the requirements of HSS Subsection 601.03(C) – Batching.
- B. Mixing Portland cement concrete shall be in accordance with the requirements of HSS Subsection 601.03(D) – Mixing.
- C. Transporting Portland cement concrete shall be in accordance with the requirements of HSS Subsection 601.03(E) – Transporting Mixed Concrete.

3.2 FIELD QUALITY CONTROL

- A. Inspection, Sampling and Testing: In accordance with HSS Subsection 601.03(A) – Quality Control.
- B. Methods of Sampling and Testing:
 - 1. Sampling: Representative composite samples will be taken in accordance with ASTM C172. Each sample will be randomly obtained from a different batch of concrete.

2. Slump Tests: The Contractor's independent test laboratory shall perform slump tests of concrete during placing of concrete, as required, in accordance with ASTM C143.
3. Temperature: The Contractor's independent test laboratory shall measure the temperature of concrete during placement of concrete, as required.
4. Strength Tests:
 - a. Prepare and cure compression test samples. Cylinders will be made and cured in accordance with ASTM C31. Cylinders will be tested in accordance with ASTM C39.
 - b. The minimum number of test cylinders to be made for each class of concrete and for each placement will be four for each 10 cubic yards or fraction thereof. When additional sets of test cylinders are required beyond the normal 7- and 28-day tests, each set will consist of a minimum of two test cylinders.
 - c. All cylinders in a set will be marked with a unique number on one end. Record this number on the record of concrete placed. The Contractor's testing laboratory shall cure all cylinders.
 - d. From each set of cylinders cast, one cylinder will be tested at 7 days and two cylinders will be tested at 28 days, in accordance with ASTM C39. If the 28-day tests are satisfactory, the fourth cylinder shall be discarded.
 - e. In the event that the 28-day tests are below the specified strength requirements, the laboratory shall test the fourth cylinder.
6. Tests for Concrete Uniformity: The Contractor's independent test laboratory shall perform tests for concrete uniformity in accordance with ASTM C94, Annex A1.

C. Evaluation and Acceptance of Tests:

1. Acceptance of Concrete: The strength of the concrete will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified 28-day compressive strength, and no individual strength test result falls below the specified 28-day compressive strength by more than 300 psi.
2. Concrete Consistency: Consistency shall be within the nominal slump range specified in HSS Table 601.03-3 – Slump for Concrete.
3. Adjustments: The Contractor may order adjustments to mix proportions, increases in minimum cement content, additional curing of a structure, or any combination of the above when the strength test acceptance criteria specified are not being met.

4. Test Cores:

- a. When laboratory test results indicate that concrete is more than 300 psi below the specified strength or if there is likelihood of low-strength concrete, a significant reduction in load-carrying capacity, or absence of desired durability in the concrete, the APE may require tests of cores drilled from the areas in question.
- b. Test cores shall be obtained from each member or area of suspect strength, from locations designated by the APE, and test specimens shall be prepared by the Contractor in accordance with ASTM C42.
- c. Three cores shall be taken for each determination of in-place strength. Concrete in the area represented by the core tests shall be considered structurally adequate if the average of the three cores is equal to at least 85 percent of the specified design strength and no single core is less than 75 percent of the design strength. Locations represented by erratic core strengths may be retested at the direction of the APE.
- d. Core holes shall be filled in accordance with the requirements of Section 03 35 00 – Concrete Finishing, for repair of surface defects.

7. Rejection of Concrete, Repair, and Replacement: The APE shall have the authority to reject concrete work that does not meet specification requirements, and to require repair or replacement as necessary to complete the Work.

D. Acceptance of Structure: Acceptance of completed concrete work requires conformance with the dimensional tolerances, appearance, and strengths specified in these Specifications and in ACI 301.

Table 03 05 15-A:
Portland Cement Concrete Mixes

Classification		Minimum Cement Content
Compressive Strength (psi*)	Maximum Aggregate Size	94-Pound Sacks per Cubic Yard
2500	3/8 inch	5.0
2500	3/4 inch	4.5
2500	1-1/2 inch	4.5
3000	3/8 inch	5.5
3000	3/4 inch	5.0
3000	1-1/2 inch	5.0
4000	1-1/2 inch	5.5

* psi = pounds per square inch at 28 days: Minimum strength(f'c). The above data are for normal weight aggregates without any admixtures

3.3 CONCRETE CLASSES AND USAGE

A. Gallons of water per bag of cement: Maximum allowable.

Concrete Class	Min. 28 days Compressive Strength (psi)	Water	Usage
AAA	4,000	5.0	Precast Sewer Manhole
A	3,000	6.6	Valve vault box extension, extended floor slab, etc.
B	2,500	7.3	Concrete pipe support and thrust blocks

END OF SECTION 03 05 15

SECTION 03 11 00

CONCRETE FORMING

PART 1 GENERAL

1.1 SUMMARY

- A. Description: This Section includes specifications for designing, furnishing materials, fabricating, erecting, and removing formwork for Miscellaneous Cast-In-Place concrete.
- B. Section Includes:
 - 1. Layout of Formwork
 - 2. Formwork Construction
 - 3. Form Release Material
 - 4. Removal of Forms
 - 5. Field Quality Control
 - 6. Re-Use of Forms
- C. Related Sections:
 - 1. Section 03 30 53 – Miscellaneous Cast-In-Place Concrete
 - 2. Section 03 35 00 – Concrete Finishing

1.2 REFERENCES

- A. American Concrete Institute (ACI):
 - 1. ACI 117 Specifications for Tolerances for Concrete Construction and Materials and Commentary
- B. State of Hawaii Department of Transportation Standard Specifications (HSS):
 - 2. HSS Section 503 Concrete Structures

1.3 SUBMITTALS

- A. General: Refer to Section 01 33 00 – SUBMITTAL PROCEDURES, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures.

- B. Shop Drawings: Submit drawings that indicate and include the following details and requirements:
 - 1. Forming system and method of erection with associated details.
 - 2. Method and schedule for removing forms.
- C. Product Data: Submit manufacturer's product data for manufactured products specified and identified.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Storage: Store form panels to prevent warpage. Protect panels from damage and contamination that could adversely affect concrete.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Forms shall be wood or steel.
- B. Form Release Agent: Commercial-formulation, silicone-free form release agent, designed for use on all types of forms, which will not bond with, stain, or adversely affect concrete surfaces; impair subsequent treatment of concrete surfaces requiring bond or adhesion; or impede wetting of surfaces that will be cured with water, or curing compounds.

2.2 FABRICATION

- A. Formwork – General: Fabricate forms in accordance with approved shop drawings. Maintain forms clean, smooth, and free from imperfections and distortion.
- B. Steel Forms: Fabricate panels conforming to approved shop drawings. Reinforce panel surfaces in a manner that will prevent bow and deflection during concrete placement.

PART 3 EXECUTION

3.1 LAYOUT OF FORMWORK

- A. Locate and stake out all forms and establish all lines, levels, and elevations.

3.2 FORMWORK CONSTRUCTION

- A. Formwork:
 - 1. Construct formwork in accordance with approved shop drawings, and in a manner that will produce finished concrete surfaces conforming to indicated

design and within specified tolerances.

3.3 FORM RELEASE MATERIAL

- A. Clean and coat form contact surfaces with form release agent before reinforcement is placed.

3.4 REMOVAL OF FORMS

- A. Remove forms by methods that will not injure, mar, gouge, or chip concrete surfaces, overstress concrete members, or distort formwork. Use air pressure or other approved methods. Do not pry against concrete. Cut off nails flush. Leave surfaces clean and unblemished.
- B. Concrete work damaged by removal operations shall be repaired as specified in Section 03 35 00 – Concrete Finishing. Where exposed surfaces are damaged beyond acceptable repair measures, damaged concrete shall be removed and replaced with new concrete.

3.5 FIELD QUALITY CONTROL

- A. Before placing concrete, check lines and grades of erected formwork.
- B. While placing concrete, provide quality control to assure that formwork and related supports have not been displaced, loss of cement paste through joints is prevented, and completed work will be within specified tolerances.

END OF SECTION 03 11 00

SECTION 03 20 00.00 10

CONCRETE REINFORCING

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.

A. ACI INTERNATIONAL (ACI)

1. ACI 318 (2008; Errata 2010) Building Code Requirements for Structural Concrete and Commentary
2. ACI 318M (2008; Errata 2010) Building Code Requirements for Structural Concrete & Commentary
3. ACI SP-66 (2004) ACI Detailing Manual

B. AMERICAN WELDING SOCIETY (AWS)

1. AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding Code - Reinforcing Steel

C. ASTM INTERNATIONAL (ASTM)

1. ASTM A 370 (2010) Standard Test Methods and Definitions for Mechanical Testing of Steel Products
2. ASTM A 615/A 615M (2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
3. ASTM A 706/A 706M (2009b) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

Supply and Installation of Odor Control

4. ASTM A 767/A 767M (2009) Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

D. CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

1. CRSI 10MSP (2009; 28th Ed) Manual of Standard Practice

1.2 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Reinforcement

SD-07 Certificates

Reinforcing Steel

1.3 DELIVERY, STORAGE, AND HANDLING

Reinforcement shall be stored off the ground on platforms, skids, or other supports.

PART 2 PRODUCTS

2.1 REINFORCING STEEL

Reinforcing steel shall be deformed bars conforming to ASTM A 615/A 615M or ASTM A 706/A 706M, grades and sizes as indicated. In highly corrosive environments or when directed by the APE, reinforcing steel shall conform to ASTM A 767/A 767M.

2.1.1 Zinc-Coated (Galvanized) Bars

Zinc-coated (galvanized) bars shall comply with the requirements of ASTM A 767/A 767M, Class A coating, galvanized after fabrication.

2.2 WIRE TIES

Wire ties shall be 16 gauge or heavier commercial grade wire.

2.3 SUPPORTS

Bar supports shall comply with the requirements of ACI SP-66. Supports for bars in concrete with formed surfaces exposed to view or to be painted shall be plastic-coated wire, stainless steel or precast concrete supports. Precast concrete supports shall be wedged-shaped, not

Supply and Installation of Odor Control

larger than 3-1/2 by 3-1/2 inches, of thickness equal to that indicated for concrete cover and have an embedded hooked tie-wire for anchorage. Bar supports used in precast concrete with formed surfaces exposed to view shall be the same quality, texture and color as the finish surfaces.

PART 3 EXECUTION

3.1 REINFORCEMENT

Reinforcement steel and accessories shall be fabricated and placed as specified and shown on approved shop drawings. Fabrication and placement details of steel and accessories not specified or shown shall be in accordance with ACI SP-66 and ACI 318. Reinforcement shall be cold bent unless otherwise authorized. Bending may be accomplished in the field or at the mill. Zinc-Coated bars shall be mill-bent prior to coating. All steel shall be bent cold unless authorized. Bars shall not be bent after embedment in concrete. Safety caps shall be placed on all exposed ends of vertical concrete reinforcement bars that pose a danger to life safety. Wire tie ends shall face away from the forms. Submit detail drawings showing reinforcing steel placement, schedules, sizes, grades, and splicing and bending details. Drawings shall show support details including types, sizes and spacing.

3.1.1 Placement

Reinforcement shall be free from loose rust and scale, dirt, oil, or other deleterious coating that could reduce bond with the concrete. Reinforcement shall be placed in accordance with ACI 318 at locations shown plus or minus one bar diameter. Reinforcement shall not be continuous through expansion joints and shall be as indicated through construction or contraction joints. Concrete coverage shall be as indicated or as required by ACI 318. If bars are moved more than one bar diameter to avoid interference with other reinforcement, conduits or embedded items, the resulting arrangement of bars, including additional bars required to meet structural requirements, shall be approved before concrete is placed.

3.1.2 Splicing

Splices of reinforcement shall conform to ACI 318 and shall be made only as required or indicated. Splicing shall be by lapping or by mechanical or welded butt connection. Welding shall conform to AWS D1.4/D1.4M. Lapped bars shall be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than one-fifth the required length of lap or 6 inches. Mechanical butt splices shall be in accordance with the recommendation of the manufacturer of the mechanical splicing device. Butt splices shall develop 125 percent of the specified minimum yield tensile strength of the spliced bars or of the smaller bar in transition splices. Bars shall be flame dried before butt splicing. Adequate jigs and clamps or other devices shall be provided to support, align, and hold the longitudinal centerline of the bars to be butt spliced in a straight line.

3.1.3 Placing Tolerances

3.1.3.1 Spacing

The spacing between adjacent bars and the distance between layers of bars may not vary

Supply and Installation of Odor Control

from the indicated position by more than one bar diameter nor more than 1 inch.

3.1.3.2 Concrete Cover

The minimum concrete cover of main reinforcement steel bars shall be as shown. The allowable variation for minimum cover shall be as follows:

MINIMUM COVER (inch)	VARIATION (inch)
6	plus 1/2
4	plus 3/8
3	plus 3/8
2	plus 1/4
1-1/2	plus 1/4
1	plus 1/8
3/4	plus 1/8

3.1.4 Splicing

Splices in steel bars shall be made only as required. Bars may be spliced at alternate or additional locations at no additional cost to the ASPA subject to approval.

3.1.4.1 Lap Splices

Lapped bars may be placed in contact and securely tied or spaced transversely apart to permit the embedment of the entire surface of each bar in concrete. Lapped bars shall not be spaced farther apart than 1/5 the required length of lap or 6 inches.

3.2 FIELD TESTS AND INSPECTIONS

3.2.1 Identification of Splices

Establish and maintain an approved method of identification of all field splices which will indicate the splicer and the number assigned each splice made by the splicer.

3.2.2 Examining, Testing, and Correcting

The Contractor shall notify the APE when ready for inspection and allow sufficient time for inspection prior to placing of concrete.

END OF SECTION 03 20 00

SECTION 03 30 53

MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

Perform all work in accordance with ACI MCP PACK Parts 2 and 3.

1.2 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.

A. ACI INTERNATIONAL (ACI)

1. ACI MCP PACK (2010) Manual of Concrete Practice

B. ASTM INTERNATIONAL (ASTM)

1. ASTM A 615/A 615M (2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
2. ASTM A 320/A 320M (2011) Standard Specification for Alloy-Steel and Stainless Steel Bolting for low – Temperature Services.
3. ASTM C 31/ C 31M (2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field
4. ASTM C 33/C 33M (2011) Standard Specification for Concrete Aggregates
5. ASTM C 39/C 39M (2010) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimen
6. ASTM C 94/C 94M (2011) Standard Specification for Ready-Mixed Concrete
7. ASTM C 143/C 143M (2010) Standard Test Method for Slump of Hydraulic-Cement Concrete
8. ASTM C 150/C 150M (2009) Standard Specification for Portland Cement

9. ASTM C 171	(2007) Standard Specification for Sheet Materials for Curing Concrete
10. ASTM C 172/C 172 M	(2010) Standard practice for Sampling Concrete
11. ASTM C 309/C 309M	(2011) Standard Specification for Liquid-Membrane Forming Compound for Curing Concrete
12. ASTM C 494/C 494M	(2011) Standard Specification for Chemical Admixtures for Concrete
13. ASTM C 1064/C 1064M	-2008 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
14. ASTM C 1107/C 1107M	(2011) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
15. ASTM D 1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
16. ASTM D 75/D 75M	(2009) Standard Practice for Sampling Aggregates

1.3 SYSTEM DESCRIPTION

The ASPA retains the option to sample and test aggregates and concrete to determine compliance with the specifications. Provide facilities and labor as may be necessary to assist the ASPA in procurement of representative test samples. Obtain samples of aggregates at the point of batching in accordance with ASTM D 75/D 75M. Sample concrete in accordance with ASTM C172/C172M. Determine slump in accordance with ASTM C 143/C, respectively, when cylinders are molded. Prepare, cure, and transport compression test specimens in accordance with ASTM C 31/C 31M. Test compression test specimens in accordance with ASTM C 39/C 39M. Take samples for strength tests not less than once each shift in which concrete is produced. Provide a minimum of three specimens from each sample; two to be tested at 28 days for acceptance, and one will be tested at 7 days for information.

1.3.1 Strength

Acceptance test results are the average strengths of two specimens tested at 28 days. The strength of the concrete is considered satisfactory so long as the average of three consecutive acceptance test results equal or exceed the specified compressive strength, f'c, and no individual acceptance test result falls below f'c by more than 300 psi.

1.3.2 Concrete Mixture Proportions

Concrete mixture proportions are the responsibility of the Contractor. Mixture proportions shall include the dry weights of cementitious material(s); the nominal maximum size of the coarse aggregate; the specific gravities, absorptions, and saturated surface-dry weights of fine and coarse aggregates; the quantities, types, and names of admixtures; and quantity of water per cubic yard of concrete. Provide materials included in the mixture proportions of the same type and from the same source as will be used on the project. Specified compressive strength f'c shall be as specified in Section 03 05 15 Portland Concrete Cement. The maximum nominal size coarse aggregate is 1 inch, in accordance with ACI MCP PACK Part 3. The maximum water cement ratio is 0.50. Submit the applicable test reports and mixture proportions that will produce concrete of the quality required, ten days prior to placement of concrete.

1.4 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Drawings

SD-03 Product Data

Water-Reducing or Retarding Admixture
Curing Materials
Batching and Mixing Equipment
Conveying and Placing Concrete
Ready-Mix Concrete
Mix Design Data
Curing Compound
Manufacturer's Recommendations and Instructions

SD-06 Test Reports

Aggregates
Concrete Mixture Proportions
Compressive Strength Testing
Slump

SD-07 Certificates

Cementitious Materials
Aggregates
Certificates of personnel conducting tests

1.5 QUALITY ASSURANCE

Indicate specific locations of Concrete Placement, Forms, and Steel Reinforcement on installation drawings and include, but not be limited to, square feet of concrete placements, thicknesses and widths, plan dimensions, and arrangement of cast-in-place concrete section.

PART 2 PRODUCTS

2.1 MATERIALS

Submit manufacturer's literature from suppliers which demonstrates compliance with applicable specifications for the specified materials.

2.1.1 Cementitious Materials

Submit Manufacturer's certificates of compliance, accompanied by mill test reports, attesting that the concrete materials meet the requirements of the specifications. Provide cementitious materials that conform to the appropriate specifications listed:

2.1.1.1 Portland Cement

ASTM C 150/C 150M, Type II

2.1.1.2 Dry-Pack Mortar

Prepare mortar consisting of one part portland cement, three parts fine sand which passes a No. 16 sieve and only enough water so the mortar will stick together in a ball when molded by hand. The water-cementitious materials ratio shall not be greater than 0.45 by weight. Let mortar set ½ hour prior to placing.

2.1.1.3 Cement-Based Grout

Cement-based grout shall consist of equal parts of Type II, portland cement and sand by dry weight, and water-reducing admixture, thoroughly mixed with water to yield a thick, creamy mixture. The water-cementitious materials ratio shall not be greater than 0.45 by weight. The sand shall meet the requirements of the fine aggregate specified herein, except 100 percent shall pass a No. 8 sieve.

2.1.1.4 Non-Shrink Grout

Non-Shrink Grout shall conform to the requirements of ASTM C1107/C 1107/M and shall be a commercial formulation suitable for the proposed application.

2.1.2 Aggregates

Fine and coarse aggregates shall meet the quality and grading requirements of ASTM C 33/C 33M Class Designations 4M or better. Submit certificates of compliance and test reports for aggregates showing the material(s) meets the quality and grading requirements of the specifications under which it is furnished.

2.1.3 Admixtures

Admixtures to be used, when required or approved, shall comply with the appropriate specification listed.

2.1.3.2 Water-Reducing or Retarding Admixture

Provide water-reducing or retarding admixture meeting the requirements of ASTM C 494/C 494M, Type A, B, or D.

Supply and Installation of Odor Control

2.1.4 Water

Use fresh, clean, potable water for mixing and curing, free from injurious amounts of oil, acid, salt, or alkali.

2.1.5 Reinforcing Steel

Provide reinforcing bars conforming to the requirements of ASTM A 615/A 615, Grade 60. Details of reinforcement not shown shall be in accordance with ACI MCP PACK Part 3, Chapters 7 and 12.

2.1.5.1 Anchor Bolts

Anchor bolts to be used in supporting the influent pump shall be stainless steel conforming to the requirements of ASTM A 320, B8 Class 2.

2.1.6 Expansion Joint Filler Strips, Premolded

Expansion joint filler strips, premolded shall be sponge rubber conforming to ASTM D 1752, Type I.

2.1.7 Formwork

The design and engineering of the formwork as well as its construction, will be the responsibility of the Contractor. Submit formwork design prior to the first concrete placement in accordance with ACI SP-4 Formwork for Concrete.

2.1.8 Form Coatings

Coat forms, for exposed surfaces, with a nonstaining form oil to be applied shortly before concrete is placed.

2.1.9 Curing Materials

Provide curing materials conforming to the following requirements.

2.1.9.1 Impervious Sheet Materials

Impervious sheet materials, ASTM C 171, type optional, except polyethylene film, if used, shall be white opaque.

2.1.9.2 Membrane-Forming Curing Compound

ASTM C 309, Type 1-D or 2, Class A or B.

2.2 READY-MIX CONCRETE

- a. Concrete shall be ready-mix concrete with mix design data conforming to ACI MCP PACK Part 2. Bill of Lading for each ready-mix concrete delivery shall be in accordance with ASTM C 94/C 94M.

Supply and Installation of Odor Control

- b. All concrete works shall have a minimum compressive strength as specified in Section 03 05 15 Portland Cement Concrete.
- c. Slump: 1 to 4 inch according to ASTM C 143/C 143M and ACI MCP PACK Part 1.
- d. Portland Cement conforming to ASTM C 150/C 150M, Type II.
- e. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.
- f. Water-reducing admixtures, retarding admixtures, accelerating admixtures, water-reducing and accelerating admixtures, and water-reducing and retarding admixtures shall conform to ASTM C 494/C 494M.

2.3 STEEL REINFORCEMENT

2.3.1 Deformed Steel Bars

Provide steel bars conforming to ASTM A 615/A 615M, Grade 60 ksi as specified in Section 03 20 00.00 10 CONCRETE REINFORCING.

2.4 FORMS

Forms shall be of wood, steel, or other approved material and conform to ACI MCP PACK, Parts 2 and 3.

Provide form release conforming to ACI MCP PACK, Part 4.

2.5 ACCESSORIES

2.5.1 Curing Compound

Provide curing compound conforming to ASTM C 309.

PART 3 EXECUTION

3.1 PREPARATION

The surface shall be clean, damp, and free of laitance. Construct ramps and walkways, as necessary, to allow safe and expeditious access for concrete and workmen. Remove standing or flowing water, loose particles, debris, and foreign matter. Ensure spare vibrators are available. The entire preparation shall be accepted by the APE prior to placing.

3.1.1 Embedded Items

Secure reinforcement in place after joints, anchors, and other embedded items have been positioned. Arrange internal ties so that when the forms are removed the metal part of the tie is not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structures. Embedded items shall be free of oil and other foreign matters such as loose coatings or rust, paint, and scale. The embedding of wood in concrete is permitted only when specifically authorized or directed. All equipment

needed to place, consolidate, protect, and cure the concrete shall be at the placement site and in good operating condition.

3.1.2 Formwork Installation

Forms shall be properly aligned, adequately supported, and mortar-tight. Provide smooth form surfaces, free from irregularities, dents, sags, or holes when used for permanently exposed faces. Chamfer all exposed joints and edges, unless otherwise indicated. Forms shall be thoroughly cleaned of all previous concrete, dirt and other surface contaminants prior to use. Do not reuse damaged form surfaces.

3.1.3 Production of Concrete

Certified copies of all laboratory trial mix reports shall be submitted to the APE from the testing laboratory. Do not place concrete prior to APE's review and acceptance in writing of the concrete mixes and cylinder test results for these laboratory mixes. Before unloading, furnish to APE for each batch of concrete a delivery ticket with information as stated in applicable section of ASTM C-34. Indicate type of cement used, brand, test certifications and amount of fly ash if used. Recording of Revolutions counter is required.

3.1.3.1 Ready-Mixed Concrete

Provide ready-mixed concrete conforming to ASTM C 94/C 94M except as otherwise specified.

3.1.3.2 Concrete Made by Volumetric Batching and Continuous Mixing

Concrete made by volumetric batching and continuous mixing shall conform to ASTM C 685/C 685M.

3.2 CONVEYING AND PLACING CONCRETE

Concrete placement is not permitted when weather conditions prevent proper placement and consolidation without approval. When concrete is mixed and/or transported by a truck mixer, deliver the concrete to the site of the work completing the discharge within 1-1/2 hours or 45 minutes when the placing temperature is 86 degrees F or greater unless a retarding admixture is used. Contractor to note high ambient temperatures are normal and prevalent rain can occur. Convey concrete from the mixer to the forms as rapidly as practicable by methods which prevent segregation or loss of ingredients. Concrete shall be in place and consolidated within 15 minutes after discharge from the mixer. Deposit concrete as close as possible to its final position in the forms and regulate it so that it may be effectively consolidated in horizontal layers 18 inches or less in thickness with a minimum of lateral movement. Carry on the placement at such a rate that the formation of cold joints will be prevented. Submit methods and equipment for transporting, handling, depositing, and consolidating the concrete to the APE prior to the first concrete placement. Perform conveying and placing concrete in conformance with the following:

3.2.1 Consolidation

Consolidate each layer of concrete by internal vibrating equipment. External vibrating equipment may be used when authorized. Systematically accomplish internal vibration by inserting the vibrator through the fresh concrete in the layer below at a uniform spacing

over the entire area of placement. The distance between insertions shall be approximately 1.5 times the radius of action of the vibrator and overlay the adjacent, just-vibrated area by approximately 4 inches. Ensure that the vibrator penetrates rapidly to the bottom of the layer and at least 6 inches into the layer below, if such a layer exists. Hold vibrator stationary until the concrete is consolidated and then withdraw it slowly at the rate of about 3 inches per second.

3.2.2 Hot-Weather Requirements

When the rate of evaporation of surface moisture, as determined by use of Figure 1 of ACI MCP PACK Part 2, is expected to exceed 0.2 psf per hour, provisions for windbreaks, shading, fog spraying, or covering with a light-colored material shall be made in advance of placement, and such protective measures taken as quickly as finishing operations will allow. Contractor is advised that high ambient temperature conditions may exist at the project site.

3.3 FORM REMOVAL

Do not remove forms before 72 hours after concrete placement, except as otherwise specifically authorized. Do not remove supporting forms and shoring until the concrete has cured for at least 5 days. When conditions require longer curing periods, forms shall remain in place.

3.4 FINISHING

3.4.1 Temperature Requirement

Do not finish or repair concrete when either the concrete or the ambient temperature is below 50 degrees F.

3.4.2 Finishing Formed Surfaces

Remove all fins and loose materials, and surface defects including filling of tie holes. Repair all honeycomb areas and other defects. Remove all unsound concrete from areas to be repaired. Surface defects greater than 1/2 inch in diameter and holes left by removal of tie rods in all surfaces not to receive additional concrete shall be reamed or chipped and filled with dry-pack mortar. Brush-coat the prepared area with an approved epoxy resin or latex bonding compound or with a neat cement grout after dampening and filling with mortar or concrete. The cement used in mortar or concrete for repairs to all surfaces permanently exposed to view shall be a blend of portland cement and white cement so that the final color when cured is the same as adjacent concrete.

3.4.3 Finishing Unformed Surfaces

Float finish all unformed surfaces, that are not to be covered by additional concrete or backfill, to elevations shown, unless otherwise specified. Surfaces to receive additional concrete or backfill shall be brought to the elevations shown and left as a true and regular surface. Slope exterior surfaces for drainage unless otherwise shown. Carefully make joints with a jointing tool. Finish unformed surfaces to a tolerance of 3/8 inch for a float finish. Do not perform finishing while there is excess moisture or bleeding water on the surface. No water or cement is to be added to the surface during finishing. Finishing shall match the existing adjacent surfaces.

3.4.3.1 Float Finish

Provide float finished surfaces, screeded and darbied or bullfloated to eliminate the ridges and to fill in the voids left by the screed. In addition, the darby or bullfloat shall fill all surface voids and only slightly embed the coarse aggregate below the surface of the fresh concrete. When the water sheen disappears and the concrete supports a person's weight without deep imprint, complete floating. Floating shall embed large aggregates just beneath the surface, remove slight imperfections, humps, and voids to produce a plane surface, compact the concrete, and consolidate mortar at the surface.

3.4.3.2 Trowel Finish

Trowelling shall be done immediately following floating to provide a smooth, even, dense finish free from blemishes including trowel marks. Protect finished surfaces from damage during the construction period.

3.5 CURING AND PROTECTION

The contractor is to be advised that the site is in American Samoa which has frequent rain, high humidity and high ambient air temperatures which may have an effect on the construction means and methods. American Samoa is located in a remote pacific island location and long product delivery and lead times should be expected. Beginning immediately after placement, and continuing for at least 7 days, cure and protect all concrete from premature drying, extremes in temperature, rapid temperature change, mechanical damage, and exposure to rain or flowing water. Provide all materials and equipment needed for adequate curing and protection at the site of the placement prior to the start of concrete placement. Accomplish moisture preservation of moisture for concrete surfaces not in contact with forms by one of the following methods:

- a. Continuous sprinkling or ponding.
- b. Application of absorptive mats or fabrics kept continuously wet.
- c. Application of sand kept continuously wet.
- d. Application of impervious sheet material conforming to ASTM C 171.
- e. Application of membrane-forming curing compound conforming to ASTM C 309, Type 1-D on surfaces permanently exposed to view. Accomplish Type 2 on other surfaces in accordance with manufacturer's instructions.

Accomplish the preservation of moisture for concrete surfaces placed against wooden forms by keeping the forms continuously wet for 7 days. If forms are removed prior to end of the required curing period, use other curing methods for the balance of the curing period. Do not perform protection removal if the temperature of the air in contact with the concrete may drop more than 60 degrees F within a 24 hour period.

3.6 TESTS AND INSPECTIONS

3.6.1 Field Testing Technicians

Supply and Installation of Odor Control

The individuals who sample and test concrete, as required in this specification, shall have demonstrated a knowledge and ability to perform the necessary test procedures equivalent to the ACI minimum guidelines for certification of Concrete Field Testing Technicians, Grade I. Submit qualifications and certificates of the field technician. All testing shall be coordinated with the APE and at the sole expense of the Contractor.

3.6.2 Inspection Details and Frequency of Testing

3.6.2.1 Preparations for Placing

Inspect foundation or construction joints, forms, and embedded items in sufficient time prior to each concrete placement by the Contractor to certify that it is ready to receive concrete.

3.6.2.2 Slump

Check slump once during each shift that concrete is produced. Obtain samples in accordance with ASTM C172/C172M and tested in accordance with ASTM C 143/C 143M.

3.6.2.3 Consolidation and Protection

Ensure that the concrete is properly consolidated, finished, protected, and cured.

3.6.3 Action Required

3.6.3.1 Placing

Do not permit placing to begin until the availability of an adequate number of acceptable vibrators, which are in working order and have competent operators, has been verified. Do not continue placing if any pile is inadequately consolidated.

3.6.3.2 Slump

Whenever a slump test result is outside the specification limits, adjust the batch weights of water and fine aggregate prior to delivery of concrete to the forms. The adjustments are to be made so that the water-cement ratio does not exceed that specified in the submitted concrete mixture proportion.

3.6.4 Reports

Report the results of all tests and inspections conducted at the project site informally at the end of each shift. Submit written reports weekly. Deliver within 3 days after the end of each weekly reporting period. See Section 01 45 00.00 10 QUALITY CONTROL.

3.7 FORM WORK

Form work shall conform to ACI MCP PACK Parts 2 through 5.

3.7.1 Preparation of Form Surfaces

Forms shall be true to line and grade, mortar-tight, and sufficiently rigid to prevent

Supply and Installation of Odor Control

objectionable deformation under load. Form surfaces for permanently exposed faces shall be smooth, free from irregularities, dents, sags, or holes. Chamfer exposed joints and exposed edges. Arrange internal ties so that when the forms are removed, the form ties are not less than 2 inches from concrete surfaces permanently exposed to view or exposed to water on the finished structure. Wood forms can be used.

3.7.2 Form Coating

Coat forms, for exposed surfaces, with a nonstaining form release coating applied shortly before concrete is placed. Forms for unexposed surfaces may be wetted in lieu of coating immediately before the placing of concrete, except that in freezing weather form release coating shall be used.

3.7.3 Removal of Forms

Remove forms carefully to prevent damage to the concrete. For structural applications and clarigester repairs, forms shall remain until the required compressive strength has been reached. The Contractor shall be responsible for all damages resulting from improper or premature removal of forms.

3.8 STEEL REINFORCING

Reinforcement shall be free from loose, flaky rust and scale, and free from oil, grease, or other coating which might destroy or reduce the reinforcement's bond with the concrete. Reinforcing shall be in accordance with Section 03 20 00.00 10 Concrete Reinforcing.

3.8.1 Fabrication

Shop fabricate steel reinforcement in accordance with ACI MCP PACK Parts 2 and 3. Shop details and bending shall be in accordance with ACI MCP PACK Parts 2 and 3.

3.8.2 Splicing

Perform splices in accordance with ACI MCP PACK Parts 2 and 3.

3.8.3 Supports

Secure reinforcement in place by the use of metal or concrete supports, spacers, or ties.

3.9 EMBEDDED ITEMS

Before placing concrete, take care to determine that all embedded items are firmly and securely fastened in place. Provide embedded items free of oil and other foreign matter, such as loose coatings of rust, paint and scale. Pipe supports and other anchors to be installed in the concrete shall be as shown on the Drawings.

3.10 FIELD TESTING

- a. Testing shall be coordinated with APE and allow sufficient time for review and coordination. Leakage tests shall be conducted for clarigester tank components (clarifier and digester portion) in order to verify the integrity of the newly refurbished

tank components and total clarigester assembly. The Contractor shall take corrective actions should tests fail.

- b. Provide samples and test concrete for quality control during placement. Sampling of fresh concrete for testing shall be in accordance with ASTM C172/C172M.
- c. Test concrete for compressive strength at 7 and 28 days for each design mix. Concrete test specimens shall conform to ASTM C 31/C 31M. Perform Compressive strength testing conforming to ASTM C 39/C 39M.
- d. Test Slump at the site of discharge for each design mix in accordance with ASTM C 143/C 143M.
- e. Test air content for air-entrained concrete in accordance with ASTM C231/C231M. Test concrete using lightweight or test extremely porous aggregates in accordance with ASTM C 173/C 173M.
- f. Determine temperature of concrete at time of placement in accordance with ASTM C 1064/C 1064M.

END OF SECTION 03 30 53

SECTION 03 35 00
CONCRETE FINISHING

PART 1 GENERAL

1.1 SUMMARY

- A. Description: This Section includes specifications for the finishing and curing of formed and unformed concrete surfaces, including the repair of surface defects.
- B. Section Includes:
 - 1. Repair of Surface Defects
 - 2. Finishing of Formed Surfaces
 - 3. Slabs and Flatwork
 - 4. Curing
 - 5. Protection
 - 6. Tolerances
- C. Related Sections:
 - 1. Section 03 11 00 – Concrete Forming
 - 2. Section 03 30 53 – Miscellaneous Cast-In-Place Concrete

1.2 REFERENCES

- A. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M182 Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats
- B. American Concrete Institute (ACI):
 - 1. ACI 117 Standard Specification for Tolerances for Concrete Construction and Materials
 - 2. ACI 301 Standard Specifications for Structural Concrete

- 3. ACI 308 Standard Practice for Curing Concrete
- 4. ACI 503.4 Standard Specification for Repairing Concrete with Epoxy Mortars
- C. ASTM International (ASTM):
 - 1. ASTM C33 Standard Specification for Concrete Aggregates
- D. State of Hawaii Department of Transportation Standard Specifications (HSS):
 - 1. HSS Section 503 Concrete Structures
 - 2. HSS Section 711 Concrete Curing Materials and Admixtures

1.3 SUBMITTALS

- A. General: Refer to Section 01 33 00 – SUBMITTAL PROCEDURES, Shop Drawings, Product Data, and Samples, for submittal requirements and procedures. Submittals involving exposed concrete finishes require approval of the APE before they may be incorporated in the Work.
- B. Shop Drawings: Submit drawings or diagrams to scale that indicate the location in plan and elevation of all concrete finishes.
- C. Product Data: Submit manufacturers' product data for manufactured products specified and indicated.

1.4 QUALITY CONTROL

- A. General: Refer to Section 01 45 00.00 10 – QUALITY CONTROL, for quality Control requirements and procedures.
- B. Finishes:
 - 1. Finishing of formed concrete surfaces shall conform to applicable requirements of ACI 301.
 - 2. Finishes for slabs and flatwork shall conform to applicable requirements of ACI 301.
- C. Curing: Conform to requirements of ACI 301 and ACI 308, as applicable, and requirements specified herein.

PART 2 PRODUCTS

2.1 TOOLS AND EQUIPMENT

Supply and Installation of Odor Control

- A. Furnish all materials, tools, equipment, facilities, and services required to perform the required concrete finishing work.

2.2 REPAIR AND FINISHING MATERIALS

- A. Portland Cement: Use same cement in the concrete work. in accordance with Section 03 05 15 – PORTLAND CEMENT CONCRETE. Furnish white Portland cement where required, to produce color matching the color of surrounding concrete.
- B. Aggregate:
 - 1. For Bonding Grout: ASTM C33, washed, clean sand passing a No. 30 sieve.
 - 2. For Patching Mortar: ASTM C33, washed, clean, graded fine aggregate of suitable size for areas to be repaired. Clean coarse aggregate up to Size No. 8 may be added for repair of larger pockets and voids.
- C. Commercial Patching Mortar: A structural repair mortar may be furnished if appropriate and approved by the APE.

2.3 CURING MATERIALS

- A. Damp Curing Materials:
 - 1. Waterproof Sheet Materials: Shall conform to HSS Subsection 711.01 – Curing Materials.
 - 2. Burlap: Shall conform to HSS Subsection 711.01 – Curing Materials and AASHTO M182, of class or weight suitable for the use and location. Do not use burlap where concrete is exposed to direct sunlight.
- B. Curing Compound:
 - 1. Liquid membrane-forming compound shall conform to HSS Subsection 711.01 – Curing Materials.

PART 3 EXECUTION

3.1 REPAIR OF SURFACE DEFECTS

- A. Repair Standards: Repair surface defects in accordance with applicable requirements of ACI 301.
- B. Surface Defects:

1. Repair of surface defects shall begin immediately after form removal.
2. Surface defects are defined to include the following: form-tie holes, air voids or pockets, bug holes with a nominal diameter or depth greater than 1/4 inch, honeycombed areas, rock pockets, visible construction joints, fins, and burrs.
3. Repair of surface defects shall be tightly bonded and shall result in concrete surfaces of uniform color and texture, matching adjacent surfaces, and free of shrinkage cracks.

C. Repair Work:

1. Remove honeycombed and other defective concrete down to sound concrete. Sawcut the edges perpendicular to the surface or slightly undercut. Feather edges will not be permitted. Dampen the area to be patched and an area at least 6 inches wide surrounding it, to prevent absorption of water from the patching mortar.
2. Where rock pockets or similar defects or voids expose steel reinforcement, cut out to solid surface behind the reinforcing steel to provide suitable key-lock for patching mortar. Patching mortar shall envelope the exposed reinforcing bar.
3. Bond patching mortar to concrete with bonding grout. Bonding grout shall consist of one part Portland cement to one part No. 30 mesh sand, mixed to the consistency of a thick cream, and then well brushed onto the concrete. Bond commercial patching mortar to concrete in accordance with manufacturer's instructions.
4. Make the patching mortar of the same materials and of approximately the same proportions as used for the concrete, except omit the coarse aggregate. Use not more than one part Portland cement to 2-1/2 parts sand by damp loose volume, and substitute white Portland cement for a portion of the regular gray portland cement, to produce patching mix matching the surrounding concrete in color when dry. Determine the proportion of white portland cement by trial mixes and test areas prior to repair of actual defective areas.
5. After surface water has evaporated from area to be patched, brush the bond coat well into surface. When bond coat begins to lose water sheen, apply patching mortar. Compact the mortar into place and strike off the patch is left slightly higher than the surrounding surface. To permit initial shrinkage, leave the patch undisturbed for at least 1 hour before being finally finished. Keep the patched area damp for 7 days.
6. Neatly finish patched surfaces to match adjacent surrounding surface texture of concrete. Grind or fill surfaces to produce level, plumb, true

planes.

7. Patching of honeycombed areas or rock pockets that are too large and unsatisfactory for mortar patching shall be cut out to solid surface, keyed, and packed solid with matching concrete to produce firm bond and flush surface. Patching shall match texture of adjacent surfaces where exposed in the finished work.
8. In exposed locations, repair work that does not match the texture and color of surrounding adjacent surfaces or was not well performed shall be removed and performed again, until repair work conforms to the requirements of these Specifications.
9. Completed repairs shall be cured as specified in Sub-paragraph 3.03 herein.

3.2 SLABS AND FLATWORK

- A. Placement and Finishing Standards: Slabs and flatwork shall be placed, consolidated, and finished in accordance with applicable requirements of ACI 301. Coordinate with Section 03 30 53 – MISCELLANEOUS CAST-IN-PLACE CONCRETE, as applicable.
- B. Placement:
 1. Slabs and flatwork shall be placed and finished monolithically. Strike off and screed slabs to true, plane surfaces at required elevations, and thoroughly compact concrete with vibrators, floats, and tampers to force coarse aggregate below the surface. Finish slab within 4 hours of concrete placement.
 2. Whether indicated or not, in areas where drains occur, slope finished slab to drains. Slopes shall be a minimum of 1/8 inch per foot unless otherwise indicated.
- C. Slab Finishes: Unless indicated otherwise, slabs and flatwork shall receive a trowel finish.
- D. Joints:
 1. Construction, expansion and contraction joints shall be located as indicated. Construction joints shall act as contraction joints. Where additional contraction joints are required to prevent shrinkage cracks, saw-cut such joints. All joints shall be straight and true to line.
 2. Mark-off lines or edges at formed construction and expansion joints shall be finished with 1/4-inch-radius curved edging tool, neat and true to line, uniform throughout.

3.3 CURING

- A. Curing Standards: Cure concrete in accordance with applicable requirements of ACI 301 and ACI 308, except:
 - 1. Curing Period: In accordance with HSS Subsection 503.03(K) – Protection and Curing, for minimum curing period.
 - 2. Curing Methods: Cure concrete by water curing, impervious membrane curing, or forms-in-place curing in accordance with HSS Subsection 503.03(L) – Curing Methods.
- B. Curing Compound: Application of curing compound shall be in accordance with applicable requirements of ACI 308.

3.4 PROTECTION

- A. Protect concrete in accordance with HSS Subsection 503.03(K) – Protection and Curing.

3.5 TOLERANCES

- A. Formed Surfaces: Adhere to the applicable requirements of ACI 301. For parts of the structure not covered by ACI 301, conform to applicable requirements of ACI 117.

END OF SECTION 03 35 00

DIVISION 05

METALS

SECTION 05 05 23

METAL FASTENINGS

PART 1 GENERAL

1.1 SUMMARY

A. Description: This Section includes specifications for welding of metal fabrications and miscellaneous metalwork, including sheet steel, as indicated. This Section also includes qualification of welders and welding procedures, inspections, and tests of welds.

B. Section Includes:

1. Field Quality Control

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM E165 Standard Test Method for Liquid Penetrant Examination

B. American Welding Society (AWS):

1. ANSI/AWS A2.4 Standard Symbols for Welding, Brazing, and Nondestructive Examination
2. ANSI/AWS A3.0 Standard Welding Terms and Definitions
3. ANSI/AWS A5.01 Procurement Guidelines for Consumables – Welding and Allied Processes – Flux and Gas Shielded Electrical Welding Processes
4. ANSI/AWS B1.10 Guide for the Nondestructive Examination of Welds
5. ANSI/AWS D1.1 Structural Welding Code - Steel
6. ANSI/AWS D1.3 Structural Welding Code – Sheet Steel
7. ANSI/AWS QC1 Standard for AWS Certification of Welding Inspectors

1.3 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with

Section 01 33 00 - SUBMITTAL PROCEDURES.

- A. For Shop drawings: Employ the standard welding symbols of AWS A2.4 and the standard welding terms of AWS A3.0.
- B. Welder Qualifications: Submit certified copies of qualification test records for each welder, welding operator, and tack welder to be employed in the Work. Comply with requirements of ANSI/AWS D1.1, Section 4.
 - 1. Submit welders' identification marks (I.D.) for each welder along with qualifications.
- C. Welding Procedures: Prior to commencement of welding, submit the procedure that will be used for qualifying welding procedures. For procedures other than those prequalified in accordance with ANSI/AWS D1.1, submit a copy of procedure qualification records in accordance with the qualification requirements of ANSI/AWS D1.1, Section 4.
- D. Welding Records and Data:
 - 1. Retain all radiographs upon completion of fabrication.
 - 2. Retain certifications that magnetic particle and dye- penetrat inspections have been satisfactorily completed.
 - 3. Submit descriptive data for field welding equipment.
- E. Mills Certificates: Retain mill certificates and certified copy of reports for all analysis and tests required by referenced ASTM and AWS specifications

1.4 QUALITY ASSURANCE

- A. Qualifications of Welders: Welders, Welding operators, and tack welders shall be qualified in accordance with ANSI/AWS D1.1, Section 4 "Qualification."
 - 1. For sheet steel, welders, shall be qualified in accordance with ANSI/AWS D1.3, Section 4 "Qualification."
- B. Qualification of Welding Procedures: Welding procedures shall be prequalified or qualified accordance with ANSI/AWS D1.1, Section 4 "Qualification"
 - 1. For sheet steel, proposed welding procedures shall be qualified in accordance with ANSI/AWS D1.3, Section 4 "Qualification."
Prequalification is not applicable to sheet steel.
- C. Qualifications of Welding Inspector: Welds to be inspected by the Contractor shall be inspected and certified by a Contractor-employed AWS Certified Welding Inspector (CWI), certified in accordance with AWS QC1.

PART 2 PRODUCTS

Supply and Installation of Odor Control

2.1 WELDING ROD/ELECTRODES

- A. Electrodes for structural plates and shapes shall conform to ANSI/AWS A5 Series Standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use. Matching filler metal requirements shall conform to ANSI/AWS D1.1, Table 3.1 and Table 4.9.
- B. Electrodes for sheet steel shall conform to ANSI/AWS A5 Series Standards and shall be coated rods or wire of size and classification number as recommended by their manufacturers for the positions and other conditions of actual use. Matching filler metal requirements shall conform to ANSI/AWS D1.3, Table 1.2.
- C. Dynamic Loaded structures shall be welded in accordance with SMAW process using E-7018 electrodes.

2.2 SHOP WELDING

- A. Perform shop welding as indicated in accordance with ANSI/AWS D1.1, and ANSI/AWS D1.3, as applicable to the work.

2.3 SHOP QUALITY CONTROL

- A. Inspections and Tests by the Contractor
 - 1. Visual Inspection: All welds shall be visually examined in accordance with ANSI/AWS D1.1, Section 6 and 7.8, as applicable. Quality of welds and standards of acceptance shall be in accordance with ANSI/ASW D1.1, as applicable.
 - 2. Acceptance or Rejection of Welds:
 - a. Where inspection frequency is specified 10 percent, if reject occurs in the first 10-percent sample, select a second 10- percent sample and test. If no failure occurs in the second percent sample, accept the represented welds.
 - b. Rework and retest the reject welds in the first 10-percent sample. If a failure occurs in the second 10-percent sample, test 100 percent of the welds. Rework and retest all rejected welds.
 - c. Where inspection frequency is specified 50 percent, adopt the same procedure.
 - 3. Liquid Penetrant Inspection: Liquid dye penetrant inspection of welds shall conform to ASTM E165. Liquid penetrant inspection may be used for detecting discontinuities that are open to surface.
 - 4. Test Results: Test result information shall be forwarded to the APE immediately after results are available, stating the acceptance or rejection of

fabricated components, so that repairs and reinspection or testing may be performed as soon as possible.

5. Repairs: Unacceptable welds shall be repaired in accordance with ANSI/AWS D1.1, Section 5.26. Repaired or corrected welds shall be reinspected or retested as specified for the original welds.

B. Shop Inspections and Tests by the APE:

1. All welds are subject to inspection and tests by the APE. Welds to be inspected and tested by the APE will be selected at random.
- 2 The APE will make the test results available to the contractor.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Inspections and Tests:

1. Perform tests of field welds as herein specified for shop welds.
2. The APE will perform visual inspections of field welds as herein specified for shop welds

- B. Field Welding: Field welding shall be performed as herein specified for shop welds.

END OF SECTION 05 05 00

SECTION 05 50 00

FORMED METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Description: This Section includes specifications for metal fabrications and miscellaneous metalwork as indicated. Metal fabrications and miscellaneous items and their related components to be provided under this section include: wide flanged, c – channel, metal doubler plate, steel plate, anchor bolts, and accessories as required to complete the Work.

B. Section Includes:

1. Installation
2. Galvanizing Repair
3. Field Painting

C. Related Sections:

1. Section 05 05 23 – Metal Fastenings

1.3 REFERENCES

A. ASTM International (ASTM):

1. ASTM A27 Standard Specification for Steel Casting, Carbon, for General Application
2. ASTM A36 Standard Specification for Carbon Structural Steel
3. ASTM A123 Standard Specification for Zinc (Hot – Dip Galvanized) Coating on Iron and Steel Products
4. ASTM A143 Standard Practice for Safeguarding Against Embrittlement of Hot- Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
5. ASTM A153 Standard Specification for Zinc Coating (Hot- Dip) on Iron and Steel Hardware
6. ASTM A307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

- 7. ASTM A384 Standard Practice of Safeguarding Against Warpage and Distortion During Hot- Dip Galvanizing of Steel Assemblies
 - 8. ASTM A563 Standard Specification for Carbon and Alloy Steel Nuts
 - 9. ASTM A780 Standard Practice for Repair of Damaged and Uncoated Areas of Hot- Dip Galvanized Coating
- B. The Society for Protective Coatings (SSPC):
- 1. SSPC-PA- 1 Shop, Field, and Maintenance Painting of Steel
 - 2. SSPC-SP- 3 Power Tool Cleaning
 - 3. SSPC-SP- 1 Solvent Cleaning

1.4 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 - SUBMITTAL PROCEDURES.

- A. Shop Drawings: Submit fully detailed shop drawings of metal fabrication and miscellaneous metal work showing sizes, details of fabrication and construction, methods of assembly, locations anchors, accessories and installation details.
- B. Product Data: Submit manufacturers' product data for all manufactured items and products.

1.5 QUALITY CONTROL

- A. General: Refer to Section 01 45 00 – Quality Control, for quality control requirements and procedures.
- B. Work Quality:
 - 1. Shop and field work shall be performed by mechanics, craftspersons, and workers skilled and experiences in the fabrication and installation of the metalwork involved.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel Materials:
 - 1. Shapes: Standard structural section, shapes, and plates, as indicated, shall conform to ASTM A36.
- B. Welding Rods/ Electrodes: Conform to the requirements of Section 05 05 23 – Metal Fastenings.

- C. Castings: ASTM A27, as applicable to the work.
- D. Anchors and Bolts: Provide 316 Stainless Steel anchors and bolts, where possible. For galvanized anchors and bolts, ASTM A307, or A563, as applicable. Bolts and nuts, shall be hot-dip galvanized in accordance with ASTM A153.

2.2 FABRICATION

- A. Metalwork shall be fabricated by firms or shops experienced and skilled in the custom fabrication and construction of metal fabrications and miscellaneous metalwork.
- B. Welded connections shall be made inconformance with requirements of Section 05 05 23- Metal Fastenings. Where exposed to view, welds shall be ground down and dressed smooth so that the shape and profile of the item welded is maintained.
- C. Forms and fabricate the work to meet installation conditions. Include anchors, fasteners, and accessories to secure the work in place, as indicated.
- D. The Contractor may furnish standard manufactured products for components when applicable, provided that such products meet space limitations and installation conditions.

2.3 GALVANIZING

- A. Steel and ferrous metal items exposed to moisture, and items indicated on Design Plans shall be galvanized after fabrication by the hot- dip process in accordance with ASTM A123. Weight of zinc coating shall conform to the requirements specified under "Weight of Coating" in ASTM A123.
- B. Safeguarding against steel embrittlement shall conform to the applicable requirements of ASTM A143.
- C. Safeguarding against warpage and distortion of steel members shall conform to the applicable requirements of ASTM A384.
- D. Shop- galvanized metalwork necessitating field welding that in any manner removes the original galvanizing shall be restored by field galvanizing repair in accordance with ASTM A780.
- E. Bolts for attachment of galvanized items shall be galvanized in accordance with ASTM A153.

2.4 CLEANING AND PAINTING

- A. Nongalvanized Metalwork:
 - 1. After fabrication and immediately before shop painting, ferrous metal work

shall be power tool cleaned in accordance with SSPC- SP 3 to remove mill scale, rust, grease, oil, and other foreign matter. Welds shall be thoroughly wire brushed.

2. After power tool cleaning and just before shop painting, ferrous metalwork shall be washed with solvent to remove dust and residue in accordance with SSPC-SP-1.
3. After cleaning and solvent washing, ferrous metalwork shall be shop painted with one coat of corrosion- inhibitive metal primer in accordance with SSPC- PA-1. Materials and application shall conform to SSPC- Paint 13, Red or Brown One- Coat Shop Paint.

B. Galvanized Metalwork:

1. Galvanized metal surfaces shall then be given a shop coat of galvanized primer in conformance with SSPC-PA- 1. Materials and application shall conform to SSPC- Paint 5, Zinc- Dust, Zinc Oxide and Phenolic Varnish Paint.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install metal fabrications and miscellaneous metalwork in accordance with the Design Plans and the shop drawings, using mechanics and workers skilled and experienced in the installation of the type of work involved.
- B. Install metal fabrications and miscellaneous metalwork with all accessories furnished by the fabricator, as required for complete and finished installations.
- C. Perform field welding, where required, in accordance with Section 05 05 23 - Metal Fastenings.

3.2 GALVANIZING REPAIR

- A. Galvanized surfaces that have become damaged from welding, handling, or installation shall be repaired immediately after installation with galvanizing repair material in accordance with ASTM A780.

3.3 FIELD PAINTING

- A. After installation, exposed painted surfaces, field welds, and other abraded or damaged primed surfaces shall be prepared as required and touched up with an additional coat of the same primers for ferrous and galvanized surfaces as herein before specified for shop painting. Spray- paint all touch-up work.

END OF SECTION 05 50 00

DIVISION 26

ELECTRICAL

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Basic Electrical Requirements specifically applicable to Division 26 Sections.

1.2 SCOPE OF WORK

- A. The specifications describe the quality and character of the materials and methods of installation.
- B. The drawings include plans of the building, with diagrammatic layouts showing approximate locations of equipment and devices. Before installing, study adjacent architectural features, and make installation in the most logical manner in accordance with Code and Regulatory Requirements.
- C. The electrical symbols, notes, instructions and schedules on the drawings are included as part of these specifications.

1.3 WORK SCHEDULE AND SEQUENCE

- A. Install work in stages to accommodate the Owner's operational requirements. Coordinate schedule and hours of operation with Owner prior to start of construction.

1.4 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code
- B. National Electrical Safety Code

1.5 SUBMITTALS

- A. Conform to Division 1 requirements.
- B. Include a transmittal form clearly indicating the Project, the name of the Contractor and the contents of the submittal.
- C. Include Contractor's stamp and signature indicating that the submittal has been reviewed and conforms to Contract Documents. Submittals without Contractor's stamp will be returned without review.

- D. Identify deviations from Contract Documents, including variations and limitations. Review of a submittal does not constitute acceptance of deviations from the Contract Documents, unless such deviation is clearly indicated as such on the submittal, and specifically accepted as such.
- E. Submit shop drawings and product data, grouped to include complete systems, products and accessories in a single package.
- F. Mark dimensions and values in units to match those specified.
- G. Ordering of equipment prior to approval of submittals is done entirely at the risk of the Contractor.

1.6 PROJECT RECORD DRAWINGS

- A. Conform to Hazardous Condition, Class 1, Division 1 requirements.
- B. Keep an accurate record of the work under this Contract, as it progresses, to be available for inspection at all times. See individual Division 26 Sections for specific requirements.
- C. Upon completion of the work, transfer all changes and information onto a new set of reproducible drawings in an orderly and legible manner.

1.7 QUALITY ASSURANCE

- A. For actual fabrication, installation and testing of the work, use only trained and experienced workers completely familiar with the equipment and materials, and the manufacturer's installation requirements.

1.8 REGULATORY REQUIREMENTS

- A. Electrical: Conform to NFPA 70.

1.9 FIELD CONDITIONS

- A. Visit the project site and become familiar with field conditions including accessibility and physical obstructions. Bid submission indicates familiarity with, and acceptance of, field conditions.
- B. Separate Sections cover site and civil Work. Study the complete set of contract documents to become familiar with the entire Project including site, architectural and structural features and systems as related to Work in this Division. Special attention should be paid to Divisions featuring equipment requiring electrical interface including pump systems and related monitor and control systems.
- C. Should there be omissions or discrepancies in the plans and specifications, or discrepancies from actual site conditions, bring them to the attention of the Engineer ten

(10) working days in advance of the date of bid opening so that corrections or clarifications can be made.

- D. Install Work in locations shown on Drawings, unless prevented by Project conditions. Coordinate work with that of other trades. Verify that adjacent and related construction conforms to contract documents.
- E. If Project conditions, including changes initiated by other trades or discovery of conditions unknown at time of bid, require rearrangement of work, mark such changes on as-built drawings. If Project conditions require unspecified materials and methods, submit Request For Information (RFI) to the Engineer with drawings showing the proposed alternative materials or methods. Obtain permission of the Engineer before proceeding.
- F. All RFIs must include a proposed solution. RFIs submitted without proposed solutions will be returned without review.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

See Drawings and individual Sections of Division 26.

2.2 SUBSTITUTIONS

- A. Conform to Division 1 requirements. Conformance to construction documents is the responsibility of the substitutor, regardless of approval.
- B. Layout on drawings, including space allotted for clearances, access, etc., is based on performance and physical attributes of equipment specified and/or scheduled on plans. Coordinate with other systems, subsystems and trades as required when using substituted materials or equipment.
- C. If the use of substitute materials or equipment requires alternate arrangement of equipment, fixtures, devices, wiring or accessories, prepare drawings showing proposed changes. Obtain permission of the C.O T.R. before proceeding.
- D. If the use of substitute materials or equipment results in different performance than that provided by the specified materials or equipment, adjust Work as required to provide parity performance, at no additional cost to the Government. Obtain permission of the Engineer before proceeding.
- E. If the use of substitute materials or equipment results in an increase in the cost, including changes to the Work of other trades, pay for any said increase in cost.
- F. See Drawings and individual Sections of Division 26 for further specific information required for substitutions.

PART 3 EXECUTION

3.1 INSTALLATION

- A. See Drawings and individual Sections of Division 26.

END OF SECTION 26 05 00

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Comply with NFPA 70.

PART 2 PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- B. Copper Conductors: Comply with NEMA WC 70.
- C. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN and XHHW.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- C. Control Circuits: Copper or tinned copper, solid or stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: 600V; Type XHHW, single conductors.
- B. Feeders: 600V; Type XHHW, single conductors.
- C. Branch Circuits: 600V: Type THHN-THWN, single conductors.
- D. Class 1 Control Circuits: 600V; Type THHN-THWN, single conductors.
- E. Class 2 Control Circuits: 300V; PLTC/ITC, PVC, single or multiconductor, with overall shield, pair shield, drain wire and comm wire as selected by pump controls manufacturer.
- F. Install all cables in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed

manufacturer's recommended maximum pulling tensions and sidewall pressure values.

- B. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- C. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- D. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
- C. Do not make splices and taps in low voltage control cables.

3.5 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, for compliance with requirements.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.

- b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- C. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.
 - 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- D. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Retain or delete this article in all Sections of Project Manual.

1.2 SUMMARY

- A. Section Includes: Grounding systems and equipment.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - 1. Ground rods.
 - 2. Connectors.
- B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Instructions for periodic testing and inspection of grounding features at ground rods based on NFPA 70B.
 - a. Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - b. Include recommended testing intervals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - 4. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - 5. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Mechanical Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.
 - 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Irreversible Compression Connectors: IEEE 837; UL 467: High strength copper irreversible compression ground connection system.

2.3 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m) in diameter.

2.4 TEST WELLS

- A. Well Pipe: 8" diameter x 24" long concrete pipe with belled end.
- B. Well Cover: Cast iron with legend "GROUND" embossed on cover.

PART 3 EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Conductor Terminations and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Mechanical connectors.
 - 2. Underground Connections: Irreversible compression connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors in all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
 - 1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
 - 2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
 - 3. Provide test well at each ground rod.
- C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
 - 1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use irreversible compression connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, to main metal water piping to building. Connect grounding conductors to main metal water pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.

- E. Ufer Ground (Concrete-Encased Grounding Electrode): Bond grounding electrode conductor to minimum 1/2" diameter reinforcing bar in concrete foundation at four locations.

3.4 LABELING

- A. Comply with requirements in Division 26 Section "Identification for Electrical Systems" Article for instruction signs. The label or its text shall be green.

3.5 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal and at individual ground rods. Make tests at ground rods before any conductors are connected.
 - a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - b. Perform tests by fall-of-potential method according to IEEE 81.
4. Prepare dimensioned Drawings locating each ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

- B. Grounding system will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.
- D. Report measured ground resistances that exceed the following values:
 - 1. Power Equipment or System with Capacity of 500 kVA and Less: 15 ohms.
- E. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hangers and supports for electrical equipment and systems.
 - 2. Construction requirements for concrete bases.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel slotted support systems.
 - 2. Nonmetallic slotted support systems.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.7 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Comply with NFPA 70.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

PART 2 PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - 1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - 2. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - 3. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - 4. Channel Dimensions: Selected for applicable load criteria.
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

PART 3 EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 1. Secure raceways and cables to these supports with two-bolt conduit clamps, or single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

- B. Raceway Support Methods: In addition to methods described in NECA 1, RMC may be supported by openings through structure members, as permitted in NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To Wood: Fasten with lag screws or through bolts.
 - 2. To New Concrete: Bolt to concrete inserts.
 - 3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 4. To Existing Concrete: Expansion anchor fasteners.
 - 5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - 6. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 7. To Light Steel: Sheet metal screws.
 - 8. Items Mounted on Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
- B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "[Cast-in-Place Concrete] [Miscellaneous Cast-in-Place Concrete]."
- C. Anchor equipment to concrete base.
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29

SECTION 26 05 33

RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal conduits, tubing, and fittings.
 - 2. Nonmetal conduits, tubing, and fittings.
 - 3. Boxes.
 - 4. Handholes and boxes for exterior underground cabling.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. FMC: Flexible metallic conduit.
- C. GRC: Galvanized rigid steel conduit.
- D. LFMC: Liquidtight flexible metallic conduit.
- E. RNC: Rigid non-metal conduit.

1.4 ACTION SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For custom enclosures and cabinets. Include plans, elevations, sections, and attachment details.

PART 2 PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. GRC: Comply with ANSI C80.1 and UL 6.
- C. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit.
 - 1. Comply with NEMA RN 1.
 - 2. Coating Thickness: 0.040 inch (1 mm), minimum.
- D. EMT: Comply with ANSI C80.3 and UL 797.
- E. FMC: Comply with UL 1; zinc-coated steel or aluminum.
- F. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- G. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
 - 2. Fittings for EMT:
 - a. Material: Steel.
 - b. Type: Setscrew or compression.
 - 3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
 - 4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch (1 mm), with overlapping sleeves protecting threaded joints.
- H. Joint Compound for GRC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

- A. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

- C. Fittings for RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
- D. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 BOXES

- A. General Requirements for Boxes: Boxes installed in wet locations shall be listed for use in wet locations.
- B. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- C. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- G. Gangable boxes are prohibited.

2.4 HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING

- A. General Requirements for Handholes and Boxes:
 - 1. Boxes and handholes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
 - 2. Boxes installed in wet areas shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel, fiberglass, or a combination of the two.
 - 1. Standard: Comply with SCTE 77.

2. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and handhole location.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC."
6. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
7. Handholes 12 Inches Wide by 24 Inches Long (300 mm Wide by 600 mm Long) and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.5 SOURCE QUALITY CONTROL FOR UNDERGROUND ENCLOSURES

- A. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 1. Tests of materials shall be performed by an independent testing agency.
 2. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 3. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012 and traceable to NIST standards.

PART 3 EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: GRC EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried or concrete encased as indicated on plans.
 4. Connection to Vibrating Equipment (Including Transformers): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 4X.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated:
 1. Exposed, Not Subject to Physical Damage: EMT.

2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: GRC.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers): LFMC.
 6. Damp or Wet Locations: GRC.
 7. Boxes and Enclosures: NEMA 250, Type 4X.
- C. Minimum Raceway Size: 1/2-inch (16-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid : Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
 3. EMT: Use setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
 4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F (49 deg C).

3.2 INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- B. Complete raceway installation before starting conductor installation.
- C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- D. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- F. Install conduits parallel or perpendicular to building lines.

- G. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - 3. Arrange raceways to keep a minimum of 2 inches (50 mm) of concrete cover in all directions.
 - 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 - 5. Change from RNC to GRC before rising above floor.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- K. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- L. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- M. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.
- N. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.
- O. Cut conduit perpendicular to the length. For conduits 2-inch (53-mm) trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.
- P. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm)

of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

- Q. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. Install raceway sealing fittings according to NFPA 70.
- R. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:
 - 1. Where conduits pass into hazardous locations.
 - 2. Where an underground service raceway enters the structure.
 - 3. Where otherwise required by NFPA 70.
- S. Comply with manufacturer's written instructions for solvent welding RNC and fittings.
- T. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 72 inches (1830 mm) of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for transformers.
 - 1. Use LFMC in damp or wet locations.
- U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to center of box unless otherwise indicated.
- V. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
 - 1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
 - 2. Install backfill as specified in Section 312000 "Earth Moving."
 - 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."

4. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

- A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
- B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch (12.5-mm) sieve to No. 4 (4.75-mm) sieve and compacted to same density as adjacent undisturbed earth.
- C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch (25 mm) above finished grade.
- D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.
- E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Identification of power and control cables.
 - 2. Identification for conductors.
 - 3. Underground-line warning tape.
 - 4. Warning labels and signs.
 - 5. Instruction signs.
 - 6. Equipment identification labels.
 - 7. Miscellaneous identification products.

1.3 ACTION SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
- C. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1[and IEEE C2].
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.

- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 PRODUCTS

2.1 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.2 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

2.3 FLOOR MARKING TAPE

- A. 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.

2.4 UNDERGROUND-LINE WARNING TAPE

- A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical utility lines.
2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE.

2.5 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.
- B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
- C. Warning label and sign shall include, but are not limited to, the following legends:
1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.6 INSTRUCTION SIGNS

- A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and UV-resistant seal for label.

2.7 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch (10 mm).

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
- G. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.2 IDENTIFICATION SCHEDULE

- A. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - 1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
 - a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - b. Colors for 208/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.

- 3) Phase C: Blue.
- c. Colors for 480/277-V Circuits:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - d. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- B. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
- C. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
- D. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
1. Limit use of underground-line warning tape to direct-buried cables.
 2. Install underground-line warning tape for both direct-buried cables and cables in raceway.
- E. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.
1. Comply with 29 CFR 1910.145.
 2. Identify system voltage with black letters on an orange background.

3. Apply to exterior of door, cover, or other access.
 4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - a. Power transfer switches.
 - b. Controls with external control power connections.
- G. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
- H. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum 3/8-inch- (10-mm-) high letters for emergency instructions at equipment used for power transfer.
- I. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - d. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
 2. Equipment to Be Labeled:
 - a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
 - b. Enclosures and electrical cabinets.
 - c. Access doors and panels for concealed electrical items.

- d. Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
- e. Substations.
- f. Emergency system boxes and enclosures.
- g. Motor-control centers.
- h. Enclosed switches.
- i. Enclosed circuit breakers.
- j. Enclosed controllers.
- k. Variable-speed controllers.
- l. Power transfer equipment.
- m. Power-generating units.
- n. Monitoring and control equipment.

END OF SECTION 26 05 53

SECTION 26 27 13

ELECTRICITY METERING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes equipment for electricity metering by utility company.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Dimensioned plans and sections or elevation layouts.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Receive, store, and handle modular meter center according to NECA 400.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify Owner no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Owner's written permission.

1.7 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 - 1. Comply with requirements of utilities providing electrical power services.
 - 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.
- C. Meter Sockets: Comply with requirements of electrical-power utility company.
- D. Meter Sockets: Steady-state and short-circuit current ratings shall meet indicated circuit ratings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
- C. Install modular meter center according to NECA 400 switchboard installation requirements.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Equipment Identification Labels: Adhesive film labels with clear protective overlay.

END OF SECTION 26 27 13

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Weather-resistant receptacles.
 - 3. Snap switches.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

1.4 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Receptacles for Owner-Furnished Equipment: Match plug configurations.
 - 2. Cord and Plug Sets: Match equipment requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing-label warnings and instruction manuals that include labeling conditions.

PART 2 PRODUCTS

2.1 GENERAL WIRING-DEVICE REQUIREMENTS

- A. Wiring Devices, Components, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.
- C. Devices that are manufactured for use with modular plug-in connectors may be substituted under the following conditions:
 - 1. Connectors shall comply with UL 2459 and shall be made with stranding building wire.
 - 2. Devices shall comply with the requirements in this Section.

2.2 STRAIGHT-BLADE RECEPTACLES

- A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 Configuration 5-20R, UL 498, and FS W-C-596.

2.3 GFCI RECEPTACLES

- A. General Description:
 - 1. Straight blade, feed-through type.
 - 2. Comply with NEMA WD 1, NEMA WD 6, UL 498, UL 943 Class A, and FS W-C-596.
 - 3. Include indicator light that shows when the GFCI has malfunctioned and no longer provides proper GFCI protection.
- B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

2.4 TOGGLE SWITCHES

- A. Comply with NEMA WD 1, UL 20, and FS W-S-896.
- B. Switches, 120/277 V, 20 A:

2.5 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
 - 1. Plate-Securing Screws: Metal with head color to match plate finish.
 - 2. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in wet and damp locations.
- B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant thermoplastic with lockable cover.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including mounting heights listed in that standard, unless otherwise indicated.
- B. Coordination with Other Trades:
 - 1. Protect installed devices and their boxes. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until right before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:

- a. Cut back and pigtail, or replace all damaged conductors.
- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailling existing conductors is permitted, provided the outlet box is large enough.

D. Device Installation:

1. Replace devices that have been in temporary use during construction and that were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, two-thirds to three-fourths of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device-mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles up.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

3.2 IDENTIFICATION

- A. Comply with Section 260553 "Identification for Electrical Systems."
- B. Identify each receptacle with panelboard identification and circuit number. Use hot, stamped, or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Test Instruments: Use instruments that comply with UL 1436.
 - 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated digital-display indicators of measurement.

- B. Tests for Convenience Receptacles:
 - 1. Line Voltage: Acceptable range is 105 to 132 V.
 - 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is unacceptable.
 - 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 - 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 - 6. Tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

- C. Wiring device will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

END OF SECTION 26 27 26

DIVISION 31

EARTHWORK

SECTION 31 23 00.00 20

EXCAVATION AND FILL

PART 1 GENERAL

1.1 SUMMARY

- A. Description: This Section describes the requirements for excavating and backfilling trench for sewer utilities.

1.2 REFERENCES

A. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C600 (2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

B. ASTM INTERNATIONAL (ASTM)

1. ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Course Aggregates
2. ASTM D 1140 (2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
3. ASTM D 1556 (2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
4. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kN-m/m³)
5. ASTM D 2321 (2005) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
6. ASTM D 2487 (2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
7. ASTM D 2922 (2005) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
8. ASTM D 3017 (2005) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

- 9. ASTM D 4318 (2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- 10. ASTM D 698 (2007e1) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
- C. U.S. ARMY CORPS OF ENGINEERS (USACE)
 - 1. EM 385-1-1 (2008) Safety and Health Requirements Manual
- D. U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
 - 1. EPA 530/F-93/004 (1993; Rev O; Updates I, II, IIA, IIB, and III) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II) (SW-846)

1.3 DEFINITIONS

A. Degree of Compaction

- 1. Degree of compaction is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698 or ASTM D 1557, for general soil types, abbreviated as percent laboratory maximum density.

B. Hard Materials

- 1. 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.

C. Rock

- 1. 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. Removal of hard material will not be considered rock excavation because of intermittent drilling and blasting that is performed merely to increase production.

1.4 SUBMITTALS

- A. ASPA approval is required for submittals. Submit the in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:
 - 1. SD-01 Preconstruction Submittals
 - a. Shoring and Sheeting Plan

- a. Dewatering work plan
 - c. Submit 15 days prior to starting work.
2. SD-06 Test Reports
- a. Borrow Site Testing
 - b. Fill and backfill test
 - c. Density tests
 - d. Moisture Content Tests
 - e. Copies of all laboratory and field test reports within 24 hours of the completion of the test.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 QUALITY ASSURANCE

A. Shoring and Sheet Piling Plan

- 1. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheet piling of excavations. Drawings shall include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations shall include data and references used.

B. Dewatering Work Plan

- 1. Submit procedures for accomplishing dewatering work.

C. Utilities

- 1. 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 ASPA-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. Support uncovered lines or other existing work affected by the contract excavation until approval for backfill is granted by the APE. Report damage to utility lines or subsurface construction immediately to the APE.

PART 2 PRODUCTS

Supply and Installation of Odor Control

2.1 SOIL MATERIALS

A. Satisfactory Materials

1. Any materials classified by ASTM D 2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, CL-ML, CH, MH free of debris, roots, wood, scrap material, vegetation, refuse, soft unsound particles, and deleterious, or objectionable materials. Unless specified otherwise, the maximum particle diameter shall be one-half the lift thickness at the intended location.

B. Unsatisfactory Materials

1. Materials which do not comply with the requirements for satisfactory materials. Unsatisfactory materials also include man-made fills, trash, refuse, 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 APE shall be notified of any contaminated materials.

C. Cohesionless and Cohesive Materials

1. Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM, GP-GM, GW-GM, SW-SM, SP-SM, and SM shall be identified as cohesionless only when the fines are nonplastic (plasticity index equals zero). Materials classified as GM and SM will be identified as cohesive only when the fines have a plasticity index greater than zero.

D. Common Fill

1. Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

E. Backfill and Fill Material

1. ASTM D 2487, classification GW, GP, GM, GC, SW, SP, SM, SC with a maximum ASTM D 4318 liquid limit of 35, maximum ASTM D 4318 plasticity index of 12, and a maximum of 25 percent by weight passing ASTM D 1140, No. 200 sieve.

F. Topsoil

1. Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inch diameter, brush, weeds, toxic substances, and other material detrimental to plant growth. Amend topsoil pH range to obtain a pH of 5.5 to 7.

2.2 UTILITY BEDDING MATERIAL

- A. Except as specified otherwise in the individual piping section, provide bedding for buried piping in accordance with AWWA C600, Type 4, except as specified herein. Backfill to top of pipe shall be compacted to 95 percent of ASTM D 698 maximum density. Plastic piping shall have bedding to spring line of pipe. Provide ASTM D 2321 materials as follows:
1. Class I: Angular, 0.25 to 1.5 inches, graded stone, including a number of fill materials that have regional significance such as coral, slag, cinders, crushed stone, and crushed shells.
 2. Class II: Course sands and gravels with maximum particle size of 1.5 inches, including various graded sands and gravels containing small percentages of fines, generally granular and noncohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D 2487.

2.3 BORROW

- A. Obtain borrow materials required in excess of those furnished from excavations from sources outside of ASPA property.

PART 3 EXECUTION

3.1 PROTECTION

A. Shoring and Sheeting

1. Provide shoring and sheeting where needed. In addition to Section 25 A and B of EM 385-1-1, include provisions in the shoring and sheeting plan that will accomplish the following:
 - a. Prevent undermining of pavements.
 - b. Prevent slippage or movement in banks or slopes adjacent to the excavation.
 - c. Allow for the abandonment of shoring and sheeting materials in place in critical areas as the work is completed. In these areas, backfill the excavation to within 3 feet of the finished grade and remove the remaining exposed portion of the shoring before completing the backfill.

B. Drainage and Dewatering

1. Provide for the collection and disposal of surface and subsurface water encountered during construction.
 - a. Dewatering
 - 1) Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave

in the excavation.

- 2) Operate dewatering system continuously until construction work below existing water levels is complete. Submit performance records weekly. Measure and record performance of dewatering system at same time each day by use of observation wells or piezometers installed in conjunction with the dewatering system.

C. Underground Utilities

1. 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 scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

D. Machinery and Equipment

1. 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

A. Clearing and Grubbing

1. 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 18 inches below existing surface.

B. Stripping

1. Strip suitable soil from the site where excavation is indicated and stockpile separately from other excavated material. Material unsuitable for use as topsoil shall be stockpiled and used for backfilling. Locate topsoil so that the material can be used readily for the finished grading. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil. Protect topsoil and keep in segregated piles until needed.

3.3 EXCAVATION

- A. Excavate to contours, elevation, and dimensions 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 shall be removed as directed.

Refill with satisfactory material and compact to 90 percent of ASTM D 698 or ASTM D 1557 maximum density. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades shall be done under the direction of the APE.

B. Pipe Trenches

1. Excavate to the dimension indicated. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed. Recesses shall be excavated to accommodate bells and joints so that pipe will be uniformly supported for the entire length. Rock, where encountered, shall be excavated to a depth of at least 6 inches below the bottom of the pipe.

C. Excavated Materials

1. 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."

3.4 FILLING AND BACKFILLING

A. Backfill and Fill Material Placement Over Pipes

1. Backfilling shall not begin until sanitary sewer or wastewater systems have been inspected, tested and approved, and the excavation cleaned of trash and debris. Backfill shall be brought to indicated finish grade. Backfill material up to an elevation of 2 feet above sewer lines shall be free from stones larger than 1 inch in any dimension.

B. Trench Backfilling

1. Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill in 6 inch lifts to top of trench.

3.5 BORROW

- A. Where satisfactory materials are not available in sufficient quantity from required excavations, approved borrow materials shall be obtained as specified herein.

3.6 COMPACTION

- A. 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.

1. General Site

- a. Compact underneath areas designated for vegetation and areas outside the 5 foot line of the paved area to 90 percent of ASTM D 698 or ASTM D 1557.
2. Paved Areas
 - a. Compact top 12 inches of subgrades to 95 percent of ASTM D 698 or ASTM D 1557. Compact fill and backfill materials to 95 percent of ASTM D 698 or ASTM D 1557.

3.7 FINISH OPERATIONS

A. Grading

1. 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.

B. Protection of Surfaces

1. Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.8 DISPOSITION OF SURPLUS MATERIAL

- A. Remove from the Project Site 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

A. Sampling

1. Take the number and size of samples required to perform the following tests.

B. Testing

1. Perform one of each of the following tests for each material used. Provide additional tests for each source change.
2. Fill and Backfill Material Testing
 - a. Test fill and backfill material in accordance with ASTM C 136 for conformance to ASTM D 2487 gradation limits; ASTM D 1140 for material finer than the No. 200 sieve; ASTM D 4318 for liquid limit and for plastic limit; ASTM D 698 or ASTM D 1557 for moisture density relations, as applicable.
3. Density Tests

a. Test density in accordance with ASTM D 1556, or ASTM D 2922 and ASTM D 3017.

1) Bedding and backfill in trenches: One test per 50 linear feet in each lift.

END OF SECTION 31 23 00

DIVISION 33

UTILITIES

SECTION 33 30 00

SANITARY SEWERAGE UTILITIES

PART 1 GENERAL

1.1 SUMMARY

- A. Description: This Section includes furnishing and installation of sewer pipes to the lines and grades indicated on the drawings and as specified herein.

1.2 REFERENCES

A. ASTM INTERNATIONAL (ASTM)

1. ASTM A 123/A 123M (2009) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
2. ASTM C 443 (2005a) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
3. ASTM C 443M (2007) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
4. ASTM C 478 (2009) Standard Specification for Precast Reinforced Concrete Manhole Sections
5. ASTM C 478M (2009) Standard Specification for Precast Reinforced Concrete Manhole Sections (Metric)
6. ASTM C 923 (2008) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
7. ASTM C 923M (2008b) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals (Metric)
8. ASTM C 969 (2002; R 2009) Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
9. ASTM C 969M (2002; R 2009) Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed

Precast Concrete Pipe Sewer Lines (Metric)

10. ASTM C 972 (2000; R 2006) Compression-Recovery of Tape Sealant
11. ASTM C 990 (2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
12. ASTM C 990M (2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric)
13. ASTM D 412 (2006ae1e2) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension
14. ASTM D 2321 (2011) Standard practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
15. ASTM D 2412 (2002; R 2008) Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
16. ASTM D 3034 (2008) Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
17. ASTM D 3212 (2007) Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
18. ASTM F 477 (2010) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

B. U.S. GENERAL SERVICES ADMINISTRATION (GSA)

1. FS A-A-60005 (Basic) Frames, Covers, Gratings, Steps, Sump and Catch Basin, Manhole

1.3 SYSTEM DESCRIPTION

A. Sanitary Sewer Gravity Pipeline

1. Provide 15 inch diameter gravity sewer line Type PSM Poly (Vinyl Chloride) (PVC).

1.4 SUBMITTALS

- A. ASPA approval is required for submittals. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Drawings of existing conditions.

SD-02 Shop Drawings

Installation and As-Built drawings, as specified.

Precast concrete manhole

Metal items

Frames and covers

Details

SD-03 Product Data

Pipeline materials

Submit manufacturer's standard drawings or catalog cuts.

SD-06 Test Reports

Test and inspection reports, as specified.

SD-07 Certificates

Certificates of compliance stating the type of cement used in manufacture of precast manholes.

Certificates of compliance stating that the fittings or gaskets used for waste drains or lines on the plans as are oil resistant.

1.5 QUALITY ASSURANCE

- A. Install specified materials by a licensed underground utility Contractor licensed for such work in the state where the work is to be performed. Installing Contractor's License shall be current and be state certified or state registered.

B. Drawings

1. Submit Installation Drawings showing complete detail, both plan and side view

details with proper layout and elevations.

1. Submit As-Built Drawings for the complete sanitary sewer system showing complete detail with all dimensions, both above and below grade, including invert elevation.
3. Sign and seal As-Built Drawings by a Professional Surveyor and Mapper. Include the following statement: "All potable water lines crossed by sanitary hazard mains are in accordance with the permitted utility separation requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage

1. Piping

- a. Inspect materials delivered to site for damage; store with minimum of handling. Store materials on site in enclosures or under protective coverings. Store plastic piping and jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes and fittings free of dirt and debris.

2. Metal Items

- a. Check upon arrival; identify and segregate as to types, functions, and sizes. Store off the ground in a manner affording easy accessibility and not causing excessive rusting or coating with grease or other objectionable materials.

B. Handling

1. Handle pipe, fittings, and other accessories in such manner as to ensure delivery to the trench in sound undamaged condition. Carry, do not drag, pipe to trench.

1.7 PROJECT/SITE CONDITIONS

- A. Submit drawings of existing conditions, after a thorough inspection of the area in the presence of the APE. Details shall include the environmental conditions of the site and adjacent areas. Submit copies of the records for verification before starting work.

PART 2 PRODUCTS

2.1 PIPELINE MATERIALS

- A. Pipe shall conform to the respective specifications and other requirements specified

below.

1. PVC Plastic Gravity Sewer Piping

a. PVC Plastic Gravity Pipe and Fittings

ASTM D 3034, SDR 35, with ends suitable for elastomeric gasket joints.

b. PVC Plastic Gravity Joints and Jointing Material

Joints shall conform to ASTM D 3212. Gaskets shall conform to ASTM F 477.

2.2 MISCELLANEOUS MATERIALS

A. Precast Concrete Manholes

1. Precast concrete manhole risers, base sections, and tops shall conform to ASTM C 478 and be manufactured in accordance with Section 03 40 00 PRECAST CONCRETE Base and first riser shall be monolithic

B. Gaskets and Connectors

1. Gaskets for joints between manhole sections shall conform to ASTM C 443. Resilient connectors for making joints between manhole and pipes entering manhole shall conform to ASTM C 923 or ASTM C 990.

C. External Preformed Rubber Joint Seals

1. An external preformed rubber joint seal shall be an accepted method of sealing cast iron covers to precast concrete sections to prevent ground water infiltration into sewer systems. All finished and sealed manholes constructed in accordance with paragraph entitled "Manhole Construction" shall be tested for leakage in the same manner as pipelines as described in paragraph entitled "Leakage Tests." The seal shall be multi-section with a neoprene rubber top section and all lower sections made of Ethylene Propylene Di Monomer (EPDM) rubber with a minimum thickness of 60 mils. Each unit shall consist of a top and bottom section and shall have mastic on the bottom of the bottom section and mastic on the top and bottom of the top section. The mastic shall be a non-hardening butyl rubber sealant and shall seal to the cone/top slab of the manhole/catch basin and over the lip of the casting. Extension sections shall cover up to two more adjusting rings.

Properties and values are listed in the following tables:

Properties, Test Methods and Minimum Values for Rubber used in preformed Joint Seals

Physical Properties	Test Methods	EDPM	Neoprene	Butyl Mastic
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Tensile, psi	ASTM D 412	1840	2195	-
Elongation percent	ASTM D 412	553	295	350
Tear Resistance, ppi	ASTM D 624 (Die B)	280	160	-
Rebound, percent, 5 minutes	ASTM C 972 (mod.)	-	-	11
Rebound, percent, 2 hours	ASTM C 972	-	-	12

D. Metal Items

1. Frames and Covers for Manholes

- a. FS A-A-60005, cast iron: Frames and covers shall be cast iron. Cast iron frames and covers shall be as indicated or shall be of type suitable for the application, circular, without vent holes. The frames and covers shall have a combined weight of not less than 400 pounds. The word "Sanitary Sewer" shall be stamped or cast into covers so that it is plainly visible.

2.3 REPORTS

- A. Submit Test Reports. Submit Inspection Reports for daily activities during the installation of the sanitary system. Information in the report shall be detailed enough to describe location of work and amount of pipe laid in place, measured in linear feet.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPELINES AND APPURTENANT CONSTRUCTION

- A. General Requirements for Installation of Pipelines: These general requirements apply except where specific exception is made in the following paragraphs entitled "Special Requirements."
 1. Earthwork
 - a. Perform earthwork operations in accordance with Section 31 23 00 EXCAVATION AND FILL.
 2. Pipe Laying and Jointing
 - a. Inspect each pipe and fitting before and after installation; replace those found defective and remove from site. Provide proper facilities for lowering sections of pipe into trenches. Replace by one of the proper dimensions, pipe or fittings that do not allow sufficient space for installation of joint material. At the end of each work day, close open ends of pipe temporarily

with wood blocks or bulkheads. Provide batterboards not more than 25 feet apart in trenches for checking and ensuring that pipe invert elevations are as indicated. Laser beam method may be used in lieu of batterboards for the same purpose.

3. Connections to Existing Lines

- a. Obtain approval from the APE before making connection to existing line. Conduct work so that there is minimum interruption of service on existing line.

B. Special Requirements

1. Installation of PVC Plastic Piping

Install pipe and fittings in accordance with paragraph entitled "General Requirements for Installation of Pipelines" of this section and with the requirements of ASTM D 2321 for laying and joining pipe and fittings. Make joints with the gaskets specified for joints with this piping and assemble in accordance with the requirements of ASTM d 2321 for assembly of joints. Make joints to other pipe materials in accordance with the recommendations of the plastic pipe manufacturer.

C. Manhole Construction

1. Make inverts in precast concrete bases with a smooth-surfaced semi-circular bottom conforming to the inside contour of the adjacent sewer sections. For changes in direction of the sewer and entering branches into the manhole, make a circular curve in the manhole invert of as large a radius as manhole size will permit. For precast concrete construction, make joints between manhole sections with the gaskets specified for this purpose; install in the manner specified for installing joints in concrete piping. Parging will not be required for precast concrete manholes. Make joints between concrete manholes and pipes entering manholes with the resilient connectors specified for this purpose; install in accordance with the recommendations of the connector manufacturer. Cut existing pipe so that pipe ends are approximately flush with the interior face of manhole wall, but not protruding into the manhole. Use resilient connectors as previously specified for pipe connectors to concrete manholes.

D. Miscellaneous Construction and Installation

1. Connecting to Existing Manholes

- a. Pipe connections to existing manholes shall be made so that finish work will conform as nearly as practicable to the applicable requirements specified for new manholes, including all necessary concrete work, cutting, and shaping. The connection shall be centered on the manhole. Holes for the new pipe shall be of sufficient diameter to allow packing cement mortar around the

entire periphery of the pipe but no larger than 1.5 times the diameter of the pipe. Cutting the manhole shall be done in a manner that will cause the least damage to the walls.

2. Metal Work

- a. Workmanship and finish: Perform metal work so that workmanship and finish will be equal to the best practice in modern structural shops and foundries. Form iron to shape and size with sharp lines and angles. Do shearing and punching so that clean true lines and surfaces are produced. Make castings sound and free from warp, cold shuts, and blow holes that may impair their strength or appearance. Give exposed surfaces a smooth finish with sharp well-defined lines and arises. Provide necessary rabbets, lugs, and brackets wherever necessary for fitting and support.
- b. Field painting: After installation, clean cast-iron frames, covers, and steps not buried in concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint. Do not paint surfaces subject to abrasion.

END OF SECTION 33 30 0

SECTION: 33 32 15
Odor Control System

GENERAL

- i. This section captures the installation of the Odor Control System

REFERENCE:

- I. The following reference shall be applied and reference to SECTION 05 05 23 for Metal and Division 26 for all detail electrical standard and specification.

SCOPE OF WORK

- II. The specifications describe the quality and character of the materials and methods of installation.
- III. The drawings include plans of the building, with diagrammatic layouts showing approximate locations of equipment and devices. Before installing, study adjacent architectural features, and make installation in the most logical manner in accordance with Code and Regulatory Requirements.
- IV. The electrical symbols, notes, instructions and schedules on the drawings are included as part of these specifications.

WORK SCHEDULE AND SEQUENCE

- I. Install work in stages to accommodate the Owner's operational requirements. Coordinate schedule and hours of operation with Owner prior to start of construction.

REFERENCES

- II. ANSI/NFPA 70 - National Electrical Code
- III. National Electrical Safety Code

SUBMITTALS

- I. Conform to Division 1 requirements.
- II. Include a transmittal form clearly indicating the Project, the name of the Contractor and the contents of the submittal.
- III. Include Contractor's stamp and signature indicating that the submittal has been reviewed and conforms to Contract Documents. Submittals without Contractor's stamp will be returned without review.
- IV. Identify deviations from Contract Documents, including variations and limitations. Review of a submittal does not constitute acceptance of deviations from the Contract Documents, unless such deviation is clearly indicated as such on the submittal, and specifically accepted as such.
- V. Submit shop drawings and product data, grouped to include complete systems, products and accessories in a single package.
- VI. Mark dimensions and values in units to match those specified.
- VII. Ordering of equipment prior to approval of submittals is done entirely at the risk of the Contractor.

SUGGESTED SPECIFICATIONS IF YOU PROVIDING PURE AIR FILTRATION ODOR CONTROL SYSTEM or EQUAL

1. General

1.01 Intent

A. It is the intent of these Suggested Specifications to give the Contractor/Engineer the descriptions of the equipment, instructions for delivery, and installation of the PureAir Filtration Drum Scrubber-1000 cfm (DS-1000) as manufactured by PureAir Filtration Inc. Norcross, Georgia.

B. The Contractor/Engineer is advised that all drawings shall be for general reference.

C. The Contractor/Engineer shall provide all equipment and work indicated below unless otherwise noted and any additional work to produce a completely finished job as required by the Engineer.

2. PRODUCTS

2.01 General

- a. This specification defines the requirements for a Drum Scrubber-1000 cfm (DS-1000) as manufactured by PureAir Filtration Atlanta, Georgia
- b. The DS-1000 consists of dry-scrubbing media contained in a 52" X 60" linear, high density, polyethylene drum with a blower mounted on top of a FRP reinforced fiberglass lid.
- c. The DS-1000 shall contain two stages of dry-scrubbing media, 30 ft³ of Sulphasorb XL and 8 ft³ of CPS12 Blend as manufactured by PureAir Filtration LLC., unless otherwise specified. The DS-1000 shall be equipped with an external real time media bed monitoring rod to measure the media life inside the DS-1000. The unit is also equipped with a high efficiency mist & grease filter w/ drain installed on the inlet of the DS-1000.
- d. The DS-1000 shall be designed to operate at 99.5+% gas removal efficiencies.
- e. The airflow capacity shall be 1000 cfm.
- f. The configuration shall be arranged so that the contaminated air shall flow into high efficiency mist & grease filter and into the bottom inlet plenum and be drawn upwards through the media bed. Treated air shall discharge out the top of the vessel through a centrifugal air ventilator.
- g. All components of the DS-1000 shall include:
 1. High density, polyethylene drum and lid
 2. 38 cu ft of dry scrubbing media
 3. Cast Aluminum direct drive blower section.

- h. The DS-1000 shall contain a "Real Time Media Bed Monitoring Rod" which can be removed from the unit to periodically view the consumption of adsorbent media.

2.02 Drum

- a. The drum material shall be linear, high density, polyethylene, 1/4" (6.4 mm) in thickness.
- b. The drum shall have a capacity of 52 inches diameter 60 inches in height.
- c. Latches shall be stainless steel and rubber.
- d. Fasteners shall be stainless steel.
- e. The drum shall contain 30 ft³ of Sulphasorb XL and 8 ft³ of CPS12 Blends adsorbent media as manufactured by PureAir Filtration.
- f. The media shall be supported by a system of pultruded FRP grating and corrosion resistant screen for maximum diffusion.
- g. The inlet shall have a 8" flexible coupling attached to a high efficiency mist and grease filter.
- h. The drum shall have a 0.75" (19 mm) diameter drain pipe.
- i. The DS-1000 shall included a Mist/Grease prefilter made from HDPE which contains a washable 316 stainless steel filter element which is capable of removing 2 micron particles at an efficiency of 99%. A spare filter element shall be supplied to facilitate maintenance.

2.03 Blower Section

- a. The blower shall be sized to deliver 1000 cfm .
- b. The blower shall consist of a direct drive motor-fan assembly.
- c. The motor shall be a 1-1/2 hp, 3450 RPM, 230/460volt / 3 phase/ 60 Hz TEFC motor.

2.04 Chemical Adsorbent Media

- a. The DS-1000 shall contain two stages of dry-scrubbing media, 30 ft³ of Sulphasorb XL (780 lbs) and 8 ft³ of CPS12 Blend (400lbs) as manufactured by PureAir Filtration LLC., unless otherwise specified.

- b. Sulphasorb XL was recently developed to provide our customers with the highest extended life. While it targets the same gases as Sulphasorb, Sulphasorb XL has a capacity for Hydrogen Sulfide (H₂S) which is roughly 60 percent greater than any other product in the market. Pure Air starts with the highest grade activated carbon. This ensures that the greatest possible adsorption capacity is reached. The carbon is then impregnated with an acid gas neutralizing compound and two proprietary reagents which improve its neutralizing and adsorption efficiency.
- c. Sulphasorb XL Media shall have the following physical properties:
 - H₂S Removal Capacity (by volume): 0.30 g/cc**
 - 1. Removal Capacity (by weight): H₂S: 66% ;
 - 2. CTC value: 70% min
 - 3. Surface Area: 1050 m²/g
 - 4. Density: 580 kg/m³
 - 5. Moisture Content: 15%
 - 6. Hardness: 97 min
 - 7. Ignition Temperature: 425 C
- d. Spherical or cylindrical porous pellets formed from a combination of powdered activated alumina and other binders, suitably impregnated with potassium permanganate to provide optimum adsorption, absorption, and oxidation of a wide variety of gaseous contaminants.
- e. Sulphasorb XL Media shall be meet the requirements of UL classification.
- f. Sulphasorb XL Media shall be capable of absorbing and removing odorous gases throughout the entire pellet.
- g. CPS12 Blend Media shall have the following physical properties:

2.05. Removal Capacity:

- 1. Hydrogen Sulfide: 0.13 g/cc min (16% by weight)
- 2. Manufacturing Quality Assurance Standards:
- 3. Permanganate Content in Alumina: 12 % minimum
- 4. Moisture Content: 20 % maximum
- 5. Crush Strength: 40 to 60 %
- 6. Abrasion Loss: 3.0 % maximum
- 7. Nominal Pellet Diameter: 1/8" (approximately 4 mm), 85% after screening
- 8. Nominal Density: 40 lbs/ft³ (0.80 g/cc)

2.06. CPS12 Blend Media shall be UL listed.

1. CPS12 Blend Media shall be capable of absorbing and removing odorous gases throughout the entire pellet.

3. MANUFACTURER

3.01 Shall be PureAir Filtration LLC, or pre-approved equal.

- a. The manufacturer shall have a minimum of 10 years experience in the design, fabrication, and testing of systems that are 99.5+% efficient at removing gaseous contaminants.
- b. The manufacturer shall be a single source provider of equipment, media, and testing services.
- c. Shall be ISO 9001 certified.

4.0. TECHNICAL REQUIREMENT FOR THE SUPPLY AND USE OF CHEMICAL

- a. Chemical supplied to be used for odor control shall be provided with the following:
 - i. Chemical Name
 - ii. Molecular Formula
 - iii. Strength
 - iv. How it will be package, in powered form. Solid or liquid
 - v. Approved for USEPA/AEPA, AWWA, WHO and ANSI/NSF
- b. Laboratory Analysis
 - i. Following test parameter should be reported in all analysis sent: pH, Conductivity, alkalinity and density
- c. Material Safety Data Sheet (MSDS)
 - i. All shipment shall be properly label
- d. Degradability
 - i. Supplier shall specify information on degrading rate of the product they are offering under storage in the following condition.
 - 1. Air conditioned storage facility
 - 2. Un-air conditioned storage facility

3. Specify best or proper procedures and facility for storage
- e. Its active ingredients
 - f. Any additional information of the product that the supplier may think it is important, that we need to know.
 - g. Shipping and handling:
 - i. Each batch shall be shipped with the following:
 1. Date of manufacturer
 2. Expiry date of the product
 3. MSDS
 4. Laboratory analysis of the product supplied
 - h. Personal Protective Equipment (PPE)
 - i. Shall be provided for the handling of the product if there is a tendency that it will react and cause un-usual reaction to the body.

END OF THE SECTION: 33 32 15

