
AMERICAN SAMOA POWER AUTHORITY



TECHNICAL SPECIFICATIONS

for

WATER DISTRIBUTION SYSTEM

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DIVISION 0 : PROCUREMENT AND CONTRACTING REQUIREMENTS

Section 00 60 00 - Project Forms



Sub-Section 00 62 11 Submittal Transmittal Form
(refer to Template below)



SUBMITTAL TRANSMITTAL FORM

Date: _____

Submittal No. _____

To: American Samoa Power Authority Attention: _____ P.O. Bos PPB Pago Pago, American Samoa 96799	From: Contractor: _____ Address: _____ _____
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Per the General requirements, contractor shall use this transmittal form for submittal of shop drawings, testing reports, product information and other data as needed.

Contractor shall follow all specifications. Failure to follow all requirements included in the contract documents and specifications will constitute a reason for the return of the submittal for an additional re-submittal. Contractor is to number each submittal.

Project Name :

Specification Section No. :

Contractor's Certification

I hereby certify that the _____ shown and marked in this submittal is that proposed to be incorporated with contract number _____, is in compliance with the contract drawings and specifications, can be installed in the allocated spaces, and is submitted for ASPA approval.

Certified by QA/QC Manager _____, Date _____

Owner's Submittal Review

- | | | |
|--|--|-----------------------------------|
| <input type="checkbox"/> No Exceptions Taken | <input type="checkbox"/> Approved as Noted | <input type="checkbox"/> Rejected |
| <input type="checkbox"/> Revise and Resubmit | <input type="checkbox"/> Incomplete/Not Reviewed(Resubmit) | |

Review Notes: _____

Review is only for general conformance with the design concept of the project and general compliance, with the information given in the contract documents and specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site; fabrication processes and techniques of construction; coordination of his or her work with that of all other trades; and the satisfactory performance of his or her work. Approval of submittal does not relieve the contractor, subcontractor or material supplier of his or her responsibility to comply with the requirements of the contract documents.

ASPA Project Manager/Engineer Signature / Date



Sub-Section 00 65 16 - Certificate of Substantial Completion Form
(refer to Substantial Completion Form below)



CERTIFICATE OF SUBSTANTIAL COMPLETION

Date Of Issuance : _____
Owner : **American Samoa Power Authority**
Contractor : _____
Project : _____
Project No. : _____

☒ This Certification of Substantial Completion applies to all Work under the Contract Documents.

☐ This Certification of Substantial Completion applies to the following specified parts of the Contract Documents: _____

The Work to which this Certificate applies has been inspected by authorized representatives of the OWNER, CONTRACTOR and ENGINEER, and found to be substantially complete and is also the date of commencement of applicable warranties required by the Contract Documents, * (except as attached.)

The Work is hereby declared to be substantially complete with the Contract Documents on:

Date of Substantial Completion

☒ A "Punch-List" of items to be completed or corrected is attached hereto. This list may not be all inclusive, and the failure to include an item in it does not alter the responsibility of the CONTRACTOR to complete all Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by the CONTRACTOR within _____ days of the above date of Substantial Completion.

☐ * A list of "excepted" Warranty items is attached hereto.

Contractor's Representative

I, _____, certify that work has been installed in accordance with the contract documents. As applicable, I agree to any "Punch-list" or warranty items as listed as part of the substantial completion.

Contractor's Signature / Date

Owner's Representative

I/We certify that based upon inspection of work, the work has been substantially completed in accordance with ASPA's requirements, contract documents, and approved plans and specifications.

Project Inspector / Date

Project Engineer Signature / Date

Senior Engineer Signature / Date

Sub-Section 00 65 19 - Certificate of Completion Form

	AMERICAN SAMOA POWER AUTHORITY ENGINEERING SERVICES DIVISION Phone: 684 699 7430 Fax: 684 699 9675
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NOTICE OF CONTRACT COMPLETION

Contract no. _____




Contractor _____

Description: _____

Release date: _____

NOTICE IS HEREBY GIVEN THAT THE ABOVE CONSTRUCTION CONTRACT HAS BEEN COMPLETED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS ISSUED BY THE AMERICAN SAMOA POWER AUTHORITY AND THAT THE FOLLOWING HAVE BEEN COMPLETED AS APPLICABLE.



- | | | |
|---|--|----------|
| <input checked="" type="checkbox"/> | RELEASE OF CLAIMS <u>REC'D</u> | REMARKS: |
|  <input checked="" type="checkbox"/> | FINAL BILLING APPROVED DATE: | |
|  <input checked="" type="checkbox"/> | AFFIDAVIT OF <u>NON GRATUITY REC'D</u> | |
|  <input checked="" type="checkbox"/> | RELEASE OF LIENS REC'D | |

APPROVED:

PROJECT ENGINEER: _____ DATE: _____

ESD MANAGER: _____ DATE: _____ 

CHIEF FINANCIAL OFFICER: _____ DATE: _____

CHIEF EXECUTIVE OFFICER: _____ DATE: _____

Distribution List: Procurement Contract File, Accounting

AFFIDAVIT OF NON GRATUITY

PROJECT:

The undersigned hereby certifies that _____ has offered no gratuities in the form of entertainment, gifts or otherwise to the Contracting Officer, any officer or employee of the United States or American Samoa Government, including members of the American Samoa Legislature, with a view toward securing an agreement or securing favorable treatment with respect to the performing of such agreement.

Sworn by:

Name - American Samoa this . day of _____, 20__.

Notarized by:

Dated: _____

Commission expiry date: ____/____/____

Sub-Section 00 65 19.16 - Affidavit of Release of Liens Form

AMERICAN POWER AUTHORITY

Contract Number:

RELEASE OF CLAIMS

Date:

WHEREAS, by the terms of the above contract for: _____, Entered into by the **American Samoa Power Authority**, hereinafter also referred to as the ASPA, and the contractor _____ it is provided that after completion of all work, and prior to final payment, the contractor will furnish the Government with a release of all claims;

NOW, THEREFORE, in consideration of the above premises and the payments made by the ASPA to the contractor; the contractor hereby remises, releases, and forever discharges the ASPA, its officer, agents, and employee, of and from all manner of debts, dues, liabilities, obligations, accounts, claims, and demands whatsoever, in law and equity, under or by virtue of said contract except:

N WITNESS WHEREOF, the contractor has executed this release this _____ day of _____

Contractor

By: _____
Signature

Corporation _____ Joint Venture

Name

Partnership _____ Individual

Title

Address

City, State, Zip Code

COMPLETE ONLY IF CONTRACTOR IS A CORPORATION

_____, CERTIFY that I am the _____ of the corporation named _____ is contractor herein, that _____, who signed this release on behalf of the corporation; was then _____ of said corporation and that said release was duly signed for and on behalf of said Corporation by the authority of the governing body.

(SEAL).

Signature.



Section 00 70 00 Conditions of the Contract

Sub-Section 00 71 00 - General Condition

01. Definitions

Contract contains legally binding provisions governing the Contractor and the Contractor's work during the construction and warranty period. Certain definitions pertaining to measurements and measurement quantities are set forth in a separate section below. Wherever in the Contract Documents the following terms are used, the intent and meaning shall be interpreted as follows:

02. Abbreviations

Whenever in these Contract Documents the following abbreviations are used, the intent and meaning shall be interpreted as follows:

"AASHTO" means the American Association of State Highway and Transportation Officials.

"ACI" means the American Concrete Institute.

"AISC" means the American Iron and Steel Construction.

"AISI" means the American Iron and Steel Institute.

"ANSI" means the American National Standards Institute.

"API" means the American Petroleum Institute.

"ASCE" means the American Society of Civil Engineers.

"ASME" means the American Society of Mechanical Engineers.

"ASTM" means the American Society for Testing Materials.

"AWS" means the American Water Society.

"AWWA" means the American Water Works Association.

"FED. SPEC." means the Federal Specifications.

"IEEE" means the Institute Of Electrical and Electrical Engineers, Inc.

"NEC" means the National Electrical Code.

"NEMA" means the National Electrical Manufacturers' Association.

"NESC" means the National Electric Safety Code.

"NEPA" National Fire Protection Association.

"OSHA" means the Occupational Safety and Health Act (Federal And State)

"SSPC" means the Steel Structures Painting Council.

"UBC" means the Uniform Building Code.

"UL" means the Underwriters' Laboratories, Inc.

"AS APPROVED," unless otherwise qualified, shall be understood to be followed by the words "by the Engineer and/or the Procurement Manager."

"AS SHOWN," AND "AS INDICATED" shall be understood to be followed by the words "on the technical specifications or drawings."



“BIDDER” means the person or persons, partnership, firm, or corporation that submitted a proposal or bid for the work contemplated under the IFB.

“CONTRACT” means the written agreement governing the performance of the work and the furnishing of labor, materials, incidental services, tools and equipment in the construction of the work. It includes supplemental agreements amending or extending the work contemplated and which may be required to complete the work in a substantial and acceptable manner. Supplemental agreements are written agreements covering alterations, amendments or extensions to the contract and include contract change orders.

“CONTRACT DOCUMENTS” has the same meaning as set forth in Section 4 of the instruction to bidders.

“CONTACTOR” means the person or persons, partnership, firm or corporation who enters into the contract awarded to it by the American Samoa Power Authority pursuant to a solicitation.

“CONTRACTING OFFICER,” means the ASPA Procurement Manager.

“DAYS,” unless otherwise specifically stated, will be understood to mean calendar days.

“ENGINEER” means the ASPA engineer, whose decisions concerning the acceptability of material and work shall be final.

“GOVERNMENT,” OR “ASG” means the American Samoa Government.

“NOTICE”, or the requirement to notify means a written communication delivered in person or by certified or registered mail to the individual, or to a member of the firm, or to an officer of the corporation for whom it is intended. Certified or registered mail shall be addressed to the last business address known to he/she who gives the notice

“OR EQUAL,” shall be understood to indicate that the “equal” product is the same or better than the product named in function, performance, reliability, quality and general configuration. Determination of equality in reference to the project design requirements will be made by the engineer. Such “equal” products shall not be purchased or installed by the Contractor without the engineer’s written approval.

“Engineer ” means the American Samoa Power Authority.

“PLANS” means the drawings, plans, profiles, cross sections, elevations, details and other supplementary drawings or reproductions thereof, signed by the engineer, which show the location, character, dimensions and details of the work to be performed. Plans may either be bound in the same book as the balance of the contract documents or bound in separate sets and are a part of the contract documents, regardless of the method of binding.

“SPECIFICATIONS ” means the terms, provisions and requirements contained herein. Where standard specifications, such as those of ASTM, ASSHTO, etc.have been referred to, the



applicable portions of such standard specifications shall become a part of these contract documents.

“SUBSTANTIAL COMPLETION,” means that degree of completion of the project or a defined portion of the project, sufficient to provide ASPA, at its discretion, the full-time use of the project or defined portion of the project for the purposes for which it was intended.

“WORK,” means all material, labor, tools and all appliance, machinery, transportation and appurtenances necessary to perform and complete the contract, and such additional items not specifically indicated or described which can be reasonably inferred as belonging to the item described or indicated as required by good practice to provide a complete and satisfactory system or structure. As used herein, “provide” shall be understood to mean “provide complete in-place”, that is, “furnish and install”.

"WORK SITE," means the location at which the Contractor, including but not limited to the Contractor's employees, performs the tasks and responsibilities related to the completion of the contract.

03. Contract Documents

The contract documents are complementary, and what is called off by one shall be as binding as if called for by all. The intent of the contract documents is to include all work (except for specific items to be furnished by the ASPA) necessary for completion of the contract. Materials or work described in words which have a well-known technical and trade meaning shall be held to refer to such recognized standards. Any discrepancies or omissions found in the contract documents shall be reported to the engineer immediately. The engineer will clarify discrepancies or omissions, in writing within a reasonable time.

04. Alteration

This contract may be amended at any time during the term hereof, with or without additional consideration, provided, however, no amendments or other variation of this contract shall be valid unless in writing and signed by the Contractor and ASPA. ASPA, without invalidating the contract, may order changes in the work within the general scope of the contract by altering, adding to, or deducting from the work, the contract being adjusted accordingly. All such work shall be executed under the conditions of the original contract, except as specifically adjusted at the time of ordering such change. In giving instructions, the engineer may order minor changes in the work not involving extra cost and not inconsistent with the purposes of the project, but otherwise, except in an emergency endangering life or property, additions or deductions from the work shall be performed only in pursuance of an approved change order from ASPA, signed by ASPA's chief executive officer. If the work is reduced by alterations, such action shall not constitute a claim for damages based on loss of anticipated profits.

05. Verbal Statement And Agreements

No oral statements of any person whatsoever shall in any manner or degree, modify or otherwise affect the terms of the contract. The Contractor is advised that ASPA assumes no responsibility for any of its officers or agents prior to the execution of this contract, unless such understandings or representations by ASPA are expressly stated in writing in this contract. The Contractor shall thoroughly examine and become familiar with all of the various parts of the contract documents and determine the nature and location of the work, the general and local conditions, all other matters which can in any way affect the work under this contract. Failure to make an examination necessary for this determination shall not relieve the Contractor from the obligations of this contract. The Contractor warrants that no verbal agreement or conversation with any officer, agent or employee of ASPA, or with the engineer either before or after the execution of this contract, has affected or modified any of the terms or obligations herein contained.

06. Documents To Be Kept On The Job Site

The Contractor shall keep one copy of the contract documents on the job site, in good order, available to the engineer and to his representatives. The Contractor shall maintain on the job site, and make available to the engineer upon request, one current marked-up set of drawings that accurately indicate all approved variations in the completed work. This set of marked-up drawings shall be used by the Contractor along with field notes and other appropriate data for the preparation of the final "as built" drawings.

07. Ownership Of Drawings

All plans, drawings, technical specifications and copies thereof furnished by the engineer are his property. They are not to be used in other work and, with the exception of the signed contract set, are to be returned to him/her on request at the completion of the work. Any reuse of these materials without specific written verification or adaptation by the engineer will be at the risk of the user and without liability or legal expense to the engineer or the project's design firm.

08. Duties Of Contractor

Within the term provided, and in accordance with the provisions of this Contract, the Contractor shall faithfully and competently be responsible for accomplishing the duties and tasks (the "Work") as set forth in the Contract Documents.

09. Supersedure

If the contract is preceded by a letter of dispatch of intent, a notice of award, or a notice to proceed, anticipating the execution of the contract, then such aforementioned letter, dispatch, notice, or directive and all rights and obligations of the parties there under are superseded and merged into the contract. All acts of the Contractor and ASPA under said letter, dispatch, notice, or directive shall be deemed to have been under the contract. The American Samoa power authority ("ASPA") will make no payment under the award until the formal contract has been prepared and executed by ASPA and the Contractor.

10. Representations

In order to induce ASPA to enter into this contract, Contractor makes the following representation(s): Contractor has familiarized itself with the nature and the extent of the contract documents, work site, locality, and all local conditions and laws and regulations that in any manner may affect cost, progress, performance, or furnishing of the work. Contractor is duly licensed to perform the work as required by local laws and regulations.

11. Contractor's Local Address

The Contractor must provide and maintain a post office address within the territory of American Samoa and file the same with the engineer. Any written notice that is required or desirable shall be served on the Contractor personally, delivered to his representative on the site, left at the last known place of residence or business of the Contractor, and/or sent through the mail to the previously mentioned local post office address. All notices addressed in compliance with the said directions of the Contractor and properly mailed shall become effective when so mailed or at the time of delivery by any of the above methods.

12. Contractor Composition

The term "Contractor," whenever used herein, refers to and means the parties or party (individual, co-partnership, corporation or joint-venture) who or which shall have duly entered into a contract with ASPA to perform the work described in the contract documents. If the Contractor hereunder is composed of more than one legal entity, Contractor expressly agrees that each such entity shall be jointly and severally liable hereunder. Within thirty (30) days after receipt of notice to proceed or award of contract, the Contractor shall provide the engineer with a copy of any supplemental documents, which set forth in detail exactly how the contract will be sponsored, managed and controlled. The Contractor shall also provide, on or before this time, power(s) of attorney or other acceptable documents that attest to the authority and right of designated representatives to commit and sign documents for the Contractor.

13. Contractor Status

It is agreed that the Contractor shall be an independent contractor of ASPA in the performance of this contract. The relationship of the parties hereto shall in no event be deemed or construed to be that of employer and employee of principal and agent, or of any other relationship other than the Contractor as an independent Contractor

14. Assignment

Neither party to the contract shall assign the contract or sublet it as a whole, without the written consent of the other, nor shall the Contractor assign any monies due or to become due to it hereunder without the previous written consent of ASPA.

15. Subcontractors

The Contractor agrees that it shall fully indemnify and hold harmless ASPA for the acts and/or omissions of its subcontractors, and of persons either directly or indirectly employed by such subcontractors. Nothing contained in the contract documents shall create any contractual relationship between any subcontractor and ASPA. ASPA shall not be liable to or pay any subcontractor for Contractor's failure to pay said subcontractor.

16. Covenant Against Contingent Fees

The Contractor warrants that no person or selling agency has been employed or retained to solicit or secure the contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bonafide employees or bonafide established commercial or selling agencies maintained by the Contractor for the purpose of securing business. For breach or violation of this warranty, ASPA shall have the right to annul this contract without liability or, at its discretion, to deduct from the contract price of considerations, or otherwise recover, the full amount of such commission, percentage, brokerage, or contingent fee.

17. Prohibited Interest

No official of ASPA who is authorized in such capacity and on behalf of ASPA to negotiate, make, accept, or approve, or to take part in negotiating, making, accepting or approving any architectural, engineering, inspection, construction, or material supply contract or any subcontract in connection with the construction of the project, shall become directly or indirectly integrated personally in this contract or in any part thereof. No officer, employee, architect, attorney, engineer, or inspector of or for ASPA who is authorized in such capacity and on behalf of ASPA to exercise any legislative, executive, supervisory, or other similar functions in connection with the construction of the project, shall become directly or indirectly interested personally in this contract or in any part thereof, any material supply Contractor, subcontract, insurance contract, or any other contract pertaining to the project.

18. Kickbacks Prohibited

ASPA may, by written notice to the Contractor, terminate the contract for cause if ASPA finds that any payment, gratuity (in the form of entertainment, gifts, or otherwise), or offer of employment was made by or on behalf of the Contractor to any ASPA employee, his/her representatives, family members, partners or assigns, any employee of the United States, any employee of the American Samoa government, including members of the FONO of American Samoa; with a view toward securing an agreement or securing favorable treatment with respect to obtaining or performance of this contract in the event that ASPA terminates the contract under this subsection, ASPA shall be entitled to:

- a. Pursue the same remedies against the Contractor which ASPA could pursue in the event of a breach of contract by the Contractor; and
 - b. Recover the full amount of such payment gratuity from the person so employed by ASPA.
- The rights and remedies of ASPA provided for in this subsection shall not be exclusive and

are in addition to any other rights and remedies provided by law or under the Contract Documents.

19. Covenant Against Collusion

The Contractor warrants that neither it nor any of its employees have directly or indirectly entered into any secret or non-secret agreement, participated in any collusion, or otherwise taken any action in restraint of competition in connection with the bid or proposal submitted. For breach or violation of this warranty, ASPA shall have the right to annul this Contract without liability or in its discretion to pursue the same remedies against the Contractor that ASPA could pursue in the event of breach of contract by the Contractor, and as a penalty in addition to any other damages to which it may be entitled by law, to exemplary damages.

20. Reports, Records, Data And Drawings

The Contractor shall submit to ASPA such schedules of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data as ASPA may request concerning work performed or to be performed under the contract not later than the 5th of the month.. The Contractor shall submit to ASPA an electronic copy of “as built” drawings in AutoCAD Civil 3d 2016 at the end of the month. These drawings shall represent a complete and accurate record of the actual work accomplished and shall be based upon first hand observations by the project superintendent or his designated representative. A detailed survey of all in-place structures shall be conducted and this data incorporated into said drawings. The Contractor shall include the following items in the “as built” drawings:

- Project location and site (community and project description and number);
- Name of project engineer, inspector and Contractor;
- North arrow and scale;
- Legend;
- Bid item quantity as claimed for payment

Requests for monthly payments will not be approved if a set of marked drawings are not kept current, and requests for final payment will not be approved until the drawings are delivered to the Engineer.

The Contractor agrees that ASPA, the Comptroller General of the United States, or the Secretary of the Interior, or any of their duly authorized agents or representatives, shall, until the expiration of three years after final payment under the Contract shall have access to and the right to examine any directly pertinent books, documents, papers, and records of the Contractor involving transactions related to the Contract.

The Contractor further agrees to include in all its subcontracts hereunder a provision to the effect that the subcontractor agrees that ASPA, the Comptroller General of the United States, or the Secretary of the Interior, or any of their duly authorized agents or representatives, shall, until the expiration of three years after final payment under the subcontract, shall have access to and the right to examine any directly pertinent books, documents, papers and records of such subcontractor, involving transactions related to the Contract.

21. Insurance

The Contractor shall obtain the insurance coverage designated herein and pay all costs associated therewith. Such insurance shall be for the coverage, amounts and limits as set forth in subsection below. Before commencing the Work under the Agreement, the Contractor shall furnish ASPA with certificates of insurance showing the type, amount, class of operations covered, effective dates and date of expiration of policies. The Contractor's public/general liability and automobile liability policies shall name ASPA as an additional insured. The Contractor's insurance shall be maintained for the full period of this Agreement.

In the case of a breach of any provision of this section, ASPA, at its option, may take out and maintain, at the expense of the Contractor, such insurance as ASPA may deem proper and may charge the Contractor with such amounts due. Nothing contained in these insurance requirements is to be construed as limiting the extent of the Contractor's responsibility for payments of damages resulting from its operations under this Agreement.

Requirements: The Contractor shall maintain during the term of this Agreement such insurance as follows:

- a. *Workmen's Compensation.* The Contractor shall maintain such statutory amounts of workmen's compensation insurance as are set forth in the American Samoa Code Annotated and American Samoa Administrative Code.
- b. *Employer's Liability.* The Contractor shall maintain employer's liability insurance in the amount of Five Hundred Thousand Dollars (\$500,000.00 USD).
- c. *Public/General Liability.* Public/General liability shall include coverage for wrongful death claims, and shall not exclude coverage for explosion, collapse or underground exposure.
- d. *Bodily/personal injury.* The Contractor shall maintain public/general liability insurance covering third party bodily/personal injury for Five Hundred Thousand Dollars (\$500,000.00 USD) per person/per occurrence with an aggregate of One Million Dollars (\$1,000,000.00 USD).
- e. *Property damage.* The Contractor shall maintain public/general liability insurance covering property damage for One Hundred Thousand Dollars (\$100,000.00 USD) per person/per occurrence with an aggregate of Two Hundred Thousand Dollars (\$200,000.00 USD).
- f. *Automobile Liability*
 - i. *Bodily/personal injury.* The Contractor shall maintain automobile liability insurance covering third party bodily/personal injury for Five Hundred Thousand

Dollars (\$500,000.00 USD). Per person/per occurrence with an aggregate of One Millions Dollars (\$1,000,000.00 USD).

- ii. Property damage. The Contractor shall maintain automobile liability insurance covering property damage for One Hundred Thousand Dollars (\$100,000.00 USD) per person/per occurrence with an aggregate of Two Hundred Thousand Dollars (\$200,000.00 USD).
- g. *Builder's Risk Insurance.* Unless otherwise modified in the Supplementary Conditions, the Contractor shall secure and maintain during the life of the Contract Builders Risk Insurance coverage for 100 percent of the Contract amount. Such insurance shall not exclude coverage for earthquake, landslide, flood, collapse, or loss due to the results of faulty workmanship, and shall provide for losses to be paid to the Contractor and ASPA as their interests may appear.

The above policies shall protect the Contractor from claims for damages for personal injury, including accidental death, as well as from claims for direct property damage, which may arise from negligent operations under this Agreement, whether such operations are by itself or by ASPA employees.

When the construction is to be accomplished within a public or private right-of-way requiring special insurance coverage, the Contractor shall conform to the particular requirements and provide the required insurance. The Contractor shall include in his liability policy all endorsements that the said authority may require for the protection of the authority, its officers, agents and employees. Insurance coverage for special conditions, when required, shall be provided as set forth in the Supplementary Conditions.

22. Indemnity

The Contractor shall indemnify, defend and hold harmless ASPA, its directors, officers, employees and agents from and against any and all claims and demands whatsoever, including costs and attorney's fees, resulting from Contractors negligent acts or omissions, or any other tortious conduct, in connection with the performance of this Contract, the Contractor shall indemnify, defend and hold harmless ASPA, its directors, officers, employees and agents from and against any and all claims and demands whatsoever, including costs and attorney's fees, under the doctrine of strict liability as it may be applied by a court of competent jurisdiction to Contractor's performance under this Contract.

23. Payment Of Taxes

The Contractor shall pay and shall assume exclusive liability for all taxes levied or assessed on or in connection with its performance of the Contract, whether before or after acceptance of the work, including but not limited to federal payroll taxes or assessments, and Government of American Samoa income and excise taxes. The Contractor may be required to show that all taxes



due or accrued to American Samoa have been paid or guaranteed before leaving American Samoa.

24. Law, Permits And Licenses

The Contractor shall keep itself fully informed of all local and federal laws and regulations that affect in any manner the work set forth in the Contract Documents. The Contractor shall at all times comply with said laws and regulation, and protect and indemnify ASPA, its directors, officers, agents, representatives, and employees against any claim or liability arising from or based on the violation of any such laws or regulations. All permits, licenses and inspection fees necessary for prosecution and completion of the work shall be secured and paid for by the Contractor, unless otherwise specified.

25. Superintendent

During the term of the Contract, the Contractor shall keep English speaking, competent supervisory personnel. The Contractor shall designate in writing, before starting work, an authorized representative acceptable to the Engineer who shall have complete authority to represent and act for the Contractor. The residential address and telephone number of the authorized representative shall be made available to the Engineer for emergency communication during off-hours. The Contractor shall give efficient supervision to the work, using his best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques and procedures, and for providing adequate safety precautions and coordinating all portions of the work under the Contract

26. ASPA Engineer's Field Office

The Contractor shall provide, maintain, and subsequently remove as its property a field office as specified below, for the exclusive use of the Engineer and its representatives.

Field office shall remain on the site for 30 days after final acceptance of all work. The field office shall be located where directed by the Engineer; leveled, blocked, tied down, and skirted as directed; and, relocated, when necessary, and approved.

Contractor shall maintain the field office in good repair and acceptable appearance. Provide daily cleaning service, maintenance, and replenishment, as applicable, of paper towels, paper cups, soap, tissue paper, and bottled water service.

Provide gravel or crushed rock under and around the field office to a minimum distance of 10 feet. Provide sanitary facilities in compliance with local health authorities.

Field office shall be trailer-type mobile structure or approved equal with the following features and equipment, new or like new in appearance and function:

- a. Security guard screens on all windows.

- b. Toilet and washbasin in separate compartments
- c. Insulated double walls, floor, and roof.
- d. Self-contained, window air conditioner.
- e. Fluorescent ceiling lights.
- f. Provide a 4 by 8 foot plan table, a standard size office desk and chair, computer station, and working communications & internet facilities.

27. Contractor Engineer's Direction

The superintendent or other duly authorized representative of the Contractor shall represent the Contractor in all directions given to the Contractor by the Engineer. Directions of major importance will be confirmed in writing. Any direction will be so confirmed, in each case, on written request from the Contractor.

28. Employees

The Contractor shall employ American Samoa labor to the fullest extent possible. It shall be responsible for hiring its own labor. It shall be the responsibility of the Contractor to ascertain that any foreign recruitment complies in full with all applicable laws and may subject it to termination of the Contract for cause or withholding of amounts payable to the Contractor. The Contractor shall employ only competent, skillful workers to do the work, and whenever any person shall appear to be incompetent or to act in a disorderly or improper manner; such person shall be removed from the work. Such removal shall not be the basis of any claim for compensation of damage against ASPA. ASPA in its discretion can remove any personnel employed by the contractor at any stage of the project as it sees fit. Contractor shall find immediate replacement without delay or disruption to the project schedule. In connection with the performance of work under this Contract, the Contractor agrees not to employ any person undergoing a sentence of imprisonment at hard labor. The Contractor shall, at all times, provide competent, suitable personnel to survey and layout work and perform construction as required by the Contract. The Contractor shall at all times maintain proper discipline and order at the work site.

29. Discrepancy With Local Or Federal Law

If any discrepancy or inconsistency is discovered between any provision of the Contract Documents and any law, ordinance, regulation, order decree of the American Samoa or the United States government, the Contractor shall forthwith report the same to the Engineer in writing. The Contractor shall at times observe and comply with all such existing and future laws, ordinances, regulations, orders and decrees, and shall protect and indemnify ASPA, its directors, officers, agents, representatives and employees against any claim or liability arising from or based upon the violation of any such law, ordinance, regulation, order or decree, whether by the Contractor or by its employees. Particular attention is called to prevailing wage and overtime compensation.

30. Hours Of Work



The Contractor shall schedule all work to be performed during the period from 7:30 a.m. to 4:00 p.m., Monday through Friday. No work will be permitted on weekends or holidays without specific approval from ASPA. The Contractor may be permitted to work at night, if it can satisfactorily demonstrate the need, in order to maintain the required progress or protect the work from the elements. If permitted to work at night, the Contractor shall provide sufficient and satisfactory lighting and other facilities. For night work, if any be performed, the Contractor shall receive no extra payment, but compensation shall be considered as having been included in the price stipulated for the work. The Contractor shall, however, be charged for such additional inspection and administrative costs as ASPA may incur.

31. Equal Opportunity

This subsection is applicable unless the Contract is exempt under the rules, regulations, and relevant orders of the Secretary of Labor (41 CFR, ch. 60). During the performance of the Contract, the Contractor agrees as follows:

The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and election for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Engineer setting forth the provisions of this subsection.

The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Engineer, advising the labor union or workers' representative of the Contractor's commitments under this subsection, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and of the rules, regulations, and relevant orders of the Secretary of Labor.

The Contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

In the event of the Contractor's noncompliance with this subsection, or with any of the said rules, regulations, orders, the Contract may be cancelled, terminated, or suspended, in all or in part, and the Contractor may be declared ineligible for further government contracts in accordance with procedures authorized in Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

The Contractor will include the provisions of this subsection in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order No. 11246 of September 24, 1965, as amended by Executive Order No. 11375 of October 13, 1967, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the government may direct as a means of enforcing such provisions, including sanctions for noncompliance.

32. Safety Requirements

The Contractor shall be solely and completely responsible for safety conditions on the site where work is to be performed, including the safety of all persons and property during the term of the Contract. This requirement shall apply continuously and not be limited to normal working hours. Safety provisions shall conform to the United States Department of Labor, Occupational Safety, and Health Act ("OSHA") and other applicable laws. The Contractor shall become thoroughly familiar with governing safety provisions and shall comply with the obligations set forth therein. The Contractor shall develop and maintain for the duration of the Contract, a safety program that will effectively incorporate and implement required safety provisions. The Contractor shall appoint a qualified employee who is authorized to supervise and enforce compliance with the safety program. The Engineer's duty to conduct construction review of the Contractor's performance is not intended to include a review or approval of the adequacy of the Contractor's safety supervisor, safety program, or safety measures taken in, on, or near the construction site.

As part of the safety program, the Contractor shall maintain at its office or other well-known place at the site of the work, safety equipment applicable to the work as prescribed by the governing safety authorities and articles necessary for giving first-aid to the injured. Contractor shall do all work necessary to protect the general public from hazards, including, but not limited to, surface irregularities and/or unramped grade changes in pedestrian sidewalk or walkway, and trenches or excavations in roadway. Barricades, lanterns, and proper signs shall be furnished in sufficient amounts to safeguard the public and the work. Contractor shall construct and maintain satisfactory and substantial temporary chain link fencing, solid fencing, railing, barricades or steel plates, as applicable, at all openings, obstructions, or other hazards on streets, sidewalks, floors, roofs, and walkways. Such barriers shall have adequate warning lights as necessary or required for safety. The Contractor shall comply with the Engineer's safety rules while on the Engineer's property.



If death or serious injuries or damages are caused, the accident shall be reported immediately by telephone or messenger to the Engineer. In addition, the Contractor shall promptly report to ASPA in writing all accidents whatsoever arising out of, or in connection with, the performance of the work whether on or adjacent to the site, giving full details and statements of witnesses. If a claim is made by anyone against the Contractor or any subcontractor on account of an accident, the Contractor shall promptly report the claim to ASPA in writing, giving full details of the claim.

The Contractor's tools and equipment used on the work shall be furnished in sufficient quantity and of a capacity and type that will safely perform the work specified, and shall be maintained and used in a manner that will not create a hazard to person or property, or cause a delay in the progress of work.

The Contractor will comply with the rules and regulations of the Territory authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by written permission of the proper authority. The Contractor will make every effort to avoid obstruction to traffic and normal commercial pursuits. Where traffic will pass over backfilled trenches before they are paved, the Contractor will maintain the top of the trench to allow normal vehicular traffic to pass over and provide temporary access driveways when required. Contractor agrees that its cleanup operations shall follow immediately after backfilling. When flagmen and guards are required by regulation or when deemed necessary for safety, the Contractor will furnish them with appropriate apparel and other traffic control devices. Traffic control procedures and devices used on all rights-of-way shall meet the requirements of the applicable current laws and regulations for traffic control. Contractor will notify the fire and police departments before closing any street or portion thereof and notify said departments when the streets are again passable for emergency vehicles. The Contractor shall leave its emergency telephone number or numbers with the police department, so that contact may be made easily at all times in case of barricade and flare trouble or other emergencies.

The Contractor shall perform all work in a fire safe manner. The Contractor shall furnish and maintain on site adequate firefighting equipment capable of extinguishing incipient fires. The Contractor shall comply with applicable American Samoa and United States fire prevention laws and regulations. Where these regulations do not apply, the Contractor agrees to follow the applicable parts of the National Fire Prevention Standard for Safeguarding Building Construction Operations (NFPS No.241).

33. Protection Of Work And/Or Property

The Contractor shall at all times safely guard ASPA's property from damage or loss. The Contractor shall at all times safely guard and protect it from damaging its own work. All loss or damages arising from any unforeseen obstruction or defects which may be encountered in the prosecution of the work, or from the action of the elements, shall be sustained by the Contractor.

34. Materials And Workmanship

Unless otherwise specified in the Contract Documents, the Contractor shall provide and pay for all materials, labor, water, tools, equipment, light, power, supplies, transportation and other facilities or incidentals necessary for the furnishing, performance, testing, start-up, execution and completion of the work. Contractor shall additionally furnish all fuel, power, light, telephone, water sanitary facilities, temporary facilities, and any other facilities or incidentals necessary for the furnishing, performance, testing, start-up, execution and completion of the work. Unless otherwise specified in the Contract Documents, all materials shall be new, and both workmanship and materials shall be of good quality. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the applicable supplier or industry standards. The Contractor shall, if required, furnish satisfactory evidence as to the kind and quality of materials. All work shall be done and completed in a thoroughly workmanlike manner notwithstanding any omission from the Technical Specifications or the Drawings, and it shall be the duty of the Contractor to call the Engineer's attention to apparent errors or omissions and request instructions before proceeding with the work. All work performed by the Contractor after it learns or should have learned of an error or omission in the Technical Specifications or Drawings without notifying the Engineer will be at the Contractor's own expense. The Engineer may, by appropriate instructions, correct errors and omissions, and these instructions shall be as binding upon the Contractor as though contained in the original Technical Specifications or Drawings. All defective work or materials shall be removed from the premises by the Contractor, whether in place or not, and shall be replaced or renewed as the Engineer may direct. All materials and workmanship of whatever description shall be subjected to the inspection of and rejection by the Engineer if not in conformance with the Technical Specifications. Contractor shall repair or replace, at Contractor's sole expense, every portion of the work that is damaged or destroyed prior to the final completion of the work and caused in whole or in part by the acts or omissions of the Contractor.

35. PNRS Conditions

The Contractor shall inform ASPA upon discovery of any historic artifacts or properties found at the construction site(s). Contractor must ensure that any excess dirt, cinder, spoils, concrete, pavement and/or drilling materials, must be properly disposed of. Any other uses of these materials shall require a separate land use permit. Associated costs shall be borne by the Contractor and shall be incidental to the undertaking of the scope of this project. The Contractor shall make every effort to prevent soil erosion and the escape of debris to the ocean. The Contractor shall not leave the project site on the condition that it would cause soil erosion in the future. The Contractor shall identify a staging area acceptable to the ASPA and the PNRS. Any other work not within the scope of this project conducted at this site shall require a separate land use permit application.

36. The Engineer

The Engineer shall be ASPA's representative during the construction period. His authority and responsibility shall be limited to the provisions set forth in these Contract Documents. The Engineer shall have the authority to reject work and materials whenever such rejection may be



necessary to ensure execution of the Contract in accordance with the intent of the Contract Documents.

The Engineer or its representative inspection and tests are for the sole benefit of ASPA and do not: Constitute or imply acceptance; Relieve Contractor of responsibility for providing adequate quality control measures; Relieve Contractor of responsibility for risk of loss or damage to the Work, materials, or equipment; Relieve Contractor of its responsibility to comply with the requirements of the Contract; or, Impair ASPA's right to reject defective or nonconforming items, or to avail itself of any other remedy to which it may be entitled.

The Engineer will make periodic visits to the site of the project to observe the progress and quality of the work and to determine, in general, if the work is proceeding in accordance with the intent of the Contract Documents. He shall not be required to make comprehensive or continuous inspections to check the quality or quantity of the work, and he shall not be responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work. Visits and observations made by the Engineer shall not relieve the Contractor of his obligation to conduct comprehensive inspections of the work and to furnish materials and perform acceptable work, and to provide adequate safety precautions in conformance with the intent of the Contract.

The Engineer will make decisions, in writing, on all claims of ASPA or the Contractor arising from interpretation or execution of the Contract Documents. Such decision shall be necessary before the Contractor can receive additional money under the terms of the Contract. Changes in work ordered by the Engineer will be made in compliance with the section entitled "Alterations."

One or more Inspectors may be assigned to observe the work and to act in matters of construction under this Contract. It is understood that such inspectors shall have the power to issue instructions and make decisions within the limitations of the authority of the Engineer. Such inspection shall not relieve the Contractor of his obligations to conduct comprehensive inspections of the work, and to provide adequate safety precautions in conformance with the intent of the Contract.

37. Rejected Material

Any material condemned or rejected by the Engineer or his authorized inspector because of non-conformity with the Contract Documents shall be removed at once from the vicinity of the work by the Contractor at his own expense, and the same shall not be used on the work.

38. Unnoticed Defects

Any defective work or material that may be discovered by the Engineer before the final acceptance of work, or before final payment has been made, or during the guarantee period, shall be removed and replaced by work and materials which shall conform to the provisions of the Contract Documents. Failure on the part of the Engineer to condemn or reject based on inferior

work or materials shall make such deductions in the final payment therefore as may be just and reasonable.

39. Right To Retain Imperfect Work

If any part or portion of the work done or material furnished under this Contract shall prove defective and not in accordance with the Technical Specifications and Drawings, and if the imperfection in the same shall not be of sufficient magnitude or importance as to make the work dangerous or unsuitable, or if the removal of such work will create conditions which are dangerous or undesirable, ASPA shall have the right and authority to retain such work but shall make such deductions in the final payment therefore as may be just and reasonable.

40. Shop Drawings

After execution of the Contract, the Contractor shall submit, in quadruplicate, to the Engineer for his review, such shop drawings, electrical diagrams, and catalog cuts for fabricated items and manufactured items (including satisfactory identification of items, units and assemblies in relation to the Drawings and Technical Specifications). Unless otherwise approved by the Engineer, shop drawings shall be submitted only by the Contractor, who shall indicate by a signed stamp on the shop drawings, or other approved means, that the Contractor has checked the shop drawings, and that the work shown is in accordance with Contract requirements and has been checked for dimensions and relationship with work of all other trades involved. The practice of submitting incomplete or unchecked shop drawings for the Engineer too correct for finish will not be acceptable, and shop drawings which, in the opinion of the Engineer, clearly indicate that they have not been checked by the Contractor will be considered as non-complying with the intent of the Contract Documents and will be returned to the Contractor for resubmission in the proper form.

When the shop drawings have been reviewed by the Engineer, two sets of submittals will be returned to the Contractor, appropriately stamped. If major changes or corrections are necessary, the shop drawings may be rejected and one set will be returned to the Contractor with such changes or corrections indicated, and the Contractor shall correct and resubmit the shop drawings in quadruplicate, unless otherwise directed by the Engineer. No changes shall be made by the Contractor to resubmitted shop drawings other than those changes indicated by the Engineer.

The review of such shop drawings and catalog cuts by the Engineer shall not relieve the Contractor from responsibility for correctness of dimensions, fabrication details and space requirements, or for deviations from the Contract Drawings or Specification, unless the Contractor has called attention to such deviations in writing by a letter accompanying the shop drawings and the Engineer approves the change or deviation in writing at the time of submission; nor shall review by the Engineer relieve the Contractor from the responsibility for errors in the shop drawings. When the Contractor does call such deviations to the attention of the Engineer, the Contractor shall state in his letter whether or not such deviations involve any deduction or extra cost adjustment

41. Detailed Drawings And Instructions

The Engineer will furnish, with reasonable promptness, additional instructions by means of Drawings or otherwise, if, in the Engineer's opinion, such instructions are required for the proper execution of the work. All such Drawings and instructions will be consistent with the Contract Documents, true developments thereof, and reasonably inferable there from.

42. Warranty Of Title

No material, supplies, or equipment for the work shall be purchased subject to any chattel mortgage security agreement or under a conditional sale or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants good title to all material, supplies and equipment installed or incorporated in the work and agrees upon completion of all work to deliver the premises together with all improvements and appurtenances constructed or placed thereon by it to ASPA free from any claim, lien, security interest, or charge and further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to a lien upon the premises or any improvements or appurtenances thereon, provided that this shall not preclude the Contractor from installing metering devices and other equipment of ASPA, the title of which is so commonly retained by ASPA. The provisions of this section shall be inserted by the Contractor into all subcontracts, and notice of its provisions shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

43. Substitution Of Materials

Except for ASPA-selected equipment items, and items where no substitution is clearly specified, whenever any material, article, device, product, fixture, form, type of construction, or process is indicated or specified by patent or proprietary name, by name of manufacturer, or by catalog number, such specifications shall be deemed to be used for the purpose of establishing a standard of quality and facilitating the description of the material or process desired. This procedure is not to be construed as eliminating from competition other products of equal or better quality by other manufacturers where fully suitable in design. The Contractor may, in such cases, submit complete data to the Engineer, within thirty (30) days following the award of the Contract, for consideration of another material, type, or process which shall be substantially equal in every respect to that so indicated or specified. Substitute materials shall not be used unless approved by ASPA in writing. The Engineer will be the sole judge of the substituted article or material.

44. Tests Samples And Inspections

The Contractor shall furnish, without extra charge, the necessary test pieces and samples, including facilities and labor for obtaining the same, as requested by the Engineer. When required, the Contractor shall furnish certificates of tests of materials and equipment made at the point of manufacture by a recognized testing laboratory. The Engineer, and authorized ASPA agents, and their representatives shall at all times be provided safe access to the work wherever it is in preparation or progress, and the Contractor shall provide facilities for such access and for

inspection, including maintenance of temporary and permanent access. If the Technical Specifications, the Engineer's instructions, or any laws or regulations require any work to be specially tested or approved, the Contractor shall give timely notice of its readiness for inspection. Inspections to be conducted by the Engineer will be promptly made, and where practicable, at the source of supply. If any work should be covered up without approval or consent of the Engineer, it shall, if required by the Engineer, be uncovered for examination at the Contractor's expense. Re-examination of questioned work may be ordered by the Engineer, and, if so ordered, the work shall be uncovered by the Contractor. If such work is found to be not in accordance with the Contract Documents, the Contractor shall correct the defective work, and the cost of reexamination and correction of the defective work shall be paid by the Contractor.

45. Royalties And Patents

The Contractor shall pay all royalties and license fees, unless otherwise specified. The Contractor shall defend all suits or claims for infringement of any patent rights and shall defend, indemnify and hold harmless ASPA from any such suits or claims.

46. Defective Work

The Contractor warrants and guarantees to ASPA that all work will be in accordance with the Contract Documents and will not be defective. Contractor hereby agrees to make, at its own expense, all repairs or replacements necessitated by defects in materials or workmanship, supplied under the Contract, which become evident to ASPA within one (1) year after the date of final acceptance of the work or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents. If defective work is found, the Contractor shall promptly, without cost to ASPA and in accordance with ASPA's written instructions, promptly either correct such defective work, or if it has been rejected by ASPA, remove it from the work site and replace it with non-defective work. The Contractor further assumes responsibility for a similar guarantee for all work and materials provided by the subcontractors or manufacturers of all work and materials provided by the sub-contractors or manufacturers of packaged equipment components. The Contractor also agrees to defend, indemnify and hold harmless ASPA from and against liability of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written order for same from ASPA. If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk or loss of damage, ASPA may have the defective work corrected or the rejected work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by Contractor.

47. Commencement Of The Work

Before work shall be started and materials ordered, the Contractor shall meet and consult with the Engineer to discuss the materials, equipment and all arrangements for prosecuting the work.

Work shall not commence until the Contractor receives the Notice of Proceed in writing from ASPA.

48. Schedules And Progress Reports

Prior to starting work, the Contractor shall submit to the Engineer its own progress schedule for acceptance showing approximately the dates on which each part or division of the work is expected to be started and finished, including an estimated timeline for use of the materials. ASPA's Milestone Schedule for purposes of progress payments ("Milestone Payments") to the Contractor shall determine ASPA's payment duties, unless the Engineer determines in writing that the Contractor's progress schedule shall be considered the official Milestone Schedule.

The Contractor shall also forward to the Engineer, at the end of each month, an itemized report of the delivery status of major and critical items of purchased equipment and material, including the status of shop drawings and the status of shop and field fabricated work. These progress reports shall indicate the date of the purchase order, the current percentage of completion, estimated delivery and cause of delay, if any.

The Contractor's progress schedule must conform to the calendar days set forth for the completion of the work and shall be subject to modification by the Engineer. The Engineer shall be advised in advance by the Contractor when construction work is scheduled and the days when no construction work will take place. If the Contractor fails to notify the Engineer in advance of a day or days when no construction work will be done, the Contractor will be charged the cost of inspection for that day or days and such charges may be deducted from any payment due the Contractor. If the completion of any part of the work or the delivery of materials is behind the approved schedule, the Contractor shall submit in writing a plan acceptable to the Engineer for bringing the work up to schedule.

ASPA shall have the right to withhold Milestone Payments for the work if the Contractor fails to prosecute the work in accordance with the Milestone Schedule. It is expressly understood and agreed that the time of beginning, rate of progress and time of completion of the work are the essence of the Contract. The work shall be prosecuted at such time, and in or on such part or parts of the project as may be required, to complete the project as contemplated in the Contract Documents and the approved Milestone Schedule.

49. Night Work

The Contractor may be required to prosecute the work at night if, at any time, the Engineer deems it necessary for the progress of the work, or if emergencies arise, and the Contractor shall promptly comply with any such requirements made in writing by the Engineer. The Contractor will also be permitted to work at night if it shall satisfy the Engineer of the need, therefore in order to maintain the required progress or protect the work from the elements. If ordered or permitted to work at night, the Contractor shall provide sufficient and satisfactory lighting and other facilities. For night work, if any be performed, the Contractor shall receive no extra

payment, but compensation shall be considered as having been included in the price stipulated for the work.

50. Aspa's Right To Perform Work

If in the opinion of the Engineer the Contractor neglects to prosecute the work in a timely manner or in accordance with the Milestone Schedule, or neglects or refuses at its own cost to perform and/or replace work rejected by the Engineer, then ASPA shall notify the Contractor and its surety of the condition, and after five (5) days' written notice to the Contractor and the Surety, and without prejudice to any other right or remedy which ASPA may have under the Contract Documents, including the section entitled "ASPA's Right to re-Contractor Work," and take over that portion of the work which has been neglected or improperly executed and make good the deficiencies and deduct its costs thereof from payments then or thereafter due the Contractor.

51. Termination For Convenience

ASPA may terminate the Contract in whole or, from time to time, in part, if the Chief Executive Officer (the "CEO") determines that a termination is in the best interest of ASPA. In such case, the CEO shall terminate the Contract by delivering to the Contractor a two-week notice of termination specifying the extent of termination and the effective date. Within two weeks of termination, the Contractor shall cease its prosecution of the work, turn over to ASPA all data and other materials acquired for purposes of the Contract, and submit to ASPA a claim for materials acquired for purposes of the Contract, and submit to ASPA a claim for materials and/or labor supplied prior to termination. ASPA shall pay the Contractor an equitable price for materials purchased and labor expended by the Contractor prior to termination, provided that such price does not exceed a fair proportion of the original Contract price.

After receipt of a notice of termination issued pursuant to this section, and except as directed by the CEO, the Contractor shall immediately proceed with the following obligations, regardless of any delay in determining or adjusting any amounts due under this section:

Stop the supply and delivery of goods and labor as specified in the notice;

Place no further orders for goods, materials, services, labor or facilities, except as necessary to complete any continued portion or portions of the Contract;

Terminate all subcontracts to the extent they relate to the supply and delivery of goods terminated;

Assigned to ASPA, as directed and approved by the CEO, all right, title, and interest of the Contractor under the subcontracts terminated, in which case ASPA shall have the right to settle or to pay any termination settlement proposal arising out of those terminations;



With approval or ratification to the extent required by the CEO, settle all outstanding liabilities and termination settlement proposals arising from the termination of subcontracts; the approval or ratification will be final for purposes of this section;

Complete performance of the supply and delivery of goods not terminated;

Take any action that may be necessary or that the CEO may direct, for the protection and preservation of the goods related to the Contract that is in the possession of the Contractor and in which ASPA has or may acquire an interest; and

Submit a final termination settlement proposal to the CEO in the form and with the certifications prescribed by the CEO. The Contractor shall submit the proposal promptly upon notice of termination, but no more than one (1) month from the effective date of termination, unless extended in writing by the CEO upon written request of the Contractor within this one (1) month period. However, if the CEO determines that the facts justify it, a termination settlement proposal may be received and acted on after one (1) month or any extension. If the Contractor fails to submit the proposal within the time allowed, the CEO may determine, on the basis of information available, the amount, if any, due to the Contractor because of the termination and shall pay the amount determined.

52. Termination For Cause

ASPA may discharge the Contractor and terminate the Contract at any time when ASPA shall determine that it has sufficient cause arising from (a) Contractor's dereliction or unsatisfactory performance of a duty, (b) Contractor's failure to perform the work in accordance with the provisions of the Contract Documents, (c) misrepresentation by the Contractor, or (d) conviction of the Contractor or any of its directors and/or officers of a felony. If ASPA terminates the Contractor for cause prior to completion of the Contractor's duties, in addition to any other rights or remedies granted ASPA in the Contract Documents and at law, ASPA shall require repayment by the Contractor of all advanced payments or Milestone Payments made and may require delivery of any partially completed work. ASPA shall finish the remaining work to be performed by whatever method ASPA may deem expedient and the Contractor shall not be entitled to receive any further compensation. In the event that the cost, including additional managerial and administrative services, to ASPA to complete the work exceeds the contract price, such excess costs shall be paid by the Contractor.

53. Termination For Default

If the Contractor refuses or fails to perform any provision of the Contract or Contract Documents with such diligence as will ensure its completion within the time specified in the Contract or any extension thereof, otherwise fails to timely satisfy any provision set forth in the Contract Documents, or commits any other substantial breach of the Contract Documents, ASPA may notify the Contractor in writing of the delay or non-performance, and if not cured within ten (10) days or any longer time specified in writing to ASPA, ASPA shall terminate the Contractor's

right to proceed under the Contract or such part of the Contract Documents as to which there has been delay or a failure to properly perform. In the event of termination in whole or in part under this section, ASPA may procure similar supplies, materials and/or services in a manner and upon terms deemed appropriate by ASPA, as further set forth in the section entitled “ASPA’s Right to Re-contract Work”. Notwithstanding termination of the Contract and subject to any directions from ASPA, the Contractor shall take timely, reasonable, and necessary action to protect and preserve property in the possession of the Contractor in which ASPA has an interest.

Payment for completed work shall be at the sole discretion of ASPA. Payment for the protection and preservation of property shall be in an amount agreed upon by the Contractor and ASPA. ASPA may withhold from amounts due the Contractor such sums as ASPA deems to be necessary to protect ASPA against loss because of outstanding liens or claims of former lien holders and to reimburse ASPA for the excess costs incurred in procuring similar goods, material and/or services. Except with respect to defaults of subcontractors, the Contractor shall not be in default by reason of any failure in performance of the Contract in accordance with its terms if the Contractor has notified ASPA within ten (10) days after the cause of the delay and the failure arises out of causes such as acts of God, acts of the public enemy, acts of ASPA and any other ASPA entity in its sovereign or contractual capacity, fires, floods, epidemics, quarantine restrictions, strikes or other labor disputes, freight embargo, or unusually severe weather. If the failure to perform is caused by the failure of a subcontractor to perform or to make progress, and if such failure arises out of causes similar to those set forth above, the Contractor shall not be deemed to be in default, unless the supplies and/or services to be furnished by the subcontractor were reasonably obtainable from other sources in sufficient time to permit the Contractor to meet the Contract requirements.

If, after notice of termination for default, it is determined for any reason that the Contractor was not in default under the provisions of this section, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the subsection entitled “Termination for Convenience.”

The rights and remedies provided in this subsection are in addition to any other rights and remedies provided by law or under the Contract Documents.

54. Termination For National Emergencies

ASPA shall terminate this Contract or portion thereof by written notice when the Contractor is prevented from proceeding with this Contract as a direct result of an Executive Order of the President or Governor of American Samoa with respect to the prosecution of war or in the interest of national defense. ASPA shall not be liable for any claims for loss of anticipated profits.

55. Aspa’s Right To Re-Contract Work

If (a) ASPA determines that the Contractor has abandoned the work, (b) the Contractor is adjudged to be bankrupt, (c) the Contractor makes a general assignment, with ASPA’s approval, for the benefit of the Contractor’s creditors, (d) a receiver is appointed on account of its

insolvency, (e) the Contractor, on more than one working day, refuses or fails to supply enough properly skilled workers or proper materials, (f) the Contractor fails to make prompt payment to subcontractors for materials or labor, (g) the Contractor disregards the laws or regulations of American Samoa or the United States, or (h) ASPA finds that the Contractor is in material breach of any provision of the Contract Documents or any laws or regulations, then ASPA may, without prejudice to any other right or remedy provided to ASPA under the Contract Documents or at law, and after giving the Contractor and its surety ten (10) days' written notice of its intent to terminate for default, terminate the employment of the Contractor in accordance with this section and the section entitled "Termination for Default" and take possession of the premises and of all materials, tools and appurtenances thereon and finish the work by whatever method ASPA may deem expedient. In such case, the Contractor shall not be entitled to receive any further compensation. In the event that the cost, including additional managerial and administrative services to ASPA to complete the work exceeds the contract price, such excess costs shall be paid by the Contractor.

56. Suspension Of The Work

ASPA shall have the authority to suspend the work wholly, or in part, for such period or periods as it may deem necessary, due to severe weather or such other conditions as are considered by ASPA to be unfavorable to the prosecution of the work. ASPA shall also have the authority to suspend the work for such time as is necessary due to the failure on the part of the Contractor to carry out orders given by ASPA or any other Contract (collectively all of the above shall constitute a "Foreseeable Suspension").

In the event that the Contractor is ordered by ASPA to suspend the Work for a Foreseeable Suspension, the period of shutdown shall be computed from the effective date of ASPA's order to suspend work to the effective date of ASPA's order to resume the Work. ASPA shall, at its sole discretion, determine whether a contract amendment is appropriate, whose determination will not be unreasonable. In the event that the Contractor is ordered by ASPA to suspend the Work for some unforeseen cause not otherwise provided for in this Agreement and over which the Contractor has no control (an "Unforeseen Suspension"), the period of suspension shall be computed from the effective date of ASPA's order to suspend work to the effective date of ASPA's order to resume the Work (the "Suspension Period"). In the event of an Unforeseen Suspension, ASPA and the Contractor shall execute an appropriate contract amendment extending the term of this Contract to account for the Suspension Period.

No provision of this section shall be construed as entitling the Contractor to compensation for delays due to inclement weather, for suspension made at the request of the Contractor, or for any other delay.

57. Examination Of Existing Facilities

After the Contract is executed and before the commencement of work, the Contractor and Engineer shall make a thorough examination of all existing buildings, structures, and other improvements in the vicinity of the work, as applicable, which might be damaged by construction operations. Periodic examinations of existing buildings, structures, and other

improvements in the vicinity of the work shall be made jointly by authorized representatives of the Contractor, Engineer, Engineer , and the affected property Engineer s. The scope of the examination shall include cracks in structures, settlement, leakage, and similar conditions. Records in triplicate of all observations shall be prepared by the Contractor and each copy of every document shall be signed by the authorized representatives of the Engineer and Contractor and signed in the manner specified above. One signed copy of every document and photograph will be kept on file in the office of the Engineer. These records and photographs are intended for use as indisputable evidence in ascertaining whether, and to what extent, damage occurred as a result of the Contractor's operatives and are for the protection of the adjacent property Engineer s, the Contractor, and the Engineer .

58. Differing Site Conditions

The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer in writing of: (a) subsurface or latent physical conditions at the site differing materially from those indicated in the contract, or (b) unknown physical conditions at the site of an unusual nature, differing materially from those ordinarily encountered and generally recognized as being work of the character provided for in the Contract. The Engineer shall promptly investigate the conditions, and if he/she finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performance of any part of the work under the Contract, whether or not changed as a result of such conditions, an equitable adjustment shall be made by ASPA and the Contract shall be modified in writing accordingly. No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required above. No claim by the Contractor for an equitable adjustment hereunder shall be allowed if asserted after final payment under this Contract.

59. Unforeseen Delays

If the Contractor is delayed in the progress of the work by any act or neglect of ASPA, or by strikes, lockouts, fire, unusual weather conditions, or unavoidable casualties, the Contractor shall, within 48 hours of the start of the delay give notice to the Engineer of the cause of the delay and estimate the possible time extension involved. Within seven (7) days after the conclusion of the delay, the Contractor shall give notice to the Engineer of any actual time extension requested as a result of the aforementioned occurrence. No extension of time will be granted to the Contractor for delays occurring to parts of the work that have no measurable impact on the completion of the total work under the Contract, nor will extension of time be granted for delays to parts of work that are not located on the critical path. No extension of time will be considered for weather conditions normal to the area in which the work is being performed. Unusual weather conditions, if determined by the Engineer to be of a severity that would stop all progress of work, may be considered as a cause for an extension of Contract completion time.

The Engineer may order the Contractor to suspend the work that may be subject to damage in climatic conditions. When delay is caused by an order to suspend work given on account of climatic conditions which, in the opinion of the Engineer, could have been reasonably foreseen,



and for damage that could have been forestalled by diligent and reasonable action on the part of the Contractor, the Contractor will not be entitled to any extension of time on account of such order. The Contractor shall maintain all drainage ways through the work, open and clear for drainage and store water flow. The Contractor's attention is directed to the average annual rainfall in American Samoa which is approximately 200 inches.

Delays in delivery of equipment or material purchased by the Contractor or his subcontractors (including ASPA selected equipment) shall not be considered as a just cause for delay. The Contractor shall be fully responsible for the timely ordering, scheduling, expediting, delivery and installation of all equipment and materials.

Within a reasonable period after the Contractor submits to the Engineer a written request for an extension of time, the Engineer will present his written opinion to the Contractor as to whether an extension of time is justified, and, if so, his recommendation as to the number of days for time extension. The Engineer will make the final decision on all requests for extension of time.

In no event shall the Contractor be entitled under the Contract to collect or recover any damages, loss or expense incurred by any delay other than as caused by ASPA. If additional costs were incurred by the contractor due to delays caused by ASPA, the contract is entitled to a cost claim of no more than the amount of the liquidated damage fee under the "Failure to Complete the Work in the Time Agreed Upon" clause.

60. Failure To Complete The Work In The Time Agreed Upon

It is agreed by the parties to the Contract that time is of the essence, and that in case all the work is not completed before or upon the expiration of the term of the Contract, damages will be sustained by ASPA, and it is therefore agreed that the Contractor will pay to ASPA the amount stipulated in the Contract Documents. A liquidated damage fee of One Thousand Dollars (\$1,000.00) per day shall be assessed by ASPA and shall be payable by the Contractor for each day the Contractor fails to successfully complete the Work before or upon the expiration of the term of the Contract. The parties explicitly agree that payment and acceptance of any late penalties shall not constitute an accord and satisfaction of the Contractor's failure to complete the Work within the term of this Contract. In addition, ASPA will have the right to charge to the Contractor and to deduct from the final payment for the work the actual cost to ASPA of engineering, inspection, construction, review, and other overhead expenses, which are directly chargeable to the Contract and which accrue during the period of such delay.

In the event that the Contractor fails to complete the work within the term of the Contract, ASPA may then relet the Contract for the unfinished portion of the work, or complete it by Force Account. Such reletting or doing said work by Force Account shall not relieve the original Contractor or its Sureties from liabilities on their bonds, or relieve the Contractor of its responsibilities set forth in the Contract Documents for all portions of this work completed by the Contractor.

61. Disputes

Except as otherwise provided in the Contract, any dispute concerning a question of fact arising under the Contract or the Contract Documents which is not disposed of by agreement, shall be decided by the Engineer, who shall reduce his/her decision to writing and mail or otherwise furnish a copy thereof to the Contractor. The decision of the Engineer shall be final and conclusive unless, within thirty (30) days from the date of receipt of such copy, the Contractor mails or otherwise furnishes to the Engineer a written appeal addressed to ASPA's Chief Executive Officer ("CEO"). The decision of the CEO or his/her duly authorized representative for the determination of such appeals shall be final and conclusive. This provision shall not be pleaded in any suit involving a question of fact arising under the Contract as limiting judicial review of any such decision to cases where fraud by such official or his representative or board is alleged; provided, however, that any such decision shall be final and conclusive, unless the same is fraudulent or capricious or arbitrary or so grossly erroneous as necessarily to imply bad faith or is not supported by substantiating evidence. In connection with any appeal proceeding under this section, the Contractor shall be afforded an opportunity to be heard by the CEP and to offer evidence in support of its appeal. After a final decision by the CEO of a dispute hereunder, and during any further appeals to a court of competent jurisdiction, the Contractor shall proceed diligently with the performance of the Contract and in accordance with the CEO's decision. This section does not preclude considerations of questions of law in connection with decisions provided for above.

62. Jurisdiction

This Contract shall be construed according to the laws of American Samoa. All disputes under this Contract and all judicial proceedings shall be brought in the High Court of American Samoa. The Contractor hereby appoints the Treasurer of the American Samoa Government as agent for service within the jurisdiction, if an agent of the Contractor cannot be found in American Samoa after a reasonable search.

The Treasurer of American Samoa is hereby appointed agent of the Contractor for service of process in all judicial proceedings. At the time of service of papers upon the agent above-referenced, ASPA shall also cause confirming copies to be posted in the U.S. Mail, certified mail, properly stamped and addressed to the Contractor's address of record.

63. Other Contracts

ASPA reserves the right to let other Contracts in connection with the work. The Contractor shall afford other Contractors reasonable opportunity for the introduction and storage of their materials and the execution of their work and shall properly connect and coordinate his work with theirs. If any part of the work under the Contract depends on the prior acceptable completion of work by others under separate Contract(s), the Contractor shall inspect and promptly report to the Engineer any defects in such work that would adversely affect the satisfactory completion of the work under the Contract. The Contractor's failure to inspect and report shall constitute acceptance of the work by others as being suitable for the proper reception and completion of the work under this Contract, excluding, however, those defects in the work by others that occur after the satisfactory completion of the work specified hereunder.



64. Use Of Premises

The Contractor shall confine its equipment, the storage of materials, and the operation of its workers to limits shown on the Functional Specifications and/or Drawing, and shall not unreasonably encumber the premises with its materials. The Contractor shall provide, at its own expense, the necessary rights-of-way and access to the work which may be required outside the limits of ASPA's property or acquired right-of-way. The Contractor shall not load or permit any part of a structure to be loaded with a weight that will endanger its safety.

65. Environmental Controls

The Contractor, in executing the work, shall maintain affected areas within and outside project boundaries free from environmental pollution that would be in violation of applicable laws. The Contractor shall not impair the operation of existing water systems and shall maintain original site drainage whenever possible.

66. Water Pollution Controls

The Contractor, in executing the work, shall comply with all applicable laws prohibiting the pollution of marine waters, lakes, wetlands, streams, or river waters. Prior to commencing excavation and construction, the Contractor shall obtain the Engineer's approval of the Contractor's detailed plans showing procedures intended to handle and dispose of groundwater, and storm water flow, including dewatering pump discharges. Dewatering pump discharges shall be conveyed to an existing stormwater outfall. The Contractor shall comply with the procedures outlined in the U.S. Environmental Protection Agency manuals entitled "Guidelines for Erosion and Sedimentation Control Planning and Implementation," "Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity," and "Erosion and Sediment Control-Surface Mining in Eastern United States."

67. Waste Material Disposal

The Contractor shall comply with all ASPA and ASEPA pollution control, solid waste and landfill requirements, regulations and laws. The Contractor shall not burn or bury rubbish or waste materials on the premises. The Contractor shall not dispose of volatile wastes such as mineral spirits, oil, chemicals, or paint thinner in storm or sanitary drains. Disposal of wastes into streams or waterways is specifically prohibited. The Contractor shall provide acceptable containers for collection and disposal of waste materials, debris, and rubbish. The Contractor shall, prior to transporting any materials to the premises, submit to and obtain approval by the Engineer of all planned routes of passage. Routes shall be developed to minimize the impact of the additional traffic on the functioning of transportation in American Samoa.

The Contractor shall at all times, keep the work site free from waste, materials, and rubbish caused by his operations, including all materials, tools, equipment, machinery and surplus. Should it become necessary for ASPA to remove any of the aforementioned materials from its facilities, ASPA may do so and charge all costs incurred thereof to the Contractor. Contractor

shall confine construction equipment, the storage of materials and equipment and the operations of workers to the work site, or a safe storage facility not adjacent to the work site. The Contractor shall not unreasonably encumber the work site with materials or equipment. Contractor shall be fully responsible for any damage to the work site or areas contiguous thereto resulting from the performance of the work. During the progress of the work, the Contractor shall keep the work site free from accumulations of waste materials, rubbish, and other debris resulting from the work. At the completion of the work, Contractor shall remove all waste materials, rubbish and debris from and about the work site as well as the removal of all tools, construction equipment, machinery, and surplus material, and shall leave the work site clean.

68. Substantial Completion Date

The Engineer may, at his/her sole discretion, issue a written notice of substantial completion for the purpose of establishing the date that ASPA will assume the responsibility for the cost of operating such equipment. Said notice shall not be considered as final acceptance of any portion of the work or relieve the Contractor from completing the remaining work within the specified time and in full compliance with the Contract Documents.

69. Aspa Use

ASPA shall have the right to take possession of and use any completed or partially completed portions of the work. Such use shall not be considered as final acceptance of any portion of the work, nor shall such use be considered as cause for an extension of the Contract completion time, unless authorized in writing by ASPA.

If, after installation, the operation or use of the materials or equipment to be furnished under this Contract proves to be unsatisfactory to ASPA, ASPA shall have the right to operate and use such materials or equipment until it can, without damage to ASPA, be taken out of service for correction or replacement. Such period of use of the defective materials or equipment pending correction or replacement shall in no way decrease the guarantee period required for the acceptable corrected or replaced items of materials or equipment.

70. Payment

In consideration of the faithful performance of the work prosecuted in accordance with the provisions of these Contract Documents, ASPA promises to pay to the Contractor the total contract amount. In consideration of the faithful performance of the work prosecuted in accordance with the provisions of these Contract Documents, the American Samoa Power Authority (ASPA) will pay the Contractor in United States dollars for all such work on the basis of percentage of completion for lump sum items and unit price for all other items.

71. Guarantee Of Structures

The Contractor shall guarantee the work done under this Contract against leaks, breaks, malfunctions, or other unsatisfactory conditions due to defective equipment, materials, or



workmanship for a period of 1 year from the date of his acceptance of the final payment under the Contract. Any repair work or replacement required, in the opinion of the Engineer, shall be done immediately by the Contractor at his own expense.

Neither the final certificate of payment nor any provision in the Contract nor partial or entire use or occupancy of the premises by ASPA shall constitute an acceptance of work not done in accordance with the Contract nor relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials or workmanship. The Contractor shall remedy any defects in the work and pay for any damage to other work resulting there from which shall appear within a period of 1 year from the date of final acceptance of work. ASPA will give notice of observed defects with reasonable promptness.

ASPA may make such repairs, if, within 5 days after the mailing of a notice in writing to the Contractor or to his agent, the Contractor shall neglect to make or undertake with due diligence the aforesaid repairs; provided, however, that if, in the opinion of the Engineer, delay would cause serious loss or damage, repairs may be made without notice being sent to the Contractor, and the Contractor shall pay the cost thereof.

Contractors' And Manufacturers' Compliance With Local Safety, OSHA And Other Code Requirements

The completed work shall include all necessary permanent safety devices, such as machinery guards and similar ordinary safety items required by the federal (OSHA) industrial authorities and applicable local and national codes. Further, any features of the work (including ASPA-select equipment) subject to such safety regulations shall be fabricated, furnished and installed in compliance with these requirements. Contractors and manufacturers of equipment shall be held responsible for compliance with the requirements included herein. Contractors shall notify all equipment suppliers and subcontractors of the provisions of this Article.

In selecting and/or approving equipment for installation in the project, ASPA and Engineer assume no responsibility for injury or claims resulting from failure of the equipment to comply with applicable national and local safety codes or requirements or the safety requirements of a recognized agency, or failure due to faulty design concepts, or defective workmanship and materials.

72. Materials And Equipment Of Foreign Manufacture

Foreign-made materials and equipment proposed for use on this Contract shall meet with the full intent and purpose of these Contract Documents; and documentation substantiating compliance with the specified requirements shall be submitted in English to the Engineer for review and approval prior to the Contractor's purchase and delivery to the project site. The ready availability of manufacturer's services and replacement parts for maintenance purposes shall be described and warranted. Bidders shall notify prospective suppliers of foreign-made material of this requirement, and the requirement for correcting defective workmanship and materials for a period of one year following final acceptance of the work under this Contract.

73. Correction Of Defective Work After Final Acceptance

The Contractor hereby agrees to make, at his own expense all repairs or replacements necessitated by defects in materials or workmanship, supplied under the terms of this Contract, which become evident within 1 year after the date of final acceptance of the work or within 1 year after the date of substantial completion established by the Engineer for specified items of equipment, or within such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents. The Contractor further assumes responsibility for a similar guarantee for all work and materials provided by subcontractors or manufacturers of all work and materials provided by the subcontractors or manufacturers of packaged equipment components. The Contractor also agrees to hold ASPA harmless from liability of any kind arising from damage due to said defects. The Contractor shall make all repairs and replacements promptly upon receipt of written order for same from ASPA. If the Contractor fails to make the repairs and replacement promptly, ASPA may do the work, and the Contractor and his Surety shall be liable for the cost thereof.

74. Release Of Liens And Claims

Before ASPA pays the Contractor the final payment for the work, the Contractor shall sign and deliver to ASPA a release of liens or claims sworn to under oath and duly notarized. The release shall state that the Contractor has satisfied all claims and indebtedness of every nature in any way connected with the work, including (but not limiting the generality of the foregoing) all payrolls, amounts due to subcontractors, accounts for labor performed and materials furnished, incidental services, liens and judgments. If any lien or claim remains unsatisfied after all payments to the Contractor are made, the Contractor shall refund to ASPA all monies that the latter may be compelled to pay in discharging such lien or claim, including all costs and attorney's fees. In addition to the above, final payment will not be made until the Contractor has filed with ASPA the following:

- a. Consent of the surety for final payment;
- b. Satisfactory evidence by affidavit or otherwise that the Contractor's debts resulting from the Contract have been fully paid or satisfactorily received;
- c. Tax clearance from the American Samoa Government that all delinquent taxes levied or allowed under Territorial statutes have been paid; and
- d. A properly executed non-gratuity affidavit.

75. Final Payment

Upon completion of all the work under the Contract, the Contractor shall notify the Engineer, in writing, that it has completed the Contract and requests final payment. If the work has been completed as provided in the Contract Documents, the Engineer will recommend acceptance of the completed work and submit a final estimate for the amount due the Contractor under this Contract. Upon approval of this final estimate by ASPA and compliance with provisions in the section entitled "RELEASE OF LIENS OR CLAIMS," and other sections or provisions of the

Contract Documents as may be applicable; ASPA shall pay to the Contractor all monies due it under the provisions of these Contract Documents.

The acceptance by the Contractor of the final payment shall release ASPA, its directors, officers, employees, agents and representatives from any and all liability to the Contractor for every act or omission of ASPA relating to or arising out of the Contract or the work performed. No payment, however, final or otherwise, shall operate to release the Contractor or its sureties from obligations under the Contract Documents, the Payment Bond, and any other bonds and/or warranties as provided for in the Contract Documents.

76. No Waiver Of Rights

Neither the inspection by the Engineer, nor any order by ASPA for payment of money, nor any payment for, or acceptance of, the whole or any part of the work by the Engineer, nor any extension of time, nor any possession taken by ASPA or its employees, shall operate as a waiver of any provision of the Contract Documents, or any power therein reserved to ASPA, or any right to damages herein provided, nor shall any waiver of any breach of the Contract Documents be held to be a waiver of any other or subsequent breach.

77. Measurement Definitions

This Section includes specifications for measurement as they apply to the Work, and includes provisions applicable to lump sum prices, measurement by volume and unit prices as indicated. Work to be paid for at the Contract price per unit measurement, as indicated in the Contract Documents, will be measured by the Engineer in accordance with United States Standard Measures.

- a. *Lump-Sum Measurement.* Lump-sum measurement will be for the entire item, unit of work, structure, or combination thereof, as specified and as indicated in the Bid Schedule of the Bid Form.
- b. *Measurement By Volume.* Measurement by volume will be by the cubic dimension indicated in the Schedule. Method of volume measurement will be by the unit volume in place or removed as shown on the Contract Drawings as specified. When material is to be measured and paid for on a volume basis and it is impractical to determine the volume by the specified method of measurement, or when requested by the Contractor in writing and accepted by the Engineer in writing, the material may be weighed in accordance with the requirements specified for weight measurement. Such weights will be converted to volume measurement for payment purposes. Factors for conversion from weight measurement to volume measurement will be determined by the Engineer and shall be agreed to by the Contractor before such method of measurement of pay quantities will be accepted.
- c. *Linear Measurement.* Linear measurement will be by the linear dimension listed or indicated in the Contract Documents. Unless otherwise indicated, items, components, or work to be measured on a linear basis will be measured at the centerline of the item in place.

78. Third Party Beneficiary

This Contract is not intended to create in the public or any member thereof a third party beneficiary or to authorize anyone not a party to this Contract to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this Contract.

79. Prohibition Against Interest In This Contract

No member of or delegate to the Congress of the United States or FONO of American Samoa shall be admitted to any share or any part of this Contract or to any benefit to arise from the same; provided that the foregoing provision of this contract is made with a corporation for its general benefit. No employee of ASPA who exercises any functions or responsibilities in connection with the carrying out of the project to which this Contract pertains shall have any private interest, direct or indirect, in this Contract.

80. Force Majeure

Neither party shall be construed to be in default with respect to any obligations hereunder if performance of such obligations is prevented by uncontrollable forces. The term uncontrollable forces is deemed for the purpose of this Contract to mean any cause beyond the control of the party affected, including, but not limited to, flood, earthquake, severe storm, drought, lightning, fire, war, riot, civil disturbance, labor disturbance, sabotage, or restraint by a court order or other regulatory agency, which by the exercise of due diligence and foresight such party could not reasonably have been expected to avoid. Any party rendered unable to fulfill any obligation by reason of uncontrollable forces shall exercise due diligence to remove such inability with all reasonable dispatch. Nothing contained herein shall be construed to obligate a party to settle a strike against its will.

81. Notices

All notices and correspondence required to be sent to either party hereunder shall be delivered personally or by certified or registered mail and addressed as follows and deemed effective when so mailed (subject to the right to designate a different address by notice similarly given):

End Of Section



Sub-Section 00 72 00 - Miscellaneous

1. Assignment

The Contractor shall neither assign nor subcontract any portion of this Agreement without the express written approval of ASPA.

2. Amendments

This Contract may be amended at any time during the term hereof, provided, however, that no amendments or other variation of this Contract shall be valid unless in writing and signed by the Contractor and a duly authorized representative of ASPA.

3. Relationship Of The Parties

The relationship of the parties hereto shall in no event be deemed or construed to be that of employer and employee or principal and agent, or of any other relationship other than as an independent Contractor providing the services specified in this Contract.

4. Entire Agreement

This Contract and all documents incorporated herein constitute the entire agreement between the parties and supersede any oral or written understandings or agreements.

5. Severability

Each part of this Contract is intended to be severable. In the event that any part of this Contract is found by the High Court of American Samoa to be illegal or unenforceable, such provision or provisions shall be severed or modified to the extent necessary to render it enforceable, and as so severed or modified, this Contract shall continue in full force and effect.

6. Section Headings, Numbers And Letters

The section headings and section numbers and letters in this Contract are for reference purposes only and shall not affect in any way the meaning or interpretation of this Contract.

7. Further Assurances

In addition to the instruments and documents to be made, executed and delivered pursuant to this Agreement, the parties hereto agree to make, execute and deliver or cause to be made, executed and delivered to the requesting party such other instruments and to take such other actions as the requesting party may reasonably require to carry out the terms of this Contract and the transactions contemplated hereby.



8. Execution In Counterparts

This Contract may be executed in any number of counterparts, each of which shall be deemed an original and all of which together shall constitute one and the same agreement.

9. Waiver

Any waiver at any time by ASPA of its rights with respect to this Contract, or with respect to any other matter arising in connection with this Contract, shall be deemed a waiver of that specific instance only and shall not be deemed a waiver with respect to any other matter arising thereafter in connection with this Contract.

10. Authority

Each party represents and warrants that it has the necessary corporate and/or legal authority to enter into this Contract and to perform all of its duties and obligations imposed by this Contract. Each party further represents that the individuals executing this Contract on their respective behalf have been duly authorized to do so and that such execution creates a valid, binding and legally enforceable obligation of each party.

11. Conflicts

In the event a court of competent jurisdiction finds that a conflict exists between two or more provisions of the Contract Documents, the provisions of the Contract shall first prevail, followed by the Notice to Bidders, Instruction to Bidders, Technical Specifications, Drawings and then Bid Form, in that order.

Bonds And Other Performance Security

- a. The contractor shall elect 20% retainage for contracts greater than \$35,000.00 but less than \$1,500,000.00 and apply pre-qualification requirements for construction companies.
- b. The Contractor shall provide the following performance bond and labor and material payment bond or other performance security unless otherwise stipulated in the bid documents: Performance Bond at 100% of the total bid amount and Payment Bond at 100% of the total bid amount.

End Of Section



Sub-Section 00 73 00 - Supplementary Conditions

01. General Federal Davis-Bacon Wages

The following supplements shall modify, delete, and or add to the General Conditions. Where any article, paragraph, or sub paragraph in the General Conditions is supplemented by one of the following paragraphs, the provisions of such article, paragraph, or sub paragraph shall remain in effect and supplemental provisions shall be considered as added thereto. Where any article, paragraph in the General Conditions is amended, voided, or suspended by any of the following paragraphs, the provisions of such article, paragraph or subparagraph not so amended, voided, or superseded shall remain in effect.

Federal Labor Standards Provisions. For Federally Assisted Construction Contracts. United States Department of Labor. CFR Code of Federal Regulations Pertaining to ESA. (Federal Davis-Bacon Wages). Title 29, Chapter I, Part 5, Subpart A (29 CFR 5.5)

Section Name: Contract provisions and related matters.

(a) The Recipient shall assure that the sub recipient(s) insert in full in any contract in excess of \$2,000 which is entered into for the actual construction, alteration or repair, including painting and decorating, of a treatment work under the CWSRF or a construction project under the DWSRF financed in whole or in part from Federal funds or in accordance with the guarantees of a Federal agency or financed from funds obtained by pledge of any contract of a Federal agency to make a loan, grant or annual contribution (except where a different meaning is expressly indicated), and which is subject to the labor standards provisions of any of the acts listed in § 5.1 or the applicable FY appropriation requirements, the following clauses:

(1) Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in Sec. 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time

actually worked therein: Provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable

standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(2) Withholding.

The loan or grant recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the (Agency or SRF program) may, after written notice to the contractor, sponsor, applicant, or Engineer, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and Basic Records

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b) (2) (B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the SRF program if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit the payrolls to the applicant, sponsor, or Engineer, as the case may be, for transmission to the SRF program. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying

number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the SRF program if the agency is a party to the contract, but if the agency is not such a party, the contractor will submit them to the applicant, sponsor, or Engineer, as the case may be, for transmission to the SRF program, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the sponsoring government agency (or the applicant, sponsor, or Engineer).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be provided under Sec. 5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under Sec. 5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the loan or grant recipient or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or Engineer, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) APPRENTICES AND TRAINEES



(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractors registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and

participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements.

The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts

The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the SRF program may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination

Debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(b) Contract Work Hours and Safety Standards Act. The Agency Head shall cause or require the contracting officer to insert the following clauses set forth in paragraphs (b) (1), (2), (3), and (4) of this section in full in any contract in an amount in excess of \$100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall

be inserted in addition to the clauses required by Sec. 5.5(a) or 4.6 of part 4 of this title. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (b) (1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (b) (1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (b) (1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The government may withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b) (2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (b) (1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (b) (1) through (4) of this section.

(c) In addition to the clauses contained in paragraph (b), in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in Sec. 5.1, the Agency Head shall cause or require the contracting officer to insert a clause requiring that the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the Agency Head shall cause or require the contracting officer to insert in any such contract a clause providing that the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the loan or grant recipient and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

Minimum Wage. The minimum wage in American Samoa for the construction industry was set at \$4.60 per hour on May 25, 2008, for Federally Assisted Construction Projects. Any changes in minimum wage during the term of this contract must be complied with at no increase in the



contract sum. The Act also provides for additional increases in the minimum wage of \$0.50 an hour each year in May.

End Of Section



DIVISION 01 : GENERAL REQUIREMENTS



Section 01 11 00 - Summary Of Work

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work by Owner.
5. Work under separate contracts.
6. Future work.
7. Purchase contracts.
8. Owner-furnished products.
9. Contractor-furnished, Owner-installed products.
10. Access to site.
11. Coordination with occupants.
12. Work restrictions.
13. Specification and drawing conventions.
14. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification:

1. Project name: **Pago Pago Water Distribution System Upgrade**
2. Project Location: **Pago Pago, American Samoa**

B. Owner: **American Samoa Power Authority (ASPA), Water Division PO Box PPB Tafuna, American Samoa 96799**

C. Owner's Representative:

1. Project Manager: **Fidel Aguila / Senior Engineer**
2. Project Engineer: **Edmon O. Lacaulan, PMP / Engineer II**
3. Project Inspector: **Samiuela Tuipulotu / I-POR I**

D. Project Web Site: A project Web site administered by Contractor will be used for purposes of managing communication and documents during the construction stage.

1. See Section 013100 "Project Management and Coordination." for requirements for establishing, administering and using the Project Web site.

Sub-Section 01 11 13 - Work Covered By Contract Documents

A. The Work of the Project is defined by the Contract Documents and consists of the following:

1. Installing new pipelines, approximately 14,000LF of 12" PVCO watermain, improved water pressure ranging from 40psi to 80psi normal system pressure for the affected areas and approximately 398 acres of residential, light commercial and industrial customers to include the proposed hospital. Reduce non-revenue water due to leakages from the old AC pipelines. Complete with gate valves, ARVs, blow-off valves, PRVs, fire hydrants and all other appurtenances tested and commissioned. Relocation of existing customer water meters 10feet from the edge of the road and installation of 2" & 3/4" laterals and service lines and restorations.

B. Type of Contract:

1. Project will be constructed under a unit price single prime contract.

C. Phased Construction

The Work shall be conducted in 3 phases, with each phase substantially complete as indicated:

1. Phase 1 : Installation of all water mains, laterals, service lines, complete with all appurtenances, complete in-place, transfer of water meter and connecting customers to the new system, tested and commissioned. The remaining work shall be substantially complete and ready for final acceptance.

2. Phase 2 : Installation of all water mains, laterals, service lines, complete with all appurtenances, complete in-place, transfer of water meter and connecting customers to the new system, tested and commissioned. The remaining work shall be substantially complete and ready for final acceptance.

3. Phase 3 : Installation of all water mains, laterals, service lines, complete with all appurtenances, complete in-place, transfer of water meter and connecting customers to the new



system, tested and commissioned. The remaining work shall be substantially complete and ready for final acceptance.

4. Before commencing work of each phase, submit an updated copy of Contractor's construction schedule showing the sequence, commencement and completion dates, Owner inspection and approval dates for all phases of the Work.

Sub-Section 01 11 16 - Work By Owner

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract. The Owner reserved the rights to perform part or all of the required tasks under this contract in the event the contractor failed to comply with the approved deadlines.

B. Owner will perform the following operations at the Project site. Those operations are scheduled to be substantially complete before work under this Contract begins. All associated costs will be invoiced to the contractor for payment.

1. Flushing and disinfection of mainlines.
2. Transfer of Water Meter
3. Tie-in shutdown.

End Of Section



Section 01 14 00 - Work Restrictions

A. General:

1. No work of any kind can begin until the proper authorization and/or work permits have been obtained.
2. Stop work around an area where existing previously unidentified hazardous material is discovered, including materials suspected of containing asbestos, and immediately contact the ASPA Engineer for direction before continuing with the Work affected.
3. The Contractor shall schedule and control all work persons employed on the project. Contractor shall instruct all workers to prevent tracking dirt and debris into roadways. Profanity, inappropriate dress or inappropriate conduct shall not be permitted on any project. Owner reserves the right to have the Contractor remove from the project anyone who, in the sole opinion of the Owner, exhibits such behavior.
4. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours:

1. No person(s) shall engage in any construction in the public realm that causes disturbance of the quiet, peace, rest or enjoyment of the public, except, between the hours of 7:30 a.m. (0730 hours) to 7:00 p.m. (1900 hours) on any week day that is not a statutory holiday.
2. Construction is not permitted on Saturday and Sunday or any statutory holidays.
3. Construction is not permitted on Village Curfews.
4. In any case where it is impossible or impractical to comply with the above, an application must be made to the APE for approval.

C. Existing Utility and Traffic Interruptions:

1. Do not interrupt utilities serving facilities unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - Notify Owner not less than two days (48 hours) in advance of proposed utility interruptions.
 - Obtain Owner's written permission before proceeding with utility interruptions.



2. No Traffic interruptions are permitted during peak hours or from 7:00am -8:30am in the morning and 3:30pm - 4:30 pm in the afternoon.

D. Noise, Vibration, and Odors:

Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption with the Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Controlled Substances:

Use of tobacco and alcohol products and other controlled substances on Project site is not permitted.

F. Employee Identification:

Provide identification tags for Contractor personnel working on Project sites. Require personnel to use identification tags at all times.

Sub-Section 01 14 13 - Access To Site

A. General:

1. The Contractor shall have full use of the Project site for construction operations during the construction period. Contractor's use of the Project site is limited only by Owner's right to perform work or to retain other contractors on portions of the Project.
2. The Contractor shall have limited use of the Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
3. The Owner retains the right to enter the construction limits to inspect and/or repair existing utilities, structures and property whenever necessary. Owner shall coordinate non-emergency access 24 hours in advance.
4. The Contractor shall make the construction site available and accessible to ASPA and any other Contractors to complete work within the site. The Contractor shall coordinate his schedule with other Contractors as approved by the Owner to ensure a complete and usable facility.



Sub-Section 01 14 19 - Use of Site

1. Do not disturb portions of the Project site beyond areas in which the Work is indicated.
2. Limit site disturbance, including earthwork and clearing of vegetation, to 10 feet beyond primary roadway curbs and main utility branch trenches.
3. Driveways, Walkways and Entrances: Keep driveways, parking garages, loading areas and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
4. Schedule deliveries to minimize use of driveways and entrances by construction operations.
5. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
6. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
7. Provide not less than 72hours' notice to Owner of activities that will affect Owner's operations.

End Of Section



Section 01 18 13 - Utility Service Connections

A. Definitions

Utility: as used in this Section, "Utility" means a public or private utility company or a municipality.

B. Contractor's Responsibilities

1. Contractor shall be responsible for connection of project service lines to Utility's lines and sources, regardless of whether the required work is performed by Contractor's own forces, Subcontractors, or Sub-Subcontractors, or by a Utility.
2. Coordinate service connections work. Make all necessary arrangements with, comply with, and cooperate fully with each Utility.
3. It is the Contractor's responsibility to locate and protect all utilities within the limits of construction. If damaged during construction, the Contractor shall repair or replace at no additional cost to ASPA.
4. If active utility lines are encountered that are not shown on the drawings or otherwise made known to the contractor, the contractor shall promptly take necessary steps to assure that service is not interrupted. If service is interrupted, the Contractor shall immediately restore service by repairing the damaged utility.

C. Utility Charges

The service connection charges, if any, levied by each Utility shall be paid by the contractor to include but is not limited to; Sewer, Water, Power, Telephone, Internet, solid waste and others.

End Of Section

Section 01 20 00 - Price And Payment Procedure

Sub-Section 01 22 13 - Unit Price Measurement

A. Definitions

1. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased. Unit prices include all necessary material, delivery, installation, insurance, overhead, profit and applicable taxes.

B. Procedures

1. Unit Prices specified on the bid form shall include full compensation for all required labor, material, products, tools, equipment, access, transportation, testing, disposable materials, erection, staging, storage, lift, overhead and profit as required to install the work.
2. Actual installed quantities will be used to determine final payment. Submit invoices or delivery slips to show actual quantities of materials delivered to the site.
3. Contractor shall assist the ASPA in taking measurements by coordinating work to allow ASPA observations prior to covering quantified work with other materials, and by providing access as required to track quantities.
4. Contractor shall track quantities in writing on a daily basis and provide owner with a listing of Unit Prices installed on a daily basis.
5. ASPA reserves the right to make large changes in the quantities for any unit price repair at the unit cost quoted, including deletion of all such repairs. At the discretion of the Engineer, negotiation of unit prices may be considered where large changes in quantity make prorated fixed costs a significant factor. Unless noted otherwise, the same unit prices shall be used for additions and deductions unless noted otherwise.
6. Where indicated on the Bid Form, the contractor shall enter Unit Price Quotations for all in-place items. Unit Prices quoted and accepted shall apply throughout the life of the contract except as otherwise specifically noted. Unit prices shall be applied as appropriate, to compute the total value of changes in scope of the work in accordance with the Contract Documents and shall include all the Contractor's overhead, profit and cost.

C. Lump Sum Items

1. Breakdown of Lump Sum Items

- a. Submit to the APE a breakdown of each Lump Sum item included in the Schedule of Prices, within 21 days after the commencement date of the Contract.

- b. Provide sufficient details as required by the Engineer to identify the principal components of the Work and to permit ready valuation of Work performed.
2. Lump Sum Items Paid in Accordance with a Schedule of prices.

Sub-Section 01 29 73 - Schedule Of Prices

1. Within 15 calendar days of notice of award, prepare and deliver to the APE a Schedule of Prices following the minimum data required below;
 - a. Project name and location.
 - b. Contractor's Name and address
 - c. Date of submittal
 - d. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - i. Related Specification Section or Division
 - ii. Description of the Work
 - iii. Name of subcontractor
 - iv. Name of manufacturer or fabricator
 - v. Name of supplier
 - vi. Change Orders (numbers) that affect value
 - vii. Dollar value of the following, as a percentage of the Contract Sum to the nearest one-hundredth percent, adjusted to a total of 100 percent.
 1. Labor
 2. Materials
 3. Equipment
 4. Overhead/Margin
 5. Profit
2. 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.
3. For each price specified in the Schedule of Prices include all costs and charges required to perform the Work including overhead charges and profit, and all costs of all related work for which payment is not specified elsewhere
4. Subject to the provisions of the Contract Documents, the total amount of the Schedule of Prices shall cover all of the Contractor's obligations under the Contract and all matters and things necessary for performance of the Work in accordance with the Contract Documents.
5. Payment will be made only for items specified in the Schedule of Prices. Costs and charges not directly provided for in the Schedule of Prices will be deemed to be included therein.
6. Work or material included in any one item will not also be measured for payment under another item. No item will be paid for more than once.
7. Payments will not be made until the Schedule of Prices has been submitted to and accepted by the APE.



8. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

Sub-Section 01 29 76 - Progress Payment Procedures

A. Pay Application Request

1. The Contractor shall submit not later than the 5th of the following month to ASPA Engineer for approval the following;
 - A. Standard ASPA Pay Application
 - B. DOL Certified payroll
 - C. Project Management Documentations
 - a. Contractors Daily Output signed by ASPA Inspector
 - b. QA/QC Documentation
 - c. Project Issue log
 - d. Health & Safety Documentation
 - e. Project Schedule Update (pdf & MS Project format)
 - f. Contractors Daily Log
 - D. Monthly As-built (Cad and PDF copy)
 - E. Delivery slip, Invoices and other Documents required by the Engineer as needed.
2. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
3. Include amounts for work completed following the previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
4. Include amounts of Change Orders and Construction Change Directives issued before the last day of the construction period covered by the application.

B. Payments To The Contractor

Payments will be made on submission of itemized requests 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.

C. 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;*
- a. Claims which the ASPA may have against the Contractor under or in connection with this contract
 - b. Unless otherwise adjusted, repayment to the ASPA upon demand for overpayment made to the Contractor.
- B. *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 detailed estimates of works submitted for the APE approval in accordance with the Schedule of Prices of this contract.
 - c. Materials are adequately insured and protected from theft and exposure.

End Of Section

Section 01 30 00 - Administrative Requirements

Sub-Section 01 30 01 - Project Coordination

1. Construction Mobilization:

- a. Cooperate with the APE in the allocation of mobilization areas of the site, for field offices and sheds, for agency facility access, traffic, and parking facilities.
- b. During Construction, coordinate use of site and facilities through the APE.
- c. Comply with ASPA's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
- d. Comply with instructions of the APE for use of temporary utilities and construction facilities.

2. Coordination

- a. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.
- b. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
- c. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.
- d. Make provisions to accommodate items scheduled for later installation.
- e. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.
- f. Prepare similar memoranda for the Construction Administrator, Owner and separate contractors where coordination of their work is required.

3. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.
6. As-Builts - coordinate monthly meetings to assure up-dates being performed.

4. Submittals

- A. Coordination Drawings: Prepare coordination drawings to complete detailed coordination of systems and components and to integrate information about fabrication and installation.
- B. Thoroughly prepare coordination drawings, as further stipulated in Part 3 "Execution", reviewing all contract documents and consulting with all entities contributing to or involved with each portion of the work under consideration.
 - a. Show the relationship of all components shown on any separate Shop Drawings.
 - b. Indicate required desired installation sequences.
 - c. Comply with requirements contained in Division 01 Section 01 33 00 "Submittal Procedures".
 - d. Prepare coordination drawings for installation of all products and materials fabricated by separate entities.
 - e. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components and all such other conditions required to coordinate the work.
 - f. Prepare a Site Logistics Plan(s) showing: The entire project area and limits; all routes into and out of site; all staging and stockpiling and lay-down areas; all aspects of phasing/staging; all parking, paving and fencing; and all specific provisions to satisfy requirements of Division 01 Sections, including but not limited to Field Engineering and Temporary Facilities and Controls. The Site Logistics Plan shall coincide with and complement the general staging plans and site plans outlined in the contract bidding documents.

Sub-Section 01 30 02 - Administrative Responsibilities

The Engineer will be responsible for administrative requirements for the following Contract meetings:

- 1. Pre-construction
- 2. Construction Progress
- 3. Environment

The Contractor shall be responsible for administrative requirements for the following Contract meetings:

- 1. Workplace Orientation
- 2. Safety

The Engineer or the Contractor may request additional meetings related to installation of equipment, commissioning progress, warranty, dispute resolution, environmental issues. Unless otherwise specifically requested by the Contractor, the Engineer will be responsible for administrative duties related to these meetings. The agenda for these meetings may be combined with that of the construction progress meetings.

Sub-Section 01 30 03 - Administrative Requirements

The administrative requirements for Contract meetings include the following:

1. Scheduling and administering the Contract meetings throughout the progress of the Work.
2. Preparing the agenda for the meetings.
3. Distributing to the relevant attendees written notice of each meeting and the proposed agenda at least 3 days in advance of the meeting date.
4. Presiding at the meetings.
5. Recording the minutes including attendance, significant proceedings and decisions, and action required by the parties.
6. Reproducing and distributing copies of the minutes within 7 days after each meeting to the meeting participants and affected parties not in attendance.

Representatives of the Contractor, Subcontractors, and Suppliers shall attend meetings as necessary and be authorized to act on behalf of the party each represents

Sub-Section 01 30 04 - Pre-Construction Meeting

- a. *Frequency*: Within 15 days after award of the Contract and prior to commencement of activities at the Site.
- b. *Purpose*: To review personnel assignments, responsibilities, schedules, submissions, and administrative and procedural requirements.
- c. *Attendees*:
 - i. Contractor's representatives: senior management, site superintendent, major Subcontractors, and others as necessary.
 - ii. Engineer's representatives: as determined by the Engineer .
- d. *Agenda* may include the following:
 - i. Appointment of representatives of participants in the Work.
 - ii. Work schedule and progress scheduling.
 - iii. Schedule of submittals.
 - iv. Requirements for temporary facilities, site signage, offices, storage sheds, utilities, and fences.
 - v. Schedule of equipment delivery.
 - vi. Site safety and security.
 - vii. Contemplated changes, change orders, approvals required, costing and mark-up percentages permitted, time extensions, overtime, and administrative requirements.
 - viii. Products and materials provided by ASPA.
 - ix. Record documents.
 - x. Maintenance manuals.
 - xi. Takeover procedures, acceptance, and warranties.
 - xii. Monthly progress claims, administrative procedures, and holdbacks.
 - xiii. Inspection and testing.
 - xiv. Insurance and transcripts of policies.
 - xv. Environmental management principles.
 - xvi. Mobilization to the Site.

Sub-Section 01 30 05 - Construction Progress Meetings

- a. *Frequency*: As needed during the course of the Work.
- b. *Purpose*: To monitor construction progress, to identify problems and actions required for their solution, and to expedite the Work.
- c. *Attendees*:
 - i. Contractor's representatives: site superintendent and, when so requested by the Engineer, Subcontractors, Suppliers, and other parties involved in the Work.
 - ii. Engineer's representatives: as determined by the Engineer.
- d. *Agenda* may include the following:
 - i. Review and approval of minutes of the previous meeting.
 - ii. Review of the Work progress since the previous meeting.
 - iii. Field observations, problems, and conflicts.
 - iv. Problems that impede the construction schedule.
 - v. Off-site fabrication delivery schedules.
 - vi. Corrective measures and procedures to regain the Contract schedule.
 - vii. Revisions to the construction schedule.
 - viii. Progress and schedule for the succeeding work period.
 - ix. Submittal schedules.
 - x. Adherence to quality standards.
 - xi. Contemplated changes affect the construction schedule and Contract Time.
 - xii. Contentious items of the Work.
 - xiii. Contract closeout issues.
 - xiv. Safety and security issues.
 - xv. Environmental issues.
 - xvi. Other business.

Sub-Section 01 30 06 - Workplace Orientation Meetings

- a. *Frequency*: As required for all new workers prior to commencement of Work on the Site.
- b. *Purpose*: To familiarize new workers with site conditions, rules, regulations, safety, and security requirements.
- c. *Attendees*: All new Contractor and Engineer personnel scheduled to work on the Site.
- d. *Agenda* may include the following:
 - i. Project description including areas of work and other concurrent construction contracts.
 - ii. Hazardous areas including open excavations, construction equipment traffic, blasting, and chemical or explosive storage, etc.
 - iii. Safety equipment to be worn by workers, including areas with special requirements.
 - iv. Traffic routes on the Site.
 - v. Evacuation procedures.
 - vi. First aid procedures.
 - vii. Excavation or work permit procedures.
 - viii. WHMIS (Workplace Hazardous Materials Information System) requirements for handling and storage of chemicals.



- ix. Fire safety rules and regulations.
- x. Rules and regulations regarding wildlife, environmental concerns, drugs, alcohol, etc.

Sub-Section 01 30 07 -Safety Meetings

- a. *Frequency:* Weekly during the course of the Work for each area of work.
- b. *Purpose:* To review safety concerns and implement preventive safety measures.
- c. *Attendees:* Contractor's and Engineer's personnel for each area of work.
- d. *Agenda* may include the following:
 - i. Review and discussion of safety concerns, accidents, and "near misses."
 - ii. Remedial or preventive actions to be taken.

Sub-Section 01 30 08 -Environmental Meetings

- a. *Frequency:* During the course of Work, schedule environment meetings weekly or as required by the Engineer to deal with issues that may arise. Depending on the issues, the Engineer may combine the agenda for environmental meetings with that of the construction progress meetings.
- b. *Purpose:* To review environment issues and implement mitigative measures.
- c. *Attendees:*
 - i. Contractor's representatives: Contractor's site superintendent and when so requested by Engineer, subcontractors, suppliers and other parties involved in the Work. Contractor's representatives shall be qualified and authorized to act on behalf of the party each represents.
 - ii. Engineer representatives: as determined by the Engineer.
- d. *Agenda* to include the following:
 - i. Review and discussion of environment concerns, accidents and "near misses".
 - ii. Identify environmental emergency notification procedures.
 - iii. Identify remedial or preventative action to be taken.
 - iv. All employees must attend environmental orientation.

End Of Section

Section 01 30 10 - Submittals And Substitution

Definitions

- a. “Administrative Submittals” means data presented for review to ensure administrative requirements of the Contract are met.
- b. “Shop Drawings” means technical data specifically prepared for work of this Contract including drawings, diagrams, schedules, templates, patterns, and similar information not in standard printed form.
- c. “Product Data” means standard printed information describing materials, products, equipment, and systems not specifically prepared for the work of this Contract. Product Data consisting of manufacturers’ standard schematic drawings, catalogue sheets, diagrams, schedules, performance charts, illustrations, and descriptive data will be accepted in lieu of Shop Drawings provided that:
 - i. Information not applicable to the work of this Contract is deleted; and
 - ii. Standard information is supplemented with information specifically applicable to the Work of this Contract.
- d. “Samples” means cuts or containers of materials or partial sections of manufactured or fabricated components that are physically identical to products proposed for use.
- e. “Field Samples” means volumes of materials as specified, which are physically representative of the materials proposed for use.

Schedule Of Submittals

- a. Submittals required for the Contract are specified in each section of the Contract Documents.
- b. Submittals required by this section are appended to this section.
- c. Compile a complete and comprehensive schedule of all anticipated submittals during progress of the Work. Include a list of each type of item for which Contractor's drawings, Shop Drawings, Certificates of Compliance, material samples, guarantees or other types of submittals are required. Upon approval by the ENGINEER this schedule will become part of the Contract and the Contractor will be required to adhere to the schedule except when specifically otherwise permitted.
- d. Within 10 days after awarding the Contract, submit to the ENGINEER the compiled schedule of submittals which will be updated weekly during the meeting.

Submittal Preparation

- a. Determine and verify:
 - i. Field measurements.
 - ii. Field construction criteria.
 - iii. Catalogue numbers and similar data.
 - iv. Compliance with the Contract Documents.
- b. Coordinate each submittal with requirements of the Work and the Contract Documents.
- c. Notify the APE, in writing, on the submittal and at the time of submission, of any deviations from the requirements of the Contract Documents.

Submittal Requirements

- a. Make submittals within the times required by the Contract Documents and sufficiently in advance of the date that reviewed submittals will be required, and in such a sequence as to cause no delay in the Work.
- b. Make submittals in the form specified or in a form considered as an industry standard.
- c. Use the provided a submittal transmittal form with each submittal under section 00 62 11
- d. Include in the submittals:
 - i. Date and revision dates.
 - ii. Project Name.
 - iii. Contract Name.
 - iv. Tender Number.
 - v. Name of:
 1. Contractor.
 2. Subcontractor
 3. Supplier.
 4. Manufacturer.
 5. Name of detailer when details are not prepared by the Contractor, Subcontractor, or Supplier.
 - vi. The Contractor's stamp, signed, certifying its review of the submittal, verification of field measurements, and compliance with the Contract Documents, or that deviations, if incorporated, will be compatible with other elements of the Work.
 - vii. 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.

List Of Suppliers

- a. Submit a list of suppliers to Owner for review 15 days prior to commencement of activities at the Site.

- b. Submit a revised list of suppliers as the work progresses and as requested by the Owner.

Photographs

- a. Digital copy of all pre-construction photographs of all residential, town, and private surface tie-in works within project areas and adjacent properties. This shall be submitted 2 days prior to any work.
- b. Digital copy of all post-construction photographs of all residential, town, and private surface tie-in works within project areas and adjacent properties. This shall be submitted 2 days after final restoration.

Construction Notifications - Public

- a. Seven days prior to construction, notify all affected businesses, institutions, facilities and residents informing them in writing of the nature of the work to be performed, how long the inconvenience will last, who to contact in the event of damages to the home, business or property, and what to do for access and alternative parking arrangements. The Contractor shall submit the proposed notification to the APE for review before issuance.

Shop Drawings And Coordination Drawings

- a. Make all Shop Drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.
- b. All Shop Drawings in the form of six (6) copies shall be submitted for review, with a blue line or black line print of each sheet.
- c. Printing and distribution of review Shop Drawings for the Engineer's use will be done by the ENGINEER. All review comments of the ENGINEER will be shown on the sepia transparency when it is returned to the Contractor. The Contractor shall make and distribute all copies required for his purposes.

Manufacturer's Literature

- a. Where the contents of submitted literature from manufacturers include data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.
- b. Submit six (6) copies of all required shop drawings, product data, etc...

Samples

- a. Samples shall be of the precise article proposed to be furnished.

- b. Unless otherwise specified, submit samples in the quantity that is required to be returned plus two (2) that will be retained by the ENGINEER.
- c. In situations specifically so approved by the ENGINEER, the Engineer's retained sample may be used in the construction as one of the installed items.

Colors And Patterns

- a. Unless the precise color and pattern is specifically described in the Contract Documents and whenever a choice of color or pattern is available in a specified product, submit accurate color and pattern charts to the ENGINEER or review and selection.

Substitutions

- a. The Contract is based on the standards of quality established in the Contract Documents. All products proposed for use, including those specified by requirement attributes and performance, shall require approval by the ENGINEER before being incorporated into the Work.
- b. Do not substitute materials, equipment, or methods unless the ENGINEER has specifically approved such substitution for this Work.
- c. "Or Equal": Where the phrase "or equal" or "equal as approved by the ENGINEER" occurs in the Contract Documents. Do not assume that materials, equipment, or methods will be approved or are equal unless the item has been specifically approved for this Work by the ENGINEER. The decision of the Engineer shall be final.

Review Of Submittals

- a. The APE will review each submittal within 10 working days of receipt of the submittal unless specified otherwise in the Contract Documents. Delays caused by tardiness in receipt of submittals will not be an acceptable basis for extension of the Contract completion date
- b. Make corrections or changes to reviewed submittals and resubmit as specified for the initial submission.
- c. Until a reviewed submittal is received, do not proceed with the Work related to the submittal.
- d. The ASPA Project Engineer (APE) approval or acceptance of submittals is not to be construed as a complete check and does not relieve the contractor from compliance with the requirements of the contract documents.

- e. Approval or acceptance will not relieve the Contractor of the responsibility for any errors which may exist and shall be corrected at no cost to ASPA.
- f. The Contractor is responsible for: confirming and correlating all quantities and dimensions; furnishing equipment materials as specified; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

END OF SECTION

Section 01 30 20 - Safety Requirements

REFERENCES

- A. 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.
- B. AMERICAN SOCIETY OF SAFETY ENGINEERS (ASSE/SAFE)
- C. ASSE/SAFE A10.32 : (2004) Fall protection
- D. ASSE/SAFE A10.34 : (2001; R 2005) Protection of the Public on or Adjacent to Construction Sites
- E. ASSE/SAFE Z359.1 : (2007) Safety Requirements for Personal Fall Arrest Systems, Subsystems and Components
- F. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
- G. NFPA 10 : (2010) Standard for Portable Fire Extinguishers
- H. NFPA 241: (2009) Standard for Safeguarding Construction, Alteration, and Demolition Operations
- I. 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

SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10;

- 1. Pre Construction Submittals
- 2. Accident Prevention Plan (APP)
- 3. Activity Hazard Analysis (AHA)
- 4. Crane Critical Lift Plan (if applicable)
- 5. Proof of qualification for Operators (if applicable)
- 6. Test Reports
- 7. Reports (Submit reports as their incidence occurs)
- 8. Accident Reports
- 9. Certificates
- 10. Confined Space Entry Permit
- 11. Hot work permit
- 12. Licenses

DEFINITIONS

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.

High Visibility Accident. Any mishap which may generate publicity and/or high visibility.

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 though provided by a physician or registered personnel.

Recordable Injuries or Illnesses. Any work-related injury or illness that results in; Death, regardless of the time between the injury and death, or the length of the illness; Days away from work (any time lost after day of injury/illness onset); Restricted work; Transfer to another job; Medical treatment beyond first aid; Loss of consciousness; or 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.

REGULATORY REQUIREMENTS

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 the worker's conduct. Equipment and vehicles shall be operated and maintained in accordance with safety standards to protect workers and the general public.

SITE QUALIFICATIONS, DUTIES AND MEETINGS

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 Person 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.

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 Operators. Provide proof of current qualification as a crane operator.

Personnel Duties

Site Safety and Health Officer (SSHO)

- 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.
- Conduct mishap investigations and complete required reports. Maintain the OSHA Form 300 and Daily Production reports for prime and subcontractors.
- Maintain applicable safety reference material on the job site.
- Attend the pre-construction conference, pre-work meetings including preparatory inspection meetings, and periodic in-progress meetings.
- Implement and enforce accepted APPS and AHAs.
- 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.
- Ensure subcontractor 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.
- Maintain a list of hazardous chemicals on site and their material safety data sheets.

Meetings

Preconstruction Conference

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).

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.

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.

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.

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.

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 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 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:

Fall Protection and Prevention (FP&P) Program Documentation. The program documentation shall be site specific and address all fall hazards in the workplace 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.

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.

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.

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.

EMERGENCY MEDICAL TREATMENT

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

REPORTS

Accident Reports. Conduct an accident investigation for recordable injuries and illnesses 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.

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.

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



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.

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.

SEVERE STORM PLAN. In the event of a severe storm warning, the Contractor must: Secure outside equipment and materials and place materials that could be damaged in protected areas. Check the surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities. Ensure that temporary erosion controls are adequate.

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.

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 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.

Unforeseen Hazardous Material. The design identifies 01 035 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."



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.

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/tag-out 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/tag-out 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, troubleshooting, 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/tag-out 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.

Tag Placement. Lockout/tag-out 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/tag-out 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/tag-out 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."



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/tag-out tag stub to the APE. That group's or individual's lockout/tag-out tags on equipment may then be removed on authorization by the APE.

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.

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.

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 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 2 CFR 1926.500, Subpart M, and ASSE/SAFE A10.32.

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 carabineers 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.

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.



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).

Guardrails and Safety Nets. Design, install and use guardrails and safety nets as required.

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).

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 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 are 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.

Weight Handling Equipment.

Equipment cranes and derricks. 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.

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.



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.

Under no circumstance shall a Contractor make a lift at or above 90 percent of the cranes rated capacity in any configuration.

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.

Do not use 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.

Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

All employees must keep clear of loads about to be lifted and of suspended loads. Use cribbing when performing lifts on outriggers.

The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

A physical barricade must be positioned to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

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.

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.

Certify that all crane operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

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

Utility Location. 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.

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 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. During verification, any damage to and existing services, the Contractor will have to pay for the damages.

Shoring Systems. Trench and shoring systems must be identified in the accepted construction safety plan and the type of shoring will be properly applied to avoid cavitation on the paved road. Manufacturing 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.

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.

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.

ELECTRICAL

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 a 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 retardant shirts, coveralls, face shields, and safety 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.

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.

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.

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.

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.

END OF SECTION

Section 01 30 30 - Construction Schedule

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

1.1.1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2. SUMMARY

1.2.1. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

- a. Startup construction schedule.
- b. Contractor's construction schedule.
- c. Construction schedule updating reports.
- d. Daily construction reports.
- e. Material location reports.
- f. Site condition reports.
- g. Special reports.

1.3. DEFINITIONS

1.3.1. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

- a. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
- b. Predecessor Activity: An activity that precedes another activity in the network.
- c. Successor Activity: An activity that follows another activity in the network.

1.3.2. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

1.3.3. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

1.3.4. Event: The starting or ending point of an activity.

1.3.5. Float: The measure of leeway in starting and completing an activity.

- a. Float time is not for the exclusive use or benefit of either Engineer or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
- b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
- c. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

1.3.6. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4. INFORMATIONAL SUBMITTALS

- 1.4.1. Format for Submittals: Submit required submittals in the following format:
 - a. Working electronic copy of schedule file, where indicated.
 - b. PDF electronic file.
- 1.4.2. Startup construction schedule.
- 1.4.3. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- 1.4.4. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- 1.4.5. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - a. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - b. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - c. Total Float Report: List of all activities sorted in ascending order of total float.
 - d. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- 1.4.6. Construction Schedule Updating Reports: Submit with Applications for Payment.
- 1.4.7. Daily Construction Reports: Submit at weekly intervals.
- 1.4.8. Material Location Reports: Submit at weekly intervals.
- 1.4.9. Site Condition Reports: Submit at time of discovery of differing conditions.
- 1.4.10. Special Reports: Submit at time of unusual event.
- 1.5. QUALITY ASSURANCE
 - 1.5.1. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Engineer's request.
 - 1.5.2. Prescheduling Conference: Conduct conference at Project site related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
 - a. Review software limitations and content and format for reports.
 - b. Verify availability of qualified personnel needed to develop and update schedule.
 - c. Discuss constraints
 - d. Review delivery dates for Engineer -furnished products.
 - e. Review schedule for work of Engineer 's separate contracts.
 - f. Review submittal requirements and procedures.
 - g. Review time required for review of submittals and resubmittals.
 - h. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - i. Review time required for Project closeout and Engineer startup procedures Review and finalize list of construction activities to be included in schedule.
 - j. Review procedures for updating schedule.



1.6. COORDINATION

1.6.1. A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

- a. Secure time commitments for performing critical elements of the Work from entities involved.
- b. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

1.1. CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

1.1.1. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.

- a. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

1.1.2. Activities: Treat each separate area as a separate numbered activity for each main element of the Work. Comply with the following:

- a. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Engineer.
- b. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
- c. Submittal Review Time: Include review and resubmittal times indicated in Section 01 30 10
- d. "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
- e. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
- f. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineers administrative procedures necessary for certification of Substantial Completion.
- g. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

1.1.3. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

- a. Phasing: Arrange list of activities on schedule by phase.
- b. Products Ordered in Advance: Include a separate activity for each product. Include delivery dates indicated stipulate the earliest possible delivery date.
- c. Engineer -Furnished Products: Include a separate activity for each product. Include delivery dates indicated stipulate the earliest possible delivery date.

1.1.4. Work Restrictions: Show the effect of the following items on the schedule:

- a. Coordination with existing construction.
- b. Limitations of continued occupancies.
- c. Uninterruptible services.

- d. Partial occupancy before Substantial Completion.
- e. Use of premises restrictions.
- f. Provisions for future construction.
- g. Seasonal variations.
- h. Environmental control.

1.1.5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following;

- a. Subcontract awards.
- b. Submittals.
- c. Purchases.
- d. Mockups.
- e. Fabrication.
- f. Sample testing.
- g. Deliveries.
- h. Installation.
- i. Tests and inspections.
- j. Adjusting.
- k. Curing.
- l. Building flush-out.
- m. Startup and placement into final use and operation.

1.1.6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

- a. Structural completion.
- b. Temporary enclosure and space conditioning.
- c. Permanent space enclosure.
- d. Completion of mechanical installation.
- e. Completion of electrical installation.
- f. Substantial Completion.

1.1.7. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion

1.1.8. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

- a. Unresolved issues.
- b. Unanswered Requests for Information.
- c. Rejected or unreturned submittals.
- d. Notations on returned submittals.
- e. Pending modifications affecting the Work and Contract Time.



1.1.9. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

1.2. STARTUP CONSTRUCTION SCHEDULE

1.2.1. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within ten days of date established for the Notice of Award.

1.2.2. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 60 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

1.3. CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

1.3.1. General: Prepare network diagrams using AON (activity-on-node) format.

1.3.2. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.

- a. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
- b. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Engineer's approval of the schedule.
- c. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
- d. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
- e. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.

1.3.3. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

- a. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - Preparation and processing of submittals.
 - Mobilization and demobilization.
 - Purchase of materials.
 - Delivery.
 - Fabrication.
 - Utility interruptions.
 - Installation.
 - Work by Engineer that may affect or be affected by Contractor's activities.
 - Testing and commissioning.

- Punch list and final completion.
- Activities occurring following final completion.
- b. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
- c. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
- d. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- e. Cost- and Resource-Loading of CPM Schedule: Assign cost to construction activities on the CPM schedule. Do not assign costs to submittal activities. Obtain Engineer's approval prior to assigning costs to fabrication and delivery activities. Assign costs under main subcontracts for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project record documents, and demonstration and training (if applicable), in the amount of 5 percent of the Contract Sum.
 - Each activity cost shall reflect an appropriate value subject to approval by Engineer.
 - Total cost assigned to activities shall equal the total Contract Sum.

1.3.4. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

1.3.5. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:

- Contractor or subcontractor and the Work or activity.
 - Description of activity.
- Main events of activity.
- Immediate preceding and succeeding activities.
- Early and late start dates.
- Early and late finish dates.
- Activity duration in workdays.
- Total float or slack time.
- Average size of workforce.
- Dollar value of activity (coordinated with the schedule of values).

1.3.6. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

- a. Identification of activities that have changed.
- b. Changes in early and late start dates.
- c. Changes in early and late finish dates.
- d. Changes in activity durations in workdays.
- e. Changes in the critical path.

- f. Changes in total float or slack time.
- g. Changes in the Contract Time.

1.3.7. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.

- a. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
- b. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
- c. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
- d. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.
 - Submit value summary printouts one week before each regularly scheduled progress meeting.

1.4. REPORTS

1.4.1. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

- a. List of subcontractors at Project site.
- b. List of separate contractors at Project site.
- c. Approximate count of personnel at Project site.
- d. Equipment at Project site.
- e. Material deliveries.
- f. High and low temperatures and general weather conditions, including presence of rain.
- g. Accidents.
- h. Meetings and significant decisions.
- i. Unusual events (see special reports).
- j. Stoppages, delays, shortages, and losses.
- k. Meter readings and similar recordings.
- l. Emergency procedures.
- m. Orders and requests of authorities having jurisdiction.
- n. Change Orders received and implemented.
- o. Construction Change Directives received and implemented.
- p. Services connected and disconnected.
- q. Equipment or system tests and startups.
- r. Partial completions and occupancies.
- s. Substantial Completions authorized.

1.4.2. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

- a. Material stored prior to previous report and remaining in storage.

- b. Material stored prior to previous report and since removed from storage and installed.
- c. Material stored following previous report and remaining in storage.

1.4.3. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report.

1.5. SPECIAL REPORTS

1.5.1. General: Submit special reports directly to Engineer within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

1.5.2. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Engineer in advance when these events are known or predictable.

PART 3 - EXECUTION

1.6. CONTRACTOR'S CONSTRUCTION SCHEDULE

1.6.1. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting using CPM scheduling.

- a. In-House Option: Engineer may waive the requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
- b. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

1.6.2. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

- a. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
- b. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
- c. As the Work progresses, indicate final completion percentage for each activity.

1.6.3. Distribution: Distribute copies of approved schedule to Engineer, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

- a. Post copies in Project meeting rooms and temporary field offices.
- b. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities,

END OF SECTION

Section 01 40 00 - Quality Requirements

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.

1.1.1. AMERICAN SAMOA POWER AUTHORITY (ASPA): ASPA QC Plan

1.1.2. ASTM INTERNATIONAL (ASTM)

- a. 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
- b. ASTM E 329 (2009) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

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

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

1.2. PAYMENTS

1.2.1. 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.

1.3. SUBMITTALS

1.3.1. Quality Control Plan

1.3.2. Test and Inspection reports (as defined in the Quality Control Plan)

1.4. GENERAL REQUIREMENTS

1.4.1. Establish and maintain an effective quality control (QC) system in compliance with the Contract Clause titled "Inspection of Construction." QC consists 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 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.

1.5. QUALITY CONTROL PLAN

1.5.1. 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 plan shall be consistent with the ASPA QC Plan and take into consideration aspects of that plan that require coordination with the Contractor. 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.

1.5.2. Content of the CQC Plan.

- a. 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
- b. 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.
- c. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.
- d. 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.
- e. 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 00130.
- f. 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.)
- g. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.
- h. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.
- i. Reporting procedures, including proposed reporting formats.
- j. 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 feature under a particular section. This list will be agreed upon during the coordination meeting.

1.5.3. Acceptance of Plan

- a. 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.

1.5.4. Notification of Changes

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

1.6. COORDINATION MEETING

1.6.1. After the Preconstruction Conference, before the 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.

1.7. Quality Control Organization

1.7.1. Personnel Requirements

- a. 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 responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the APE.

1.7.2. CQC System Manager

- a. Identify as CQC System Manager an individual within the onsite work organization who is responsible for overall management of CQC and has 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.

1.7.3. CQC Personnel

- a. 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.

1.7.4. Organizational Changes

1.7.5. 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.

1.8. SUBMITTALS AND DELIVERABLES

1.8.1. Submittals, if needed, must comply with the requirements in Section 01 30 10. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements.

1.9. CONTROL

1.9.1. 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:

1.9.2. Preparatory Phase

- a. 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:
 - b. 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.
 - c. Review of the contract drawings.
 - d. Check to assure that all materials and/or equipment have been tested, submitted, and approved.
 - e. Review of provisions that have been made to provide required control inspection and testing.
 - f. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
 - g. 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.
 - h. Review of the appropriate activity hazard analysis to assure safety requirements are met.

- i. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.
- j. Check to ensure that the portion of the plan for the work to be performed has been accepted by the APE.
- k. Discussion of the initial control phase.
- l. 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.

1.9.3. Initial Phase

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

1.9.4. Follow-up Phase

- a. 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.
- b. Additional Preparatory and Initial Phases
- c. 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.

1.10. TESTS

1.10.1. 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.

1.10.2. Testing Laboratories

1.10.3. Capability Check

- a. 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.

1.10.4. Capability Recheck

- a. 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.

1.10.5. Onsite Laboratory

- a. 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.

1.11. COMPLETION INSPECTION

1.11.1. Punch-Out Inspection

- a. 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.

1.11.2. Pre-Final Inspection

- a. 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.

1.11.3. Final Acceptance Inspection

- a. 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 the 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 because for the APE to bill the Contractor for the ASPA's additional inspection cost in accordance with the contract clause titled "Inspection of Construction".

1.12. DOCUMENTATION

1.12.1. 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, and 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. Off Site 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 certification statement.
- l. 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.

1.13. NOTIFICATION OF NON-COMPLIANCE

1.13.1. 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



Section 01 50 00 - Temporary Facilities And Control

1.1. GENERAL PROVISIONS

1.1.1. The General Conditions of Construction Contracts and Special Provisions preceding these specifications shall govern this section of the work.

1.2. DESCRIPTION

Work Included:

1.2.1. Temporary facilities and controls required for this Work include, but are not necessarily limited to:

- a. Temporary utilities such as water, electricity, telephone and internet
- b. Field offices and sheds
- c. Sanitary facilities
- d. Enclosures such as tarpaulins, barricades, and canopies
- e. Fencing of the construction area
- f. Haul roads.

1.3. Related Work Described Elsewhere:

1.3.1. Except that all equipment furnished by Subcontractors shall comply with all requirements of pertinent safety regulations, the ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.

1.3.2. Permanent installation and hook-up of the various utility lines are described in pertinent other Sections of these Specifications.

1.4. PRODUCT HANDLING

1.4.1. Use all means necessary to maintain temporary facilities and controls in proper and safe condition throughout the progress of the work.

1.5. JOB CONDITIONS

1.5.1. Make all required connections to existing utility systems with minimum disruption to services in the existing utility systems, when disruption of the existing service is required, do not proceed without the ENGINEER's approval and, when required, provide alternate temporary service.

1.6. UTILITIES

1.6.1. General:

- a. All temporary facilities shall be subject to the Engineer's approval.

1.7. Water:

1.7.1. Furnish and install all necessary temporary water lines and water supply and, upon completion of the Work, remove all such temporary facilities.

1.7.2. The Contractor will furnish all the water needed for construction, at no cost to the Engineer .

1.8. Electricity:

1.8.1. Furnish and install all necessary temporary wiring and, upon completion of the work, remove all such temporary facilities.

1.8.2. Furnish and install area distribution boxes so located that the individual trades may use 30m (100') maximum length extension cords to obtain adequate power and artificial lighting at all points where required for the work, for inspection and for safety.

1.8.3. The Contractor shall make arrangements for and pay for all temporary electrical power required for construction.

1.9. Telephone and Internet:

1.9.1. Make all necessary arrangements and pay all costs for operation and installation of telephone and internet service to the Field office.

1.10. CONTRACTOR'S FACILITIES

1.10.1. Field Office:

- a. Provide a field office building and sheds adequate in size and accommodation for all Contractor's Offices, supplies and storage.
- b. Within the Contractor's facilities, provide enclosed space adequate for holding weekly project meetings. Furnish with all required tables, chairs, and utilities.
- c. The entire facility, including furniture, will remain the property of the Contractor and shall be removed from the site after completion of the work.

1.10.2. Sanitary Facilities:

- a. Provide temporary sanitary facilities in the quantity required, for use of all personnel. Maintain in a sanitary condition at all times.

1.11. ENGINEER'S FIELD OFFICE:

1.11.1. Contractor shall provide ASPA Field Office per General Condition.

1.12. ENCLOSURES

1.12.1. Furnish, install, and maintain for the duration of construction all required scaffolds, tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, and other temporary construction necessary for proper completion of the work in compliance with all safety and other regulations.

1.13. PROJECT SIGNS

1.13.1. Allow no signs or advertising of any kind on the job site except as specifically approved in advance by the ENGINEER.

1.13.2. At the contractors expense, provide a minimum of three (3) project signs, each with a display area of 4' x 8'. The signs should be constructed in accordance with the following specifications:

- a. The structure shall consist of three (3) 2"x6" pressure-treated timber posts, with perimeter and diagonal bracing for stability.

- b. The posts and bracing must be made of pressure-treated lumber, and fasteners shall be galvanized steel nails and screws.
- c. The footing design must be based on structural analysis, ensuring proper load-bearing capacity and stability. Concrete footings should be designed with a minimum 4000 psi mix and reinforced with steel rebar or mesh as required.
- d. The display area should be a clean, unobstructed 4' x 8' space suitable for clear signage installation, ensuring visibility and legibility.
- e. Submittals for review include structural analysis, material cut sheets, and design drawings in PDF format showing the layout, post locations, and bracing details.

1.14. FENCING OF THE CONSTRUCTION AREA

1.14.1. General:

- a. Furnish and install temporary fence around construction areas on the site

1.14.2. Construction:

1.14.3. The temporary fence shall consist of woven wire mesh not less than 1.82 m (72") in height, complete with metal posts and all required bracing and with truck and pedestrian gates as required.

1.15. MAINTENANCE AND REMOVAL

1.15.1. Maintain all temporary facilities and controls as long as needed for the safe and proper completion of the Work. Remove all such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the ENGINEER

END OF SECTION



Section 01 60 00 - Owner (ASPA) Furnished Products

PART 1 - GENERAL

1.1. DESCRIPTION:

1.1.1. The work includes receiving, unloading, handling, storing, protecting and installing ASPA furnished materials.

1.2. PRODUCT DELIVERY, STORAGE, AND HANDLING

1.2.1. Store and handle products upright and in accordance with the manufacturer's instructions.

1.2.2. Protect products as required to prevent damage during storage and construction.

PART 2 - PRODUCTS

1.3. ASPA MATERIAL SCHEDULE

1.3.1. Contractor shall be provided with similar/equivalent materials listed below;

1.3.2. If the Engineer substitute's items, there shall be no additional cost

Item No.	Item Description	Estimated Qty.	Unit
1	Access Hatch, Heavy Duty Aluminum, H2O LOAD Rated	5	SET
2	Adapter, 3/4" MNPT x 1" Socket, PVC Sch 80	710	EA
3	Adapter, 3/4" MNPT x 1/2" Socket, PVC Sch 80	710	EA
4	Adapter, 3/4" MNPT x 3/4" Socket, PVC Sch 80	710	EA
5	Anchor Bolts, 1"Ø x 16", ASTM F1554 GR. 36, with Heavy Hex Nut (A563) & PL3/8"x3 washer (A36), All Hot Dip Galv	20	EA
6	ARV Enclosure, 2' x 2' X 1/8" SS Box with Vent, 3/8" x 2" SS Strap, Hasp & Staple w/ Pad lock	10	EA
7	ARV Enclosure, 24" dia. X 36", Blue	20	EA
8	ARV, 1" Combintation, ARI Model#D-040	25	EA
9	Ball Valve, 1" Full port, FNPT X FNPT, No lead Brass	25	EA
10	Base Bend, 6" X 90° , FL x FL	50	EA
11	Baseplate, 20" x 20" x 3/4", Hot Dip Galvanized, Pre-drilled hole, (request detailed drawing)	5	EA



12	Beam, Structural Steel, W21x93, 62' Long, Hot Dip Galvanized, Pre-drilled hole, 32ea Stiffener (request detailed drawing)	2	EA
13	Bend, 10"Ø x 45°FL x FL, DI	5	EA
14	Bend, 12" X 11-1/4° MJ X MJ, DI	65	EA
15	Bend, 12" X 22-1/2° MJ X MJ, DI	90	EA
16	Bend, 12" X 45° MJ X MJ, DI	145	EA
17	Bend, 12"Ø x 45° , FL x FL, DI	125	EA
18	Bend, 4"Ø x 45°FL x FL, DI	5	EA
19	Bend, 6" X 11-1/4° MJ X MJ, DI	20	EA
20	Bend, 6" X 22-1/2° MJ X MJ, DI	25	EA
21	Bend, 6" X 45° MJ X MJ, DI	40	EA
22	Bend, 6"Ø x 45° , FL x FL, DUCTILE IRON	25	EA
23	Bend, 8"Ø x 45° , FL x FL, DUCTILE IRON	10	EA
24	Bollard, 4" x 7', PE x Male Threaded Hotdip Galvanized Cast Iron Pipe with Dome Cap	230	EA
25	Bolts, 3/4" x 1-3/4" Long Hex Head, Fully Threaded SS316 8ea	50	SET
26	Bolts, 1/2"Ø x 2" ASTM F1554 w/ Nuts & Washer, All Hot Dip Galv, for Strap	25	EA
27	Bolts, 7/8"Ø x 3-1/2" A325N, All Hot Dip Galv, for Beam Splice connection	70	ea
28	Break-Off Check Valve, 6" x 21" FL x 8ea Threaded Holes	50	EA
29	Connector, Pipe to Manhole, Kor-N-Seal - 10"	5	EA
30	Connector, Pipe to Manhole, Kor-N-Seal - 4"	5	EA
31	Corp Stop, 1" MNPT x PJ, No lead Brass	20	EA



32	Corp Stop, 2" MNPT x PJ, No lead Brass	710	EA
33	Corp Stop, 3/4" MIP x 1" PJ for PVC, No lead Brass	710	EA
34	Coupling, 1" FNPT x PJ, No lead Brass	20	EA
35	Coupling, 1" x Socket x Socket, PVC SCH 80	2,510	EA
36	Coupling, 1/2" x Socket x Socket, PVC SCH 80	710	EA
37	Coupling, 12" Romac macro HP complete set	75	EA
38	Coupling, 2" x Socket x Socket, PVC SCH 80	625	EA
39	Coupling, 3/4" x Socket x Socket, PVC SCH 80	710	EA
40	Coupling, 6" Romac macro HP complete set	5	EA
41	Curb Box Base	710	EA
42	Curb Box, 1" x 3' Upper Section, marked "WATER"	710	EA
43	Curb Stop, 2" PJ x PJ for PVC, No lead Brass	710	EA
44	Denso Colortape, 6" x 25', BLUE	215	ROLL
45	Dismantling Joint, - 10"Ø FL x FL, DI, 316SS B&N, FBE	5	EA
46	Dismantling Joint, - 4"Ø FL x FL, DI, 316SS B&N, FBE	5	EA
47	Elbow, 1" x 45°, Socket x Socket, PVC SCH 80	5,470	EA
48	Elbow, 1" x 90°, Socket x Socket, PVC SCH 80	1,800	EA
49	Elbow, 2" x 45°, Socket x Socket, PVC SCH 80	2,580	EA
50	Elbow, 2" x 90°, Socket x Socket, PVC SCH 80	2,040	EA
51	Electronic Marker, 4" diameter, colored blue	110	EA



52	End Cap, For 12"Ø DI Complete Accessories	5	EA
53	End Cap, For 6" PVCO Pipe Complete Accessories	10	EA
54	End Cap, For 8" AC Pipe Complete Accessories	5	EA
55	Flange Connecting Accessories - 10"Ø , Bolts, Nuts & Washers SS316	30	SET
56	Flange Connecting Accessories - 12"Ø , Bolts, Nuts & Washers SS316	455	SET
57	Flange Connecting Accessories - 4"Ø , Bolts, Nuts & Washers SS316	20	SET
58	Flange Connecting Accessories - 6"Ø , Bolts, Nuts & Washers SS316	420	SET
59	Flange Coupling Adapter, For 12" PVCO Pipe Complete Accessories	150	EA
60	Flange Coupling Adapter, For 12"Ø DI Pipe Complete Accessories	5	EA
61	Flange Coupling Adapter, For 6" DI Pipe Complete Accessories	50	EA
62	Flange Coupling Adapter, For 6" PVCO Pipe Complete Accessories	165	EA
63	Flange Coupling Adapter, For 8"Ø AC Pipe Complete Accessories	5	EA
64	Floor Drain 6"	5	ea
65	Gate Valve, 12" x FL x FL	50	EA
66	Gate Valve, 6" x FL x FL	80	EA
67	Gate Valve, 8" x FL x FL	5	EA
68	Hydrant, Wet Barrel 8 Holes Flange	50	EA
69	Joint Restraint Harness, 12" DI for PVCO pipes	840	EA
70	Joint Restraint Harness, 6" DI for PVCO pipes	240	EA
71	Ladder Extension, Heavy Duty Aluminum	5	EA



72	Ladder, Heavy Duty Aluminum	5	EA
73	Meshwire, 665 (7' x 15')	50	EA
74	MJ Restraint, for 12" PVCO Pipe complete set	790	EA
75	MJ Restraint, for 6" PVCO Pipe complete set	225	EA
76	Nipple, 1" X 0'-6" No lead Brass, SCH 40, MNPT X MNPT	25	EA
77	Nipple, 1" X 1'-0" No lead Brass, SCH 40, MNPT X MNPT	25	EA
78	Pipe Lubricant, 32oz All purpose NSF approved	110	EA
79	Pipe, 1" x 20', Grey, Bell End x Plain End, PVC SCH 80	1,835	EA
80	Pipe, 12" x 20' Gasketed Bell x Spigot Joint, PVCO	840	EA
81	Pipe, 12"Ø x 12', FL x FL, DUCTILE IRON 125#	25	EA
82	Pipe, 12"Ø x 62', FL x FL, DUCTILE IRON 125#	5	EA
83	Pipe, 2" x 20', Grey, Bell End x Plain End, PVC SCH 80	2,040	EA
84	Pipe, 3/4" x 20', Grey, Bell End x Plain End, PVC SCH 80	710	EA
85	Pipe, 6" x 20' Gasketed Bell x Spigot Joint, PVCO	240	EA
86	Profiling Mastic, 4 lb. Bags, by Denso	110	BAGS
87	PVC Cement, Industrial Grade, 16 OZ	25	EA
88	PVC Primer, Industrial Grade, 16 OZ	25	EA
89	Rebars, #3x20', Epoxy Coated	60	EA
90	Rebars, #4x20', Epoxy Coated	175	EA
91	Rebars, #5x20', Epoxy Coated	180	EA



92	Reducer, 10"Ø x 12"Ø, FL x FL, Concentric, DI	5	EA
93	Reducer, 12" x 8", FL x FL	5	EA
94	Reducer, 2" x 1", Socket x Socket, PVC SCH 80	625	EA
95	Reducer, 4"Ø x 6"Ø, FL x FL, Concentric, DI	5	EA
96	Rubber Gasket - 10"Ø	30	EA
97	Rubber Gasket - 12"Ø	455	EA
98	Rubber Gasket - 4"Ø	20	EA
99	Rubber Gasket - 6"Ø	470	EA
100	Rubber Gasket - 8"Ø	10	EA
101	Service Saddle, 12" X 1"IP, Romac 202NS	20	EA
102	Service Saddle, 12" X 2"IP, Romac 202NS	660	EA
103	Service Saddle, 6" X 1"IP, Romac 202NS	5	EA
104	Service Saddle, 6" X 2"IP, Romac 202NS	50	EA
105	Spool, 10"Ø x 5', FL x FL, DI	5	EA
106	Spool, 12"Ø x 6', FL x FL, DI	50	EA
107	Spool, 12"Ø x 6', FL x PE, DI	5	EA
108	Spool, 4"Ø x 3', FL x FL, DI	5	EA
109	Spool, 6"Ø x 5', FL x PE, DI	50	EA
110	Strap, 2.5" x 3/16" THK SS316 Flat Bar, Pre-drilled hole on both end, (request detailed drawing)	10	EA
111	Support, 12" x 12" x 6" High, Neoprene Rubber Rubatex R431	10	EA



112	Tee, 1" x 1" x 1", Socket x Socket x Socket, PVC SCH 80	3,600	EA
113	Tee, 12" x 12" x 6", FL x FL x FL, DI 8 Holes	35	EA
114	Tee, 2" x 2" x 1", Socket x Socket x Socket, PVC SCH 80	3,370	EA
115	Tee, 2" x 2" x 2", Socket x Socket x Socket, PVC SCH 80	1,250	EA
116	Tee, 6" x 6" x 6", FL x FL x FL, DI 8 Holes	10	EA
117	Teflon Tape	5	EA
118	Trace Wire Box, Blue Magnetized Cover	45	EA
119	Trace Wire, #12 x 500' Blue	140	ROLL
120	Union, 1" FNPT x FNPT, No lead Brass	25	EA
121	Valve Box, 2Pc. Heavy Duty Slip Type With Locking Lid	135	EA
122	Warning Tape, Detectable 6" x 1000' blue for Water Line	20	ROLL
123	Water Meter - 10", OMNI T2 w/ Strainer	5	EA
124	Water Meter - 4", OMNI T2 w/ Strainer	4	EA
125	Water Meter Box, 5/8" X 3/4" w /Fittings	710	EA
126	WYE, 12" x 12" x 12", DI, FL x FL x FL	5	EA
127	WYE, 6" x 6" x 6", DI, FL x FL x FL	5	EA

1.4. CONTRACTOR'S RESPONSIBILITY

1.4.1. 20 working days after receipt of Notice to Proceed, Contractor must receive all materials furnished by ASPA at ASPA Tafuna Compound.

1.4.2. Contractor's must deliver, store and protect materials at approved site staging area and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Contractor shall assume responsibility for such defects and omissions.

1.4.3. Contractor must provide a daily inventory of all installed materials and it shall be signed by APE or its representative before the end of the working day.



1.4.4. All unused materials shall be returned by the contractor to ASPA Tafuna compound at the end of the contract.

1.4.5. Missing, unaccounted and damaged materials shall be paid by the contractor to ASPA and it shall be deducted from the final payment.

PART 3 - EXECUTION

1.5. INSTALLATION

1.5.1. Install products in accordance with the manufacturers' instructions, technical specifications and drawing plans.

1.5.2. Any materials needed to complete the project that are not listed above shall be provided by the contractor at no cost to ASPA and shall be incidental to the respective bid items.

1.6. ADJUSTMENT, CLEANING, AND PROTECTION

1.6.1. Repair or replace items not acceptable to the APE.

1.6.2. Upon completion of installation, clean products in accordance with manufacturers' recommendations, and protect from damage until final acceptance of the work.

1.7. TESTING

1.7.1. Contractor-installed products shall be tested after installation in the presence of the Engineer ,

1.7.2. Correct defects or replace and retest as required. Repairs, replacement, and retesting shall be made at no additional cost to the Engineer .

END OF SECTION



Section 01 70 00 - Closeout Submittals

PART ONE: GENERAL

1.1. Summary

Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Project Record Documents and Samples.
2. Operation and Maintenance Manuals.
3. Instruction of Engineer 's personnel.
4. Warranties and bonds.
5. Spare parts and overages

1.2. Definitions

1.2.1. As-Built Drawings: As-built drawings are developed and maintained by the Contractor and depict actual conditions, including deviations from the Contract Documents. These deviations and additions may result from coordination required by, but not limited to: contract modifications; official responses to Contractor submitted Requests for Information; direction from the Contracting Officer; designs which are the responsibility of the Contractor, and differing site conditions.

1.3. Submittals

At time of substantial completion, contractor shall furnish physical and digital copies of Project Record Documents, As-built & Record Drawings, Record Specifications, Operation and Maintenance Manuals and Warranties and Bonds as required by Engineer . All submitted records and files shall clearly identify the Engineer , project name, drawing name, specification section and date.

PART TWO: PRODUCTS (NOT USED)

PART THREE: EXECUTION

1.4. Project Record Documents

1.4.1. In addition to requirements in General Conditions, maintain on site for Engineer one record set of the following documents; record actual revisions to the Work:

1. Contract Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and Construction Change Directives.
5. ASI's and responses to RFI's.
6. Reviewed shop drawings, product data, and samples.
7. Field Test Records
8. Inspection Certificates

9. Manufacturer's instruction for assembly, installation, and adjusting.

1.4.2. The record documents shall include all disciplines of work whether changes occur or not. These documents, as well as the approved permit set of plans, shall be available to the Engineer and Engineer at the site and reviewed with them on a monthly basis. Satisfactory maintenance of up-to-date record drawings on a monthly basis will be a requirement for approval of progress payments.

1.5. Record Drawings:

1.5.1. Content: Types of items requiring marking include, but are not limited to, the following:

1. Dimensional changes to Contract Drawings.
2. Revisions to details shown on Drawings.
3. Field changes of dimensions and details.
4. Actual equipment locations.
5. Changes made by Addenda.
6. Changes made by Change Order or Construction Change Directive.
7. Changes made following Engineer's written orders, including ASI's and responses to RFI's.
8. Details not on the original Contract Drawings.
9. Field records for variable and concealed conditions.
10. Record information on the Work that is shown only schematically

1.6. AS-BUILTS

1.6.1. Scope

- a. Work required under this section consists of surveying and preparing as-built drawings in AutoCAD to be approved by ASPA.
- b. Prior to completion of the final inspection, the Contractor shall provide to ASPA an electronic file and certified copies of as-built surveys with all required revisions included as the final as-built survey.
- c. All changes requested by ASPA must be made to the electronic file, as well as the printed, signed and sealed copies. Neglecting to provide the required information will delay the final inspection.
- d. All measurements are to be made by the Surveyor or Engineer who will be certifying the project as constructed.
- e. The Contractor is responsible for coordinating with the Surveyor or Engineer during construction and shall provide access to all utilities prior to being buried; allowing accurate horizontal and vertical measurements to be acquired by the Surveyor or Engineer. In the event of any discrepancies identified by ASPA and at no cost to ASPA, the Contractor shall verify the location and measurements of any buried utilities.
- f. Any and all utility information must be collected, regardless of "typical" alignments (including existing obstructing, conflicting, or crossing utility infrastructure). Refer to the information provided in the contract documents (construction plans, specifications, etc.).
- g. The Surveyor or Engineer must provide ASPA with a certificate of its professional liability coverage.

1.6.2. CONFIGURATION STANDARDS

- a. All electronic as-built utility information in the as-built survey must reference the State Plane Coordinate System 1962, D_1983_HARN_UTM_Zone_2SNAD (horizontal) and NAVD88 or ASVD02 (vertical); the units must be in feet, and be properly projected into its correct spatial location prior to submitting to ASPA. ASPA will not re-project or manipulate as-built surveys in an attempt to correct improperly spatially referenced as-built surveys. It's the certifying Surveyor or Engineer's responsibility to ensure all submitted information adheres to the specifications.
- b. All new and existing utilities (water, sewer, reclaimed, electrical, communications, etc...) and drainage located within project site impacted by construction shall be located relative to property lines and/or right-of-way lines, using the specifications identified in this document.
- c. Blocks inserted into a drawing shall be on the correct layer, identifying those features (including service type).
- d. All text (DTEXT and MTEXT) must be masked; CUT/BROKEN LINES BEHIND TEXT WILL NOT BE ACCEPTED. Detail(s) also must be masked. The dimensions will be created with masked text using a standard dimension style(s)
- e. All dimensioning, text and multileader lines must be drawn using ASPA's provided template (each template has been preconfigured).
- f. Set the 'Dimension Association' to 2 (exploded dimensions will not be accepted).
- g. Use Arial font in template and name them as follows: ASPA Annotative Text, ASPA Standard Dimension and ASPA Annotative Leader.
- h. All corresponding line types must be used.
- i. Text identifying information about features shall be properly aligned. Text shall be visible on the drawing using the template font style provided and with the base set to the upper left-hand corner of the text which is clear of the linear or block features. For legibility, it may require that the label be moved and accompanied by a leader arrow. The labels shall be placed onto a separate layer and not to be placed on the feature layer itself. Labels must be properly rotated for easy legibility (horizontal alignment).
- j. Features shall be placed on their appropriate layers and assigned colors by layer for consistency. Features shown in the AutoCAD files shall be in model space and be contained in the AutoCAD files as opposed to being linked through externally referenced files (binded layers MUST reflect the correct layers).
- k. The AutoCAD file shall be reviewed for duplicate objects.
- l. Polylines shall be continuous from structure to structure. End points of polylines must be snapped to the end points of connecting polylines, with a structure node being snapped to the end point.

1.6.3. Creating AutoCAD as-built surveys.

- a. Clean all unnecessary layers and blocks before submitting final as- built plans to ASPA
- b. Use only ASPA approved layers
- c. Properly place features on the correct AutoCAD layers
- d. Do not break lines or trim behind text boxes; utilize the text masking feature (also applies to detail blow ups)
- e. Use reasonably scaled templates and blocks for all drawings
- f. Add continuations / match lines on all related as-builts
- g. Do not explode blocks, even if object is owned by others
- h. Snap all designated blocks at the base point of the object i) Properly connect all lines, blocks, etc.
- i. Create detail blow-ups to show information in close proximity (to maintain legibility)
- j. Layer naming conventions shall follow the NCS (National CAD Standards) guidelines. For more information on NCS, visit their website at nationalcadstandard.org.
- k. Each feature (e.g., hydrant, valves, mains, etc.) shall have IDs assigned by the Surveyor or Engineer completing the as-builts, which reference a worksheet table. The worksheet table will contain an inventory of items installed. The entire table must be complete and refer to a corresponding feature on the as-builts.
- l. All water features, pressure pipe networks, plan and profile must be drawn in model space under a single file of AutoCAD Civil3d 2020 version format. Pipe networks drawn using polylines is not acceptable.
- m. All other construction details can be drawn using any cad format editable in Autocad 2020 version.

1.6.4. COSTS

- a. The as-built surveys shall be prepared at the Contractor's expense.
- b. The applicant's Contractor shall be responsible for paying in advance to ASPA, the cost for reviewing the final as-built surveys for each extension of the ASPA's utility system. The cost is based on the ASPA's initial estimate of the time needed to review the final as-built surveys.
- c. Extra time required to review the as-built surveys, due to failure of meeting the as-built specifications or for other inadequate or inaccurate information required of Contractor's Surveyor or Contractor to complete ASPA's as-built drawings or by any combination of such factors shall be charged to and paid by the Contractor as an additional cost of completing ASPA's final CAD as-built plans, based on a rate of \$50.00 per hour, plus plotting cost for any extra proof sets.

1.6.5. SUBMISSION OF AS-BUILTS

- a. As-built surveys shall be submitted using ASPA's AutoCAD template settings; with the Contractor, Surveyor or Engineer's title block. Sheets shall be no

larger than 24"x36" and accompanied by all necessary electronic files delivered on CD/DVD or by e-mail.

- b. Scale shall range between 1"=10' to 1"= 60', unless approved by ASPA.
- c. Each sheet must be labeled "AS-BUILT" in one-inch high bold letters in the bottom right hand corner and include the following items:
 - 1. Station numbers and with offsets
 - 2. Dimension measurements
 - 3. Lot numbers
 - 4. Street names
 - 5. Scale
 - 6. Location, elevation and datum of the benchmark used
 - 7. Easements as shown on approved plans
 - 8. Certification block (see 3 below)
- d. Once ASPA has completed its proposed final review of the CAD as-built plans for such extension, a proof set of the proposed plans will be provided to the Contractor for proof reading and verification of the accuracy of ASPA's proposed final CAD as-built drawings, based on the information provided to ASPA by the Contractor or Surveyor.
- e. When ASPA's proposed final CAD as-built drawing has been verified as accurate by the Contractor and ASPA, then a final set of "official" as-built drawing will be plotted by the Contractor for the signature of the Surveyor and/or contractors Engineer.

1.6.6. ASBUILT CERTIFICATION & LIABILITY CONFIRMATION

- a. Each as-built survey sheet is required to have a certification block and bear the name, address, phone number and signature of the liable professionals.
- b. The Registered Professional Surveyor will certify the horizontal and vertical dimensions and elevations of the project's as-built conditions.
- c. The Registered Professional Engineer shall certify according to their field such as Civil Engineer for Civil/Structural works, Electrical Engineer for Electrical Plan, Mechanical Engineer for mechanical Works, etc.
- d. The signature(s) certify the as-built survey and information provided is accurate.
- e. Submit a signed sealed written report in a format acceptable to ASPA by the Surveyor or Engineer which identifies each pipe and appurtenances and outline the attributes of each material.

1.6.7. ASSET TABLE WORKSHEET

- a. The following asset database sample template must be saved in a Google drive and must be updated accurately on a daily basis. Database can be shared by the APE upon request of the contractor.

1. Fire Hydrant Asset Database

Feature_ID	Type	Size	Current Pressure (psi)	X_Easting	Y_Northing	Z_Elevation	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
FH0001											

2. Valve Asset Database

Feature_ID	Type	Size	Open_Direction	X_Easting	Y_Northing	Z_Elevation	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
VLV0001											

3. Service Saddles Asset Database

Feature_ID	Type	Size	Open_Direction	X_Easting	Y_Northing	Z_Elevation	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
SAD00001											

4. Fitting Asset Database

Feature_ID	Material	Type	Size	X_Easting	Y_Northing	Z_Elevation	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
FIT000001											

5. Meter Asset Database

Feature_ID	Meter_No.	Customer_Name	Account_No.	Size	Pressure	X_Easting	Y_Northing	Z_Elevation	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
M0000001													

6. Pipe Database

Feature_ID	Length	Size	Material	Start_Feature_ID	End_Feature_ID	Cover	Model_No.	Manufacturer	Date_Installed	Installed_by	Remarks
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M0000											
001											

- b. The APE may deduct 2 % of the total monthly pay application if the contractor failed to comply with this as-built requirements. Payment will be made upon compliance of this requirements.

1.6.8. Layer Name Format

AutoCAD drawing layer name, shall follow the National CAD Standards.

(e.g., CU-WATR-DOMC-PIPE-XXXX XXXX XXXX XXXX XX-ST)

1.6.9. Asbuilt Deliverables

GIS File Format. (At the minimum contractor shall provide data for use with ArcGIS/GIS software)

- Completion of aerial surveys to prepare a GIS package for the entire project extents . Project extents are as shown in the construction drawings.
- All data to be augmented by survey grade GPS, giving spot heights with a positional and height accuracy in the order of 30mm/0.1', where possible.
- Aerial photos of the site. Individual JPEGs.
- Orthophoto TIFF. Ortho-rectified to be 2D measurable in plan and in the form of geo-referenced TIFFs (Highest quality, large files > 1GB).
- Raster DSM (Digital Surface Model). Geo-referenced TIFF format, containing all surveyed height data, including roof tops, vegetation etc.
- Provide shapefile for all new and existing features installed and discover under this project. Shapefile must conform to ESRI Shapefile Technical Description. Contractor shall propose attribute tables and database for ASPA approval.

Google Earth File Format. (At the minimum contractor shall provide data for use with Google Earth Pro)

- As an alternative to GIS software contractor shall submit the asbuilts in google earth ready file containing attribute data overlaid onto the high resolution orthophoto.
- Google Earth tiles. Ortho-rectified photos to be 2D measurable in plan and in the form of geo-referenced Google Earth KMZ tile formats.
- ASPA shall approved needed data to be included in the attributes table.

CAD File Format. (At the minimum contractor shall provide data for use with Autocad civil 3d),

- Orthophoto JPEG/DWG. Ortho-rectified to be 2D measurable in plan and compressed to the form of geo-referenced best quality JPEGs.
- As Built drawing overlaid onto the high resolution orthophoto DWG file.
- TIN surface -accurate 3d CAD file complete with a DTM (Digital Terrain Model) surface and other details that include contours, spot heights and basic breaklines in DWG/ DXF.
- Complete Topographic Survey.

END OF SECTION



DIVISION 02 : EXISTING CONDITIONS

Section 02 41 00 - Demolition

PART 1 GENERAL

1.1 SUMMARY

Description: The work includes demolition, removal, relocation and restoration work as indicated on the drawings and as specified herein. Work includes decommissioning or removal of pipes, fittings, fire hydrant and other appurtenances as indicated. 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 remove daily in areas specified by the APE. The Contractor shall pay for all necessary permits and certificates that may be required in connection with this work.

1.2 SUBMITTALS

Submit proposed demolition and removal procedures to the APE for approval before work is started in accordance with Section 01 30 10 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

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.

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 interfere to streets, driveways, sidewalks, and passageways, etc. Provide details on the proposed traffic control.
- 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 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

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

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

Place backfill and compact to a minimum 95 percent laboratory maximum density or as shown otherwise in the Construction plans.

3.4 EXISTING CONDITIONS DOCUMENTATION

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

All existing water utility and facilities to be demolished, removed and disposed shall be as indicated on the drawings.



3.6 MATERIAL TO BE SALVAGED

Remove and salvage Fire hydrants, PRV's, ARV and other appurtenances as directed by APE onsite. Deliver salvaged materials to ASPA Tafuna compound yard.

3.7 RESTORATION

Any road work restoration, DPW will be involved in determining the extent of restoration. Road cavitation compaction has to be supervised by APE/DPW. Restore curbs and gutters, concrete walls, CRM, landscaping, embankment 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

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. 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 and used by ASPA, except when authorized or approved in writing by the APE and 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 is not indicated on the drawings, the APE shall be notified prior to further work in that area.

END OF SECTION

Section 02 82 00 – Asbestos Remediation

PART 1 - GENERAL

1.1. SOPE OF WORK

1.1.1. The work of this Section shall apply to any work operations that disturb asbestos containing materials. Any disturbance of asbestos-containing material will be performed in a manner to protect workers and the environment from asbestos exposure, and in accordance with NESHAP and OSHA Rules.

1.2. EXTENT OF WORK

1.2.1. AC pipes shall be abandoned in place to the fullest possible extent. Contractor is not allowed to relocate, deliver and store anywhere else.

1.2.2. Removal, clean-up and disposal of asbestos containing materials (ACM) and asbestos/waste contaminated elements in an appropriate regulated area shall be limited to tie-in and connection point only.

1.2.3. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

1.2.4. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

1.2.5. Asbestos abatement activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends).

1.3. PERMITS AND COMPLIANCE

1.3.1. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.

1.4. SUBMITTALS

1.4.1. Within 7 days prior to the pre-construction conference, the Contractor shall submit Abatement Work Plan for review and approval prior to the commencement of asbestos abatement activities:

1.5. CONTRACTOR QUALIFICATIONS

1.5.1. Use only trained and experienced workers to perform the abatement Work. Maintain on-site a Superintendent and one Head Foreman. Superintendent and Head Foreman must be approved prior to the start of the Work and shall not be changed without prior written approval. Superintendent and Foreman shall be certified as Asbestos Abatement Supervisor.

1.5.2. Use only trained and experienced asbestos removal workers to perform the Work.

1.5.3. Adhere to applicable Standards and Specifications:

- a. EPA Regulations for Asbestos (40 CFR 61.140 – 61.153 and 40 CFR763).



- b. OSHA Regulations for Asbestos (29 CFR 1926.1101)
- c. OSHA Regulations for Respiratory Protection (29 CFR 1910.134).
- d. All state, county, and city codes and ordinances, as applicable. Make available for review at the site one copy of EPA, OSHA, and applicable state, county, and city regulations governing the Work.

1.6. PERSONNEL PROTECTION

1.6.1. Comply with all the regulatory requirements for asbestos exposure monitoring in accordance with OSHA 29 CFR 1926.1101, other applicable federal, state, and local regulations, and the Contract Documents, whichever is more stringent.

1.6.2. Prior to commencement of work, instruct all workers in the appropriate procedures for personnel protection and asbestos removal. Ensure that workers are knowledgeable in these procedures.

1.6.3. Acknowledge and agree to sole responsibility for enforcing worker protection requirements at least equal to those specified in this Section.

1.6.4. Provide workers with personally issued and marked respiratory protection equipment approved by NIOSH and OSHA for the type of work being performed.

1.6.5. Where respirators with disposable filters are used, provide sufficient filters for replacement as necessary.

1.6.6. Provide respiratory protection at all times, in compliance with OSHA requirements. The minimum acceptable respiratory protection used for this project shall be as follows:

- a. Provide a minimum of half-face dual cartridge respirators for workers during pre-cleaning of work areas, installation of barriers, waste handling, and disposal activities outside the work areas.
- b. Provide a minimum of half-face dual cartridge respirators for workers during the removal of asbestos-containing materials from the time of first disturbance of the material.

1.6.7. Be solely responsible for scheduling necessary air sampling by an independent Testing Laboratory for compliance monitoring of own respiratory protection with OSHA regulations. Pay for all costs associated with such testing.

1.6.8. Permit no visitors, except for governmental inspectors having jurisdiction or as authorized by ASPA, in the work areas after commencement of asbestos disturbance or removal.

1.6.9. Provide workers with sufficient sets of protective disposable clothing (Tyvek or similar), consisting of full-body coveralls, head covers, gloves, and foot covers of sizes to properly fit individual workers.

1.6.10. Provide suitable respirators and protective equipment for use by authorized visitors, ASPA, and Testing Laboratory's representatives. Furnish these in as many sets as required for full-time monitoring by Consultant and Testing Laboratory

PART 2 - PRODUCTS

1.7. ABATEMENT MATERIALS

1.7.1. A. Plastic Sheeting – “true mil” thickness in sizes to minimize the frequency of joints. Use of “spray-on poly” is not permitted.

1.7.2. Tape – glass fiber or other type capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces under both dry and wet conditions.

1.7.3. Surfactant (wetting agent) – mixture of “Dust-Set Amended Water Base (Matheson Chemical Corporation) or equivalent, and water, mixed to manufacturer’s specifications or equivalent.

1.7.4. Encapsulant – manufactured by reputable, established manufacturer or encapsulant materials and approved specifically for use in asbestos contaminated environments. Determine compatibility of the mastic with the materials and conditions. For any areas where asbestos-containing materials will be removed, the following products are approved for use in asbestos contaminated areas:

- a. American Coating Corporation – Cable Coating No. 22P
- b. Fiberlock Technologies, Inc. – Fiberset F. T.
- c. H.B. Fuller Co., Foster Products Division Protekto 32-60
- d. Industrial Protective Coatings – Serpiflex Sheild
- e. Childers Products Company – CHIL-LOCK CP-240

1.7.5. Impermeable Waste Containers – suitable to receive and retain asbestos containing or contaminated materials until disposal at an approved site and labeled in accordance with OSHA Regulation 29 CFR 1926.1101. Containers shall be both air and water tight.

1.7.6. Warning Labels and Signs – as required by OSHA 29 CFR 1926.1101.

1.7.7. Other Materials – provide all other materials (such as lumber, nails, and hardware) which may be required to construct and dismantle the barriers that isolate the work area.

1.8. TOOLS AND EQUIPMENT

1.8.1. Provide suitable tools for asbestos-containing material removal which may include but not be limited to the following:

- a. Water Sprayer – utilize airless or other low-pressure sprayer for amended water application. High-pressure sprayers are prohibited.
- b. Transportation – as required for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property. Use only lined, enclosed, and sealable roll-off containers to haul waste.
- c. Half-Face Air Purifying Respirator (APR) Equipment – negative pressure, half-face air purifying respirators approved by NIOSH and MSHA for asbestos removal work.
- d. Powered Air Purifying Respirator (PAPR) Equipment – powered air purifying respirators approved by NIOSH and MSHA for asbestos removal work.
- e. Scaffolding – as required to accomplish the specified work and meet all applicable safety regulations.

1.8.2. The following tools are not suitable for asbestos-containing materials removal operations and are prohibited from the work area:

- a. Utility Water Hose and Sprayer Attachments.
- b. Brooms.
- c. Pressure Washers.
- d. Knife Blades without Housings.

PART 3 – EXECUTION

1.9. PREPARATION



1.9.1. General work area preparations for asbestos abatement activities:

- a. Coordinate sequence of work area preparation throughout the site with other trades to properly segregate work areas from areas in which other construction is being performed.
- b. Provide temporary power and lighting as necessary to maintain a safe and comfortable work environment.
- c. Install fire extinguishers in work area per NFPA recommendations, the requirements of OSHA Standards, and Texas requirements.
- d. Segregate work area from adjacent areas. Construct visual barriers as necessary to segregate work areas and staging areas from adjacent areas.
- e. Maintain a Sign In/Out Log in the immediate vicinity of the entrance to the work area. Utilize log from the time the first activity is performed involving the disturbance of asbestos-containing materials. Require all persons entering the work areas to register each time upon entering and leaving work areas.

1.10. REMOVAL OF ASBESTOS-CONTAINING MATERIALS

1.10.1. A. Contractor shall maintain security at all times, from the time of first disturbance of asbestos-containing material.

1.10.2. Personnel performing these duties shall be properly trained and able to effectively communicate with the supervisor/foreman, and be qualified to enter the work area containment in appropriate protective equipment in the event it becomes necessary to enter the contaminated space.

1.10.3. At all times, keep material thoroughly wetted.

1.10.4. Ensure no visible emissions at any time during the removal of asbestos containing material.

1.10.5. After removal of asbestos-containing materials, wet-clean and HEPA-vacuum all surfaces in the work area to remove residual material. Continue wet cleaning and HEPA-vacuuming until surfaces are visibly free of material.

END OF SECTION



DIVISION 03 : CONCRETE

Section 03 05 15 - Portland Cement Concrete

PART 1 GENERAL

1.1 SUMMARY

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
5. ASTM C94 - Standard Specification for Ready-Mixed Concrete
6. ASTM C114 - Standard Test Methods for Chemical Analysis
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

1.3 SUBMITTALS

A. General: Refer to Section 01 30 10 – 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.

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

1.4 QUALITY CONTROL

A. General: Refer to Section 01 40 00 – 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 ANALYSIS 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/ C494M. 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: Use fresh, clean, potable water for mixing and curing, free from injurious amounts of oil, acid, salt, or alkali.

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 HS 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.

5. 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 Core:

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.

5. 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.

END OF SECTION

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 war-page. 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

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

Section 03 20 00 - 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
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 30 10 SUBMITTAL PROCEDURES:

1. Reinforcement Shop Drawings
2. Reinforcement Certificates

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 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 ACI318. 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 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

Section 03 30 53 - Miscellaneous Cast-In-Place Concrete

PART 1 GENERAL

1.1 SUMMARY

Perform all work in accordance with the Drawings, this Section of the specifications and 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 C150/C 150M (2009) Standard Specification for Portland cement
9. ASTM C171 (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 Package Hydraulic-Cement Grout (Non-shrink)
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/C31M. 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 3,000 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 30 10 SUBMITTAL PROCEDURES:

Installation Drawings

Product Data for;

1. Water-Reducing or Retarding Admixture Curing
2. Materials
3. Batching and Mixing Equipment
4. Conveying and Placing Concrete Ready-Mix
5. Concrete
6. Mix Design Data Curing Compound
7. Manufacturer's Recommendations and Instructions

Test Reports for;

1. Aggregates
2. Concrete Mixture Proportions Compressive
3. Strength Testing Slump

Certificates for;

1. Cementitious Materials
2. Aggregates

3. 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 C150/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 C33/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.

2.1.3.1 Water-Reducing or Retarding Admixture

Provide water-reducing or retarding admixture meeting the requirements of ASTM C494/C 494M, Type A, B, or D.

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 shall be as shown on the drawings.

2.1.6 Expansion Joint Filler Strips, Pre-molded

Expansion joint filler strips, pre-molded shall be sponge rubber conforming to ASTM D1752, 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 non-staining 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.

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 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 has 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 darbyed 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

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. Delivery within 3 days after the end of each weekly reporting period.

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 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 non-staining 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 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.

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. 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

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 30 10 – 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 40 00 – 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

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 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:

Liquid membrane-forming compound shall conform to HSS Sub-section 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. Saw-cut 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. 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 ACI301 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

Section 03 40 00 - Precast Concrete

PART 1 - GENERAL

1.1 SUMMARY

Description: This Section covers the fabrication of precast concrete box for water utilities.

1.2 REFERENCES

A. ACI INTERNATIONAL (ACI)

1. ACI 211.1 (1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
2. ACI 318 (2008; Errata 2008) Building Code Requirements for Structural Concrete and Commentary
3. ACI 318M (2008) Metric Building Code Requirements for Structural Concrete and Commentary

B. AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

1. ACPA 01-102 (2000) Concrete Pipe Handbook
2. ACPA 01-110 (1984) Design Manual for Sulfide and Corrosion Prediction and Control
3. ACPA QPC (2005; Ver 3.0) Q Cast Plant Certification Manual

C. AMERICAN WELDING SOCIETY (AWS)

1. AWS D1.4/D1.4M (2005; Errata 2005) Structural Welding Code - Reinforcing Steel

D. ASTM INTERNATIONAL (ASTM)

1. ASTM A 153/A 153M (2005) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
2. ASTM A 615/A 615M (2008b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
3. ASTM A 706/A 706M (2008a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

4. ASTM A 767/A 767M (2009) Standard Specification for Zinc- Coated (Galvanized) Steel Bars for Concrete Reinforcement
5. ASTM A 82/A 82M (2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
6. ASTM C 1064/C 1064M 2008) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
7. ASTM C 1107/C 1107M (2008) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-shrink)
8. ASTM C 1244 (2005e1) Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
9. ASTM C 1244M (2005e1) Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill (Metric)
10. ASTM C 143/C 143M (2009) Standard Test Method for Slump of Hydraulic-Cement Concrete
11. ASTM C 150/C 150M (2009) Standard Specification for Portland Cement
12. ASTM C 171 (2007) Standard Specification for Sheet Materials for Curing Concrete
13. ASTM C 173/C 173M (2009) Standard Test Method for Air Content of Freshly Mixed Concrete by the Method
14. ASTM C 192/C 192M (2007) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
15. ASTM C 309
16. ASTM C 31/C 31M (2009) Standard Practice for Making and Curing Concrete Test Specimens in the Field
17. ASTM C 33/C 33M (2008) Standard Specification for Concrete Aggregates
18. ASTM C 39/C 39M (2005e1e2) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
19. ASTM C 443 (2005a) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets



20. ASTM C 443M (2007) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
21. ASTM C 494/C 494M (2008a) Standard Specification for Chemical Admixtures for Concrete
22. ASTM C 595/C 595M (2008a) Standard Specification for Blended Hydraulic Cements
23. ASTM C 618 (2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
24. ASTM C 877 (2008) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
25. ASTM C 877M (2002;E 2005) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections (Metric)
26. ASTM C 891 (1990; R 2003) Installation of Underground Precast Concrete Utility Structures
27. ASTM C 920 (2008) Standard Specification for Elastomeric Joint Sealants
28. ASTM C 923 (2008) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
29. ASTM C 923M (2008b) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals (Metric)
30. ASTM C 990 (2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants
31. ASTM C 990M (2009) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric)

D. NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA)

1. NPCA QC Manual (2005; R 2006) Quality Control Manual for Precast Plants

1.3 SUBMITTALS

A. ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 SUBMITTAL PROCEDURES:



1. Preconstruction Submittals

a. Quality Control Procedures

1) Quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and/or ACPA QPC.

2. Shop Drawings

a. Standard Precast Units;

1) Drawings for standard precast concrete units furnished by the precast concrete producer for approval by the APE. These drawings shall demonstrate that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

b. Custom-Made Precast Units;

1) Drawings for custom-made precast concrete units furnished by the precast concrete producer for approval by the APE. Show on these drawings complete design, installation, and construction information in such detail as to enable the APE to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

3. Product Data

a. Standard Precast Units

1) Cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.

b. Proprietary Precast Units

1) Standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information as to demonstrate that such products will perform the intended task.

c. Embedded Items

1) Product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.

d. Accessories



1) Proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, and other items installed before or after delivery.

4. Design Data

a. Design Calculations and Concrete Mix Proportions

1) Precast concrete unit design calculations, and concrete mix proportions.

5. Test Reports

1) Copies of materials certifications and/or laboratory test reports, including mill tests and all other test data, for Portland cement, aggregates, admixtures, and curing compound proposed for use this project.

2) Copies of test reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions.

3) Sufficient documentations, when the use of self-consolidating concrete (SCC) is proposed, showing a minimum of 30-days production track records demonstrating that SCC is appropriate for casting of the product.

4) Copies of in-plant QA/QC inspection reports, upon the request of Contracting Officer.

6. Certificates

a. Quality Control Procedures

1) Quality control procedures established in accordance with NPCA QC Manual and/or ACPA QPC.

1.4 GENERAL REQUIREMENTS

A. Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been, for at least 3 years, regularly and continuously engaged in the manufacture of precast concrete work similar to that indicated on the drawings. Coordinate precast work with the work of other trades.

1.5 DESIGN

A. Custom-Made Precast Units

1. Submit design calculations and drawings of custom-made precast units, prepared and sealed by a registered professional APE, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices.

B. Proprietary Precast Units

1. Products manufactured under franchise arrangements shall conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, shall conform to the requirements in this specification.

C. Joints and Sealants

1. Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

D. Concrete Mix Design

1. Concrete Mix Proportions

a. Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Do not use calcium chloride in precast concrete containing reinforcing steel or other embedded metal items. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and constituents meet the requirements of this specification.

2. Concrete Strength

a. Provide precast concrete units with a 28-day compressive strength (f'_c) of 4000 psi.

3. Corrosion Control for Sanitary Sewer Systems

a. Follow design recommendations outlined in Chapter 7 of ACPA 01-102 or the ACPA 01-110 when hydrogen sulfide is as a potential problem.

1.6 QUALITY ASSURANCE

A. Demonstrate adherence to the standards set forth in NPCA QC Manual and/or ACPA QPC. Meet requirements written in the subparagraphs below.

1. NPCA and ACPA Plant Certification

a. The precast concrete producer shall be certified by the National Precast Concrete Association's and/or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.

2. Qualifications, Quality Control and Inspection a. Qualifications

1) Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of 3 years. The precast concrete producer shall maintain a permanent quality control department or retain an independent testing agency on a continuing basis.

b. Quality Control Procedures

1) Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.

a) Slump: Perform a slump test or once a day. Perform slump tests in accordance with ASTM C 143/C 143M.

b) Temperature: Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C 1064/C 1064M.

c) Compressive Strength: Make at least four compressive strength specimens for each 50 cubic yards of concrete of each mix in accordance with the following Standards: ASTM C 31/C 31M, ASTM C 192/C 192M, ASTM C 39/C 39M.

c. Submit test reports as specified in the Submittals paragraph and documentation to demonstrate compliance with the above subparagraphs.

1.7 HANDLING, STORAGE AND DELIVERY

A. Handling

Handle, transport, and store products in a manner to minimize damage. Lifting devices or holes shall be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.

B. Storage

Store units off the ground or in a manner that will minimize potential damage.

C. Delivery

Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the APE for quality and final acceptance.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement

1. Furnish cement conforming to ASTM C 150/C 150M, II. Furnish blended cements that conform to ASTM C 595/C 595M.

B. Water

1. Furnish water potable or free of deleterious substances in amounts harmful to concrete or embedded metals.

C. Aggregates

1. Selection

- a. Furnish aggregates conforming to ASTM C 33/C 33M. Provide aggregates not containing any substance, which may be deleteriously reactive with the alkalis in the cement.

D. Admixtures

1. Accelerating, Retarding, Water Reducing a. ASTM C 494/C 494M

E. Reinforcement

1. Reinforcing Bars

- a. Deformed Billet-steel: ASTM A 615/A 615M
- b. Deformed Low-alloy steel: ASTM A 706/A 706M

2. Reinforcing Wire

- a. Plain Wire: ASTM A 82/A 82M

3. Galvanized Reinforcement

- a. Provide galvanized reinforcement conforming to ASTM A 767/A 767M. F. Inserts and Embedded Metal

1. All items embedded in concrete shall be of the type required for the intended task, and meet the following standards.

a. Hot-dipped Galvanized: ASTM A 153/A 153M

b. Proprietary Items: In accordance with manufacturers published literature

G. Accessories

1. Preformed Flexible Joint Sealants for Manholes: ASTM C 990.

2. Elastomeric Joint Sealants: ASTM C 920

H. Pipe Entry Connectors

1. Pipe entry connectors shall conform to ASTM C 923 or ASTM C 1478.

I. Grout

1. Non-shrink Grout shall conform to ASTM C 1107/C 1107M. Cementitious grout shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

PART 3 - EXECUTION

3.1 FABRICATION AND PLACEMENT

A. Perform fabrication in accordance with NPCA QC Manual and/or ACPA QPC unless specified otherwise.

1. Forms

a. Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices.

2. Reinforcement

a. Follow applicable ASTM Standard or ACI 318 for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire fabric into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4/D1.4M. Position reinforcing as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover shall be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.

3. Embedded Items



a. Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1/D1.1M when necessary. Hold rigidly in place inserts, elements, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations.

3.2 CONCRETE

A. Concrete Mixing

1. Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

B. Concrete Placing

1. Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.

C. Concrete Curing

1. Commence curing immediately following the initial set and completion of surface finishing.

a. Curing by Moisture Retention

1) Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:

a) Cover with polyethylene sheets a minimum of 6 mils thick in accordance with ASTM C171.

b) Cover with burlap or other absorptive material and keep continually moist.

c) Use of a membrane-curing compound applied at a rate not to exceed 200 square ft/gallon, or in accordance with manufacturers' recommendations according to ASTM C 309.

D. Stripping Products from Forms

1. Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

E. Patching and Repair

1. No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

a. Repairing Minor Defects

1) Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.

b. Repairing Honeycombed Areas

1) When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

F. Shipping Products

1. Do not ship products until they are at least 5 days old, unless it can be shown that the concrete strength has reached at least 75 percent of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.3 INSTALLATION

A. Site Access

1. It is the Contractor's responsibility to provide adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.

B. General Requirements

1. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.

2. Lift products by suitable lifting devices at points provided by the precast concrete producer.

3. Install products in accordance with the precast concrete producer's instructions. In the absence of such instructions, install underground utility structures in accordance with ASTM C 891.

4. Field modifications to the product will relieve the precast producer of liability even if such modifications result in the failure of the product.

C. Water Tightness

1. Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system.

3.4 FIELD QUALITY CONTROL

A. Site Tests

When water tightness testing is required for an underground product, use one of the following methods:

1. Vacuum Testing

Prior to backfill vacuum test system according to ASTM C 1244.

2. Water Testing

Perform water testing according to the contract documents and precast concrete producer's recommendations.

END OF SECTION



DIVISION 09 : FINISHES

Section 09 90 00 - Painting And Coatings

PART 1 - GENERAL

1.1. SCOPE OF WORK

Work included under this section consists of surface preparation, field paint application, surface protection, clean-up, and/or other appurtenant work on the following surfaces:

- 1.1.1. All exterior and interior surfaces.
- 1.1.2. All exterior and buried ferrous metal surfaces.
- 1.1.3. All exposed pipe, and other mechanical and electrical equipment if any.
- 1.1.4. Touch-up painting of pre-finished mechanical, electrical and specialty equipment.
- 1.1.5. All metal trim, metal doors, frames, flashings, gratings, brackets, bolts, nuts, clamps and hangers.
- 1.1.6. Ducts, piping and electrical conduit in painted rooms, against painted surfaces, or exposed to the weather.
- 1.1.7. The Contractor shall furnish all materials, tools, and equipment, and shall do all painting work specified herein, or otherwise specified or indicated on the Drawings.

1.2. QUALITY OF WORK

All finishes shall be applied by skilled workmen in accordance with the best practices and standards of the painting trade. Brushes, rollers, all equipment, and the techniques used in applying finishes shall be of sufficient quality to assure the specified results. Work not conforming to this specification shall be corrected by touching up or refinishing as directed by the Engineer.

1.3. SUBMITTAL REQUIREMENTS

The contractor shall submit shop drawings, manufacturer's literature and color samples in accordance with applicable provisions contained in the "General Provisions" and "Special Provisions" sections of these Specifications. A detailed list of submittal requirements is included in the Special Provisions.

1.4. DELIVERY AND STORAGE

Painting materials shall be delivered to site in the manufacturer's original containers with labels intact and seals unbroken. Painting materials and equipment shall be stored and mixed in rooms assigned for that purpose. All necessary precautions shall be taken to prevent fire. Rags or waste soiled with paint shall be removed from premises at end of each day's work, or shall be stored in covered metal containers.

1.5. INTENT

It is the purpose and intent of this Specification to cover the complete paint finishing of all exterior and interior surfaces as scheduled or specified and all surfaces which normally require a paint finish for corrosion resistance, weather protection, finished appearance or utility. Finished surfaces shall be of the type of finish, color sheen, film thickness and quality specified.

1.6. REFERENCE STANDARD OF QUALITY

1.6.1. The painting specifications and paint finish schedule list products by brand name to a standard of quality. Products of other manufacturers may be accepted in place of those specified upon proof of equivalency in accordance with the General Provisions as modified by the Special Provisions and this section.

1.6.2. If the Contractor desires to use other than specified products, he shall submit an itemized list giving the manufacturer's name, and the specific name and number of each product offered as a substitute and such other information as is necessary to enable the Engineer to evaluate substitute products. Approval of substitute products shall be obtained from the Engineer before any materials are applied. Unspecified materials, such as turpentine and paint thinner shall be pure and of the highest quality of an approved manufacturer and shall bear the manufacturer's label on each container or package. All materials shall be delivered to the job site in the original containers with contents and labels intact.

1.7. PRELIMINARY EXAMINATION

Notify the Engineer in writing of any uncorrected defects in surfaces to be painted. Do not proceed with the finishing of surfaces in question until any discrepancies are corrected. The starting of work on any surface shall imply that the surface has been inspected and approved by the painting Contractor.

1.8. PRIMING

1.8.1. In general, surfaces of equipment, steel, and cast iron are specified to be shop primed. Any such surfaces which have not been shop primed shall be field primed. Galvanized, aluminum, stainless steel and insulated surfaces shall be field primed.

1.8.2. Surfaces specified to be field painted with clear finish coats need not be primed. Priming will not be required on concrete block and plaster board surfaces specified to be painted with latex paint.

1.9. RIGHT OF REJECTION

No exterior painting or interior finishing shall be done under conditions which jeopardize the appearance or quality of the painting or finishing in any way and the Engineer shall have the right to reject all material or work that is unsatisfactory, and reserve the right at all times to replace either, or both, at the expense of the Contractor.

PART 2 - MATERIALS

1.10. GENERAL

1.10.1. All paint shall be the product of a recognized manufacturer exclusively engaged in the manufacture of painting material. All paints for wood and metal surfaces shall be well-ground and shall not skin, liver, curdle, or body excessively in the containers. It shall be readily stirred with a paddle to a smooth uniform paint.

1.10.2. The paint shall be suitable for brushing at package consistency. It shall brush out evenly and shall not show laps or unevenness of color or texture. When applied to vertical surfaces, it shall not sag.

1.10.3. All exposed surfaces, including sides and edges, shall be painted. Hangers, brackets, fastenings, and other miscellaneous items shall be painted with the same system as the adjacent material. Paint systems shall be in addition to shop primers.

1.10.4. Paint shall be stored inside. No adulterant, unauthorized thinner, or other material not included in the paint formation shall be added to the paint for any purpose.

1.10.5. Paint used in successive field coats shall be produced by the same manufacturer. Paint used in the first field coat over shop painted or previously painted surfaces shall cause no wrinkling, lifting, or other damage to underlying paint. Any paint system shall be the product of a single manufacturer.

1.10.6. All paint used for intermediate and finish coats shall be guaranteed by the paint manufacturer to be lead-free, and fume proof. Where painting materials are referenced to Federal or Military Specifications, the reference shall define general type and quality required but is not intended to limit acceptable materials to an exact formulation.

1.10.7. For each paint, the Contractor shall follow the paint manufacturer's specific application instructions. Upon the Engineer's request, the Contractor shall furnish the following application instructions:

- a. Surface preparation recommendations.
- b. Type of primer to be used.
- c. Maximum dry and wet mil thickness per coat.
- d. Minimum and maximum curing times between coats.
- e. Thinner to be used with each paint.
- f. Ventilation requirements.
- g. Atmospheric conditions during which the paint shall not be applied.
- h. Allowable methods of application.
- i. Maximum allowable moisture content and minimum age of plaster, concrete and wood surfaces at the time of paint application.
- j. Curing time before submergence in water.

1.10.8. The minimum number of coats and minimum total dry mil thickness of the system for each surface shall be as specified in the paint schedule.

1.11. PAINTING SCHEDULE

A schedule is appended to this section listing the surface preparation, primer, finish and dry mil thickness to be used on each surface to be coated.

1.12. PRIMERS AND PRETREATMENT

1.12.1. P-1 Epoxy Primer - Minimum dry thickness 1.5 mils. Koppers 654 "Epoxy Primer", or Tnemec 66-1211 "Hi-Build Epoxoline".

1.12.2. P-2 Rust Inhibitive - Minimum dry thickness 2 mils. Koppers 622 "Rust-Penetrating" or Tnemec 77 "Chem-Prime".

1.12.3. P-3 Galvanized Metal Wash Primer - Minimum dry thickness 0.5 mils (mil-P-153B). Koppers 40 "Passivator or Tnemec 32-1210 "Vinoline".

1.13. INTERMEDIATE AND FINISH PAINTS

1.13.1. F-1 Epoxy Resin - Minimum dry thickness 6 mils. Koppers 200 "HB Epoxy", or Tnemec66 "Hi-build epoxy.

1.13.2. F-2 Gloss Alkyd Enamel - Minimum dry thickness 1.5 mils (Fed Spec TT-E-489). Koppers "Glamortex 501" enamel or Tnemec "Tnemegloss" enamel.

1.13.3. F-3 Semigloss Alkyd Enamel - Minimum dry thickness 2.1 mils (Fed Spec TT-E-529). Koppers "Glamortex Semi-gloss" or Tnemec 23 "Enderatone".

1.13.4. F-4 coal Tar - Minimum dry thickness 15 mils. Koppers "Bitumastic Super Service Black" or Tnemec 449 "Heavy Duty Black".

1.13.5. F-5 Polyurethane - Minimum dry thickness 2 mils. Tnemec 70 "Endurashield".

1.14. ALUMINUM SURFACES

All aluminum in contact with steel or concrete shall be painted in accordance with the ASCE "Specifications for Structures of Aluminum Alloy 6061-T6, Second Progress Report of the Committee of the Structural Division of Design in Lightweight Structural Alloys".

1.15. SURFACES NOT TO BE PAINTED

Except as otherwise required or directed, the following surfaces are to be left unpainted:

1.15.1. Exposed surfaces of aluminum.

1.15.2. Polished or finished stainless steel. Unfinished stainless steel shall be painted.

1.15.3. Nickel or chromium.

1.15.4. Galvanized surfaces, except piping, conduit, exposed pre-cast concrete wall panel anchors, and ductwork.

1.15.5. Piping concealed in plumbing chases and above suspended ceilings.

1.15.6. Rubber and plastics, including fiberglass reinforced plastics.

PART 3 - PERFORMANCE

1.16. SURFACE PREPARATION

1.16.1. The Contractor shall prepare the surfaces to be coated as specified under the paint schedule. Any surfaces to be coated which are not listed under the paint schedule shall be prepared in accordance with the manufacturer's instructions for the material to be applied.

1.16.2. All grease, oil, dirt, and other contaminants which may affect the bond between the coating and the surface shall be removed by a cleaning agent which will leave the surface clean and dry.

1.16.3. Cleaning and painting operations shall be performed in a manner which will prevent dust or other contaminants from getting on freshly painted surfaces.

1.16.4. Surfaces shall be free of cracks, pits, projections, or other imperfections which would prevent the formation of a smooth, unbroken paint film, except for concrete block construction where a rough surface is an inherent characteristic.

1.16.5. When applying touch-up paint, or repairing previously painted surfaces, the surfaces to be painted shall be cleaned and sanded or wire brushed in such a manner that the edges of adjacent paint are feathered or otherwise smoothed so that they will not be noticeable when painted. All paint made brittle or otherwise damaged by heat or welding shall be completely removed.

1.16.6. Hardware items such as bolts, screws, washers, springs, and grease fittings need not be cleaned prior to painting if there is no evidence of dirt, corrosion, or foreign material.

1.16.7. All galvanized surfaces shall have a metal conditioner applied prior to the first prime coat.

1.16.8. All surfaces to be finished shall be clean and dry before any materials are applied. Use a moisture meter to determine moisture content as follows. The moisture content shall be less than 18 percent for wood; 8 percent for stucco, concrete or plaster.

1.16.9. Metal Surfaces

- a. Where noted, the surface preparation for steel and other metals refer to the specifications for surface preparation by the latest revision of the Steel Structures Painting Council. All metal work shall be cleaned of grease, oil and dirt by solvent cleaning (SSPC-SP-1).
- b. Method S-1 - Surface shall be wire brushed where required to remove loose rust and dirt, etc. (SSPC-SP2)

1.16.10. Galvanized Surfaces

- a. Method G-1 - All galvanized surfaces shall be prepared for painting in strict conformity with the instructions of the manufacturer of the vinyl wash primer. Any subsequent primer required by the coating manufacturer for the finish coating shall then be applied. Any chemical treatment of galvanized surfaces shall be followed by thorough rinsing with clear water.

1.16.11. PVC Pipe

- a. Method V-1 - All wax and oil shall be removed from PVC plastic surfaces by wiping with a solvent of the type used for the specified primer.

1.17. PAINT APPLICATION

1.17.1. Apply all finish evenly, free from sags, runs, crawls, brush marks, skips or other defects. Apply products at the proper consistency and do not thin or otherwise alter them except in accordance with the manufacturer's printed directions. All coats shall be applied in such manner as to produce an even film of uniform thickness completely coating all corners and crevices. All painting shall be done by thoroughly experienced workmen. Care shall be exercised during spraying to hold the nozzle sufficiently close to the surfaces being painted to avoid excessive evaporation of the volatile constituents and loss of material into the air, or the bridging over of crevices and corners. Spray equipment shall be equipped with mechanical agitators, pressure gauges, and pressure regulators. Nozzles shall be of proper size. Floors, roofs, and other adjacent areas and installations shall be satisfactorily protected by drop cloths or other precautionary measures. All over-spray shall be removed by approved methods or the affected

surface repainted. Care shall be exercised to avoid lapping of paint on hardware of other unscheduled surfaces.

1.17.2. Each coat of material shall be thoroughly dry before the application of a succeeding coat. In no case shall paint be applied at a rate of coverage per gallon which is greater than the maximum rate recommended by the manufacturer. Paint films showing sags, checks, blisters, teardrops, or rat edges will not be accepted. Paint containing any of these defects shall be entirely removed and the surface repainted.

1.17.3. Sandpaper enamels and varnishes lightly between coats and dust thoroughly before the application of a succeeding coat.

1.17.4. If the finish coat is to be colored, the prime coat and the intermediate coat shall be tinted to have a slight variation in color from each other and from the finish coat.

1.17.5. Finish tops, bottoms, and edges of doors after they are fitted.

1.18. PRIMING

1.18.1. Edges, corners, crevices, welds, and bolts shall be given a brush coat of primer before the specified spot or touch-up painting of metal surfaces. Special attention shall be given to filling all crevices with paint.

1.18.2. Abraded and otherwise damaged portions of shop applied paint shall be repainted. Welded seams and other uncoated surfaces, heads and nuts of field installed bolts, and surfaces where paint has been damaged by heat, shall be given a coat of the specified primer. This patch, spot, or touch-up painting shall be completed, and shall be dry and hard, before additional paint is applied.

1.18.3. Prime and back-prime all wood and millwork.

1.19. LATEX PAINT

Latex paint shall be applied by brushing or rolling; spraying is not permitted. Latex paint shall not be thinned excessively.

1.20. MIXING AND THINNING

1.20.1. Paint shall be thoroughly mixed each time any is withdrawn from the container. Paint containers shall be kept tightly closed except while paint is being withdrawn.

1.20.2. Unless otherwise authorized, all paint shall be factory mixed to proper consistency and viscosity for hot weather application without thinning. Thinning will be permitted only as necessary to obtain a recommended coverage at lower application temperatures. In no case shall the wet film thickness of applied paint be reduced, by addition of paint thinner or otherwise, below that represented by the recommended coverage rate.

1.21. FERROUS METAL FILM THICKNESS

It is intended that the dry film thickness and the continuity of submerged painted ferrous metal surfaces be subject to continual field check by the Engineer. Dry film thickness shall be measured by a General Electric thickness Gauge. Continuity shall be tested by a low voltage-west sponge, transistorized device as manufactured by the K-D Company, Palo Alto, California. Contractor shall perform continuity tests as required by the Engineer.



1.22. ATMOSPHERIC CONDITIONS

Apply all material to dry and properly prepared surfaces when weather conditions are favorable for painting. No materials shall be applied when the temperature of the materials is below 50 degrees F, or when the temperature of the air, surface to be painted or substrate, is below (or likely to fall below) 50 degrees F. Final ruling on the favorability of weather conditions shall be in accordance with the recommendations of the manufacturer and/or the Engineer.

1.23. REPAIRING DAMAGED PAINT ON EQUIPMENT

Painted surfaces on equipment, which have become damaged prior to acceptance by the Government, shall be repainted with the same or equivalent paint used in the original application.

1.24. PROTECTION OF SURFACES

Throughout the work the contractor shall use drop cloths, masking tapes, and other suitable measures to protect all surfaces from accidental spraying, splattering, or spilling of paint. He shall be liable for and shall correct and repair any damaged condition resulting from his operations or from the operations of all those who are responsible to him during the time his work is in progress and until the work is accepted. In case bituminous paints are spilled or dropped on any material except metals, the spots shall, after surface cleaning, be spot painted with aluminum paint prior to applying the specified paint. Any exposed concrete or masonry not specified to be painted which is damaged by paint shall be either removed and rebuilt or, where so authorized by the Government, painted with two coats of masonry paint.

1.25. CLEAN-UP

All clothes and cotton waste which might constitute a fire hazard shall be placed in metal containers or destroyed at the end of each work day. Upon completion of the work all staging, scaffolding and containers shall be removed from the site or destroyed in a manner approved by the Engineer.

END OF SECTION



DIVISION 31 - EARTHWORK

Section 31 10 00 - Site Clearing

PART 1 - GENERAL

1.1. SECTION INCLUDES

- 1.1.1. Remove surface debris and topsoil excavation
- 1.1.2. Clear site of plant life, trees, shrubs and grass, including the root system of trees and shrubs

1.2. MEASUREMENT AND PAYMENT

- 1.2.1. Site Clearing:
 - a. Basis of Measurement and Payment: Payment for site clearing shall be an incidental cost to the installation of the connections and shall include all work related to clearing site, loading and removing waste materials from site.

1.3. REGULATORY REQUIREMENTS

- 1.3.1. Conform to applicable American Samoa Code for disposal of debris, burning debris on site and use of herbicides.
- 1.3.2. Coordinate clearing Work with utility companies and Engineer .

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

1.4. PREPARATION

- 1.4.1. Prepare site as per construction drawings and provide erosion control per PNRS permit requirements.
- 1.4.2. Locate, identify, and protect utilities that remain, from damage.

1.5. PROTECTION

- 1.5.1. Protect trees, plant growth, and features designated to remain, as final Landscaping
- 1.5.2. Protect bench marks and existing structures from damage or displacement.

1.6. CLEARING

- 1.6.1. Clear areas required for access to site and execution of Work.
- 1.6.2. Remove trees and shrubs, within marked areas and as indicated.
- 1.6.3. Remove Stumps and main root system
- 1.6.4. Clear undergrowth and deadwood, without disturbing subsoil.
- 1.6.5. Remove debris, rock, and extracted plant life from site.

1.7. TOPSOIL EXCAVATION

- 1.7.1. Excavate topsoil from areas to be further excavated, or re-graded.
- 1.7.2. Stockpile in area where directed by engineer and approved by landEngineer to height not exceeding 8 feet and protect from erosion.

END OF SECTION

Section 31 10 10 - Site Cleaning

PART 1 - GENERAL

1.1. GENERAL PROVISIONS

1.1.1. The General Conditions of Construction Contracts and Special Provisions preceding these specifications shall govern this section of the work.

1.2. DESCRIPTION

1.2.1. Work Included:

1.2.2. Throughout the construction period, maintain the buildings and site in a standard of cleanliness as described in this Section.

1.2.3. Related Work Described Elsewhere:

1.2.4. In addition to the standards described in this Section, comply with all requirements for cleaning up as described in various other Sections of these Specifications.

1.3. QUALITY ASSURANCE

1.3.1. Inspection:

1.3.2. Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

1.3.3. Codes and Standards:

1.3.4. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

PART 2 – PRODUCTS

1.4. CLEANING MATERIALS AND EQUIPMENT

1.4.1. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

1.5. COMPATIBILITY

1.5.1. Use only the cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer of the material or as approved by the Engineer.

PART 3 – EXECUTION

1.6. PROGRESS CLEANING

1.6.1. General:

1.6.2. Retain all stored items in an orderly arrangement allowing maximum access, not impeding drainage or traffic, and providing the required protection of materials.

1.6.3. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this Work.

1.6.4. At least twice each month, and more often if necessary, completely remove all scrap, debris, and waste material from the job site.

1.6.5. Provide adequate storage for all items awaiting removal from the job site, observing all requirements for fire protection and protection of the ecology.

1.7. Site:

1.7.1. Daily, and more often if necessary, inspect the site and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

1.7.2. Weekly, and more often if necessary, inspect all arrangements of materials stored on the site.

1.7.3. Maintain the site in a neat and orderly condition at all times.

1.8. Structures:

1.8.1. Weekly, and more often if necessary, inspect the structures and pick up all scrap, debris, and waste material. Remove all such items to the place designated for their storage.

1.8.2. Weekly, and more often if necessary, sweep all interior spaces clean. "Clean", for the purpose of this sub-program, shall be interpreted as meaning free from dust and other material capable of being removed by use of reasonable effort and hand-held broom.

1.8.3. As required preparatory to installation of succeeding materials, clean the structures or pertinent portions thereof to the degree of cleanliness recommended by the manufacturer of the succeeding material, using all equipment and materials required to achieve the required cleanliness.

1.8.4. Following the installation of finished floor materials, clean the finish floor daily (and more often if necessary) at all times while work is being performed in the space in which finish materials have been installed. "Clean", for the purpose of this subparagraph, shall be interpreted as meaning free from all foreign material that, in the opinion of the ENGINEER may be injurious to the finish floor material.

1.9. FINAL CLEANING

1.9.1. Definition:

1.9.2. Except as otherwise specifically provided, "clean" (for the purpose of this Article) shall be interpreted as meaning the level of cleanliness generally provided by skilled cleaning using commercial quality building maintenance equipment and materials.

1.9.3. General:

1.9.4. Prior to completion of the Work, remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste. Conduct final progress cleaning as required.

1.9.5. Site:

1.9.6. Unless otherwise specifically directed by the ENGINEER, broom clean all paved areas on the site and all public paved areas directly adjacent to the site. Completely remove all resultant debris.

1.9.7. Structures:

1.9.8. Exterior: Visually inspect all exterior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. If necessary to achieve a uniform degree of exterior cleanliness, hose down the exterior of the structure. In the event of stubborn stains not removable with water, the ENGINEER may require light sandblasting or other cleaning at no additional cost to the Engineer.



1.9.9. Interior: Visually inspect all interior surfaces and remove all traces of soil, waste material, smudges, and other foreign matter. Remove all traces of splashed materials from adjacent surfaces. Remove all paint dropping, spots, stains, and dirt from finished surfaces. Use only the specified cleaning materials and equipment.

1.9.10. Timing:

1.9.11. Schedule final cleaning as approved by the ENGINEER.

END OF SECTION

Section 31 20 00 - Cutting And Patching

PART 1 - GENERAL

1.1. GENERAL PROVISIONS

1.1.1. The General Conditions of Construction Contracts and Special Provisions preceding these specifications shall govern this section of the work.

1.2. DESCRIPTION

1.2.1. Work Included:

- a. This Section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the Work required to:
- b. Make the several parts fit properly.
- c. Uncover Work to provide for installation, inspection or both of ill-timed Work.
- d. Remove and replace Work not conforming to requirements of the Contract Documents.
- e. Remove and replace defective work.

1.3. QUALITY ASSURANCE

1.3.1. Perform all cutting and patching in strict accordance with pertinent requirements of these Specifications and, in the event no such requirements are determined, in conformance with the ENGINEER's written direction.

1.4. SUBMITTALS

1.4.1. Request for the Engineer's Consent:

1.4.2. Prior to cutting which affects structural safety, submit written request to the ENGINEER for permission to proceed with cutting.

1.4.3. Should conditions of the Work, or Schedule, indicate a required change of materials or methods for cutting and patching, so notify the ENGINEER and secure his written permission prior to processing.

PART 2-PRODUCTS

1.5. MATERIALS

1.5.1. For replacement of Work removed, use materials that comply with the pertinent Sections of these Specifications.

1.6. PAYMENT COSTS

1.6.1. The extent of cutting and patching of below slab/grade is shown on the drawings; the cost for such work shall be included in the lump sum price. Contractor performs all other and patching needed to comply with the Contract Documents at no additional cost to the Engineer .



PART 3-EXECUTION

1.7. CONDITIONS

1.7.1. Inspection

- a. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, backfilling, and patching.
- b. After uncovering the Work, inspect conditions affecting installation of new Work.

1.7.2. Discrepancies:

- a. If uncovered conditions are not as anticipated, immediately notify the ENGINEER and secure needed directions.
- b. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

1.8. PREPARATION PRIOR TO CUTTING

1.8.1. Provide all required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work

1.9. PERFORMANCE

1.9.1. Perform all required excavation and backfilling as required under pertinent Sections of these Specifications. Perform cutting and demolition by methods that will prevent damage to other portions of the Work and will provide proper surfaces to receive installation of repair and new work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerances and finishes.

END OF SECTION

Section 31 23 00 - Excavation And Fill

PART 1 GENERAL

1.1. SUMMARY

1.1.1. Description: This Section describes the requirements for excavating and backfilling trench for utilities.

1.2. REFERENCES

1.2.1. AMERICAN WATER WORKS ASSOCIATION (AWWA)

- a. AWWA C600(2005) Installation of Ductile-Iron Water Mains and Their Appurtenances

1.2.2. ASTM INTERNATIONAL (ASTM)

- a. ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Course Aggregates
- b. ASTM D 1140(2000; R 2006) Amount of Material in Soils Finer than the No. 200 (75-micrometer) Sieve
- c. ASTM D 1556(2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method
- d. ASTM D 1557 (2007) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³) (2700 kNm/m³)
- e. ASTM D 2321 (2005) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- f. ASTM D 2487(2006e1) Soils for Engineering Purposes (Unified Soil Classification System)
- g. ASTM D 2922 (2005) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- h. ASTM D 3017 (2005) Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
- i. ASTM D 4318 (2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- j. 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) EM 385-1-1 (2008) Safety and Health Requirements Manual

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

- a. 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

1.3.1. Degree of Compaction

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.

1.3.2. Hard Materials

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

1.3.3. Rock

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

1.4.1. ASPA approval is required for submittals. Submit in accordance with Section 01 30 10 SUBMITTAL PROCEDURES:

- a. Shoring and Sheet Piling Plan
- b. Dewatering work plan
- c. Borrow Site Testing
- d. Fill and backfill test
- e. Density tests
- f. Moisture Content Tests

1.5. DELIVERY, STORAGE, AND HANDLING

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

1.6. QUALITY ASSURANCE

1.6.1. Shoring and Sheet Piling Plan

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.

1.6.2. Dewatering Work Plan

- a. Submit procedures for accomplishing dewatering work. C. Existing Utilities to be located
- b. Locate existing underground utilities within the area of excavation by examination of ASPA records, toning and potholes prior to excavation.
- c. 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

1.7. SOIL MATERIALS

1.7.1. Satisfactory Materials

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.

1.7.2. Unsatisfactory Materials

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.

1.7.3. Cohesionless and Cohesive Materials

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 non-plastic (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.

1.7.4. Common Fill

Approved, unclassified soil material with the characteristics required to compact to the soil density specified for the intended location.

1.7.5. Backfill and Fill Material

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.

1.7.6. Topsoil

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.

1.7.7. PIPE 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.
- b. Plastic piping shall have bedding to spring line of pipe. Provide ASTM D 2321 materials as follows:

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.

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 non-cohesive, either wet or dry. Soil Types GW, GP, SW, and SP are included in this class as specified in ASTM D2487.

1.7.8. PIPE TRENCH SEAL MATERIAL

Type S4C gravel. Grading: Percent passing sieve 1/2"=100, 3/8"=90-100, #16=25-45, #100 5-15.

1.7.9. BORROW

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

PART 3 EXECUTION

1.7.10. PROTECTION

- a. Shoring and Sheeting
- b. 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:
 - Prevent undermining of pavements.
 - Prevent slippage or movement in banks or slopes adjacent to the excavation.
 - 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.

1.7.11. Drainage and Dewatering

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

Dewatering. Groundwater flowing toward or into excavations shall be controlled to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation. 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.

1.7.12. Underground Utilities

Location of the existing utilities indicated is approximate. The Contractor shall physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor shall scan the construction site with electromagnetic and sonic equipment and mark the surface of the ground where existing underground utilities are discovered.

1.7.13. Machinery and Equipment

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

1.7.14. SURFACE PREPARATION

A. Clearing and Grubbing

Unless indicated otherwise, remove trees, stumps, logs, shrubs, brush and vegetation and other items that would interfere with construction operations within the clearing limits. Remove stumps entirely. Grub out matted roots and roots over 2 inches in diameter to at least 18 inches below existing surface.

B. Stripping

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.

1.7.15. EXCAVATION

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 over depth excavation of unsatisfactory material below grades shall be done under the direction of the APE.

1.7.16. Pipe Trenches



1.7.17. 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.

1.7.18. Temporary cover and patching.

Provide temporary cover or patching for open trenches in accordance with construction notes on the plans.

1.7.19. Excavated Materials

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

1.7.20. FILLING AND BACKFILLING

1.7.21. Backfill and Fill Material Placement over Pipes

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 indicate 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.

1.7.22. Trench Backfilling

Backfill as rapidly as construction, testing, and acceptance of work permits. Place and compact backfill in 6 inch lifts to top of trench.

1.7.23. BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, approved borrow materials shall be obtained as specified herein.

1.7.24. COMPACTION

Determine in-place density of existing subgrade; if required density exists, no herein are for cohesion less materials. When cohesive materials are encountered or used, density requirements may be reduced by 5 percent.

1. General Site. 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. 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.

1.7.25. FINISH OPERATIONS

A. Grading

Finish grades as indicated within one-tenth of one foot. Grade areas to drain water away from structures. Maintain areas free of trash and debris. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

B. Protection of Surfaces

Protect newly backfilled, graded, and tops oiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

1.7.26. DISPOSITION OF SURPLUS MATERIAL

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.

1.7.27. 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 applicable.

3. Density Tests

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



DIVISION 32 – EXTERIOR IMPROVEMENT

Section 32 11 23 - Aggregate Base Course

PART 1 GENERAL

1.1 SUMMARY

A. Description: This Section includes the furnishing and placing of aggregate base course for restoration to its original condition as a result of water pipes trenching.

1.2 REFERENCES

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO T 180 (2009) Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and an 457-mm (18-in) Drop

2. AASHTO T 224 (2001; R 2004) Correction for Coarse Particles in the Soil Compaction Test

B. ASTM INTERNATIONAL (ASTM)

1. ASTM C 117 (2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing

2. ASTM C 127 (2007) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregates

3. ASTM C 128 (2007a) Standard test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregates

4. ASTM C 131 (2006) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

5. ASTM C 136 (2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

6. ASTM C 29/C 29M (2007) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

7. ASTM D 1556 (2007) Density and Unit Weight of Soil in Place by the Sand-Cone Method

8. 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)



9. ASTM D 2167 (2008) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
10. ASTM D 4318(2005) Liquid Limit, Plastic Limit, and Plasticity Index of Soils
11. ASTM D 6938 (2007a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
12. ASTM D 75/D 75M (2009) Standard Practice for Sampling Aggregates
13. ASTM E 11 (2009) Wire Cloth and Sieves for Testing Purposes

1.3 DEFINITION

A. Degree of compaction required is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D 1557 abbreviated as a percent of laboratory maximum dry density. One exception is as follows: Since ASTM D 1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve will be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.4 SYSTEM DESCRIPTION

A. All plant, equipment, and tools used in the performance of the work will be subject to approval before the work is started and shall be maintained in satisfactory working condition at all times. Provide equipment which is adequate and has the capability of producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 SUBMITTALS

A. ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 – SUBMITTAL PROCEDURES:

1. Product Data

- a. List of proposed equipment to be used in performance of construction work, including descriptive data.
- b. Copies of waybills and delivery tickets during the progress of the work.

2. Test Reports

- a. Sampling and Testing

b. Field Density Tests

- c. Certified copies of test results for approval not less than 30 days before material is required for the work.
- d. Calibration curves and related test results prior to using the device or equipment being calibrated.
- e. Copies of field test results within 24 hours after the tests are performed.

1.6 QUALITY ASSURANCE

A. Sampling and testing are the responsibility of the Contractor, to be performed by an approved testing. Perform tests at the specified frequency. No work requiring testing will be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements.

1. Sampling

- a. Take samples for laboratory testing in conformance with ASTM D 75/D 75M. When deemed necessary, the sampling will be observed by the APE.

2. Tests

a. Sieve Analysis

- 1) Make sieve analysis in conformance with ASTM C 117 and ASTM C 136. Complete particle-size analysis of the soils in conformance with ASTM D 422. Sieves shall conform to ASTM E 11.

b. Liquid Limit and Plasticity Index

- 1) Determine liquid limit and plasticity index in accordance with ASTM D4318.

c. Moisture-Density Determinations

- 1) Determine the laboratory maximum dry density and optimum moisture in accordance with ASTM D 1557.

d. Field Density Tests

- 1) Measure field density in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 6938. For the method presented in ASTM D 1556, use the base plate, as shown in the drawing. For the method presented in ASTM D 6938, check and adjust the calibration curves, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication.



Tests performed in accordance with ASTM D 6938 result in a wet unit weight of soil and ASTM D 6938 will be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall also be checked along with density calibration checks as described in ASTM D6938. The calibration checks of both the density and moisture gauges shall be made by the prepared containers of material method, as described in paragraph Calibration, in ASTM D 6938, on each different type of material to be tested at the beginning of a job and at intervals as directed.

e. Wear Test

- 1) Perform wear tests in conformance with ASTM C 131.

f. Weight of Slag

- 1) Determine weight per cubic foot of slag in accordance with ASTM C29/C 29M.

3. Testing Frequency

a. Initial Tests

- 1) Perform one of each of the following tests on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation.

- a) Sieve Analysis including 0.02 mm size material
- b) Liquid limit and plasticity index
- c) Moisture-density relationship
- d) Wear
- e) Weight per cubic foot of Slag

b. In-Place Tests

- 1) Perform one of each of the following tests on samples taken from the placed and compacted rigid pavement, and asphalt concrete pavement base course. Samples shall be taken and tested at the rates indicated.

- a) Perform density tests on every lift of material placed and at a frequency of one set of tests for every 500 square yards, or portion thereof, of completed area.

- b) Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

- c) Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

- d) Measure the thickness of each course at intervals providing at least one measurement for each 500 square yards or part thereof. The thickness measurement shall be made by test holes, at least 3 inches in diameter through the course.

4. Approval of Material

a. Select the source of materials 30 days prior to the time the material will be required in the work. Tentative approval will be based on initial test results. Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and compacted course.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Perform construction when the atmospheric temperature is above 86 degrees F. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 AGGREGATES

A. Aggregate Base Course for Asphalt Paving.

1. Provide aggregate base course consisting of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, angular sand, or other approved material. Aggregate base course shall be free of lumps of clay, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine aggregate.

1.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. When the coarse aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements and shall be stockpiled separately.

a. Crushed Gravel: Crushed gravel shall be manufactured by crushing gravels, and shall meet all the requirements specified below.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

c. Crushed Slag: Crushed slag shall be an air-cooled blast-furnace product having an air dry unit weight of not less than 1120 kg/cubic meter 70 pcf as determined by ASTM C 29/C 29M, and shall meet all the requirements specified below.

1) Aggregate Base Course

Aggregate base course shall not show more than 50 percent loss when subjected to the Los Angeles abrasion test in accordance with ASTM C 131. The amount of flat and elongated particles shall thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D 5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Crushed gravel shall be manufactured from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in Table 1.

1.2 Fine Aggregate

Fine aggregates shall be angular particles of uniform density. When the fine aggregate is supplied from more than one source, aggregate from each source shall meet the specified requirements.

a. Aggregate Base Course

Aggregate base course fine aggregate shall consist of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

1.3 Gradation Requirements

Apply the specified gradation requirements to the completed base course. The aggregates shall be continuously well graded within the limits specified in Table 1. Sieves shall conform to ASTM E 11.

TABLE 1 GRADATION OF AGGREGATES
Percentage by Weight Passing Square-Mesh Sieve

Sieve Designation	No. 1	No. 2	No. 3
50 mm 2 inch	100	---	---
37.5 mm 1-1/2 inch	70-100	100	---
25.0 mm 1 inch	45-80	60-700	100
12.5 mm 1/2 inch	30-6	30-65	40-70
4.75 mm No. 4	20-50	20-50	20-50
2.0 mm No. 10	15-40	15-40	15-40
0.425 mm No. 40	5-25	5-25	5-25
0.075 mm No. 200	0-8	0-8	0-8



Note 1: The values are based on aggregates of uniform specific gravity. If materials from different sources are used for the coarse and fine aggregates, they shall be tested in accordance with ASTM C 127 and ASTM C 128 to determine their specific gravities. If the specific gravities vary by more than 10 percent, the percentages passing the various sieves shall be corrected as directed by the APE.

Liquid Limit and Plasticity Index

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve shall be either non- plastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

PART 3 EXECUTION

3.1 OPERATION OF AGGREGATE SOURCES

Clearing, stripping and excavating are the responsibility of the Contractor. Operate the aggregate sources to produce the quantity and quality of materials meeting the specified requirements in the specified time limit. Aggregate sources on private lands shall be conditioned in agreement with local laws and authorities.

3.2 STOCKPILING MATERIAL

Prior to stockpiling of material, clear and level storage sites. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Aggregates shall be stockpiled on the cleared and leveled areas designated by the APE to prevent segregation. Materials obtained from different sources shall be stockpiled separately.

3.3 PREPARATION OF UNDERLYING MATERIAL

Prior to constructing the base courses, clean the underlying course or subgrade of all foreign substances. The surface of the underlying course or subgrade shall meet specified compaction and surface tolerances. Correct ruts, or soft yielding spots, in the underlying courses, subgrade areas having inadequate compaction, and deviations of the surface from the specified requirements, by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and re-compacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D 2487, the surface shall be stabilized prior to placement of the overlying course. Accomplish stabilization by mixing the overlying course material into the underlying course, and compacting by approved methods. The finished underlying course shall not be disturbed by traffic or other operations and shall be maintained in a satisfactory condition until the overlying course is placed.

3.4 GRADE CONTROL

The finished and completed course shall conform to the lines, grades, and cross sections shown. The lines, grades, and cross sections shown shall be maintained by means of line and grade stakes placed by the Contractor at the work site.

3.5 MIXING AND PLACING MATERIALS

Mix and place the materials to obtain uniformity of the material at the water content specified. Make such adjustments in mixing or placing procedures or in equipment as may be directed to obtain the true grades, to minimize segregation and degradation, to reduce or accelerate loss or increase of water, and to insure a satisfactory aggregate base courses.

3.6 LAYER THICKNESS

The compacted thickness of the completed course shall be as indicated. When a compacted layer of 6 inches is specified, the material may be placed in a single layer; when a compacted thickness of more than 6 inches is required, no layer shall be thicker than 6 inches nor be thinner than 3 inches when compacted.

3.7 COMPACTION

Compact each layer of the material, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of optimum water content, as determined from laboratory tests, as specified in this section. In all places not accessible to the rollers, compact the mixture with hand- operated power tampers. Compaction of the base courses shall continue until each layer is compacted through the full depth to at least 95 percent of laboratory maximum density. Make such adjustments in compacting or finishing procedures as may be directed to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory sub-base course. Any materials that are found to be unsatisfactory shall be removed and replaced with satisfactory material or reworked, as directed, to meet the requirements of this specification.

3.8 SMOOTHNESS TEST

The surface of the top layer shall show no deviations in excess of 3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Measurements shall also be taken perpendicular to the centerline at 50 foot intervals. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.9 THICKNESS CONTROL

The completed thickness of the course(s) shall be in accordance with the thickness and grade indicated on the drawings. The completed course shall not be more than 1/2 inch deficient in



thickness nor more than 1/2 inch above or below the established grade. Where any of these tolerances are exceeded, correct such areas by scarifying, adding new material of proper gradation or removing material, and compacting, as directed. Where the measured thickness is 1/2 inch or more thicker than shown, the course will be considered as conforming with the specified thickness requirements plus 1/2 inch. The average job thickness shall be the average of the job measurements as specified above but within 1/4 inch of the thickness shown.

3.10 MAINTENANCE

Maintain the completed course in a satisfactory condition until accepted.

END OF SECTION

Section 32 12 13.16 - Asphaltic Tack Coats

PART 1 GENERAL

1.1 SUMMARY

Description: This Section includes the furnishing and application of asphaltic tack coats as shown on the drawings and as specified herein.

1.2 REFERENCES

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 82 (1975; R 2008) Standard Specification for Cut- Back Asphalt (Medium-Curing Type)
2. AASHTO T 102 (2009) Spot Test of Asphaltic Materials
3. AASHTO T 40 (2002; R 2006) Sampling Bituminous Materials

B. ASTM INTERNATIONAL (ASTM)

1. ASTM D 140/D 140M (2009) Sampling Bituminous Materials
2. ASTM D 2027 (2010) Cutback Asphalt (Medium-Curing Type)
3. ASTM D 2995 (1999; R 2009) Determining Application Rate of Bituminous Distributors
4. ASTM D 977 (2005) Emulsified Asphalt

1.3 SYSTEM DESCRIPTION

A. General Requirements

1. Plant, equipment, machines and tools used in the work are subject to approval and shall be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, should have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

B. Bituminous Distributor



1. Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 650 psi of tire width to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. Design and equip the distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume- measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process.

C. Heating Equipment for Storage Tanks

1. The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. Fix an armored thermometer to the tank with a temperature range from 40 to 400 degrees F so that the temperature of the bituminous material may be determined at all times.

D. Power Brooms and Power Blowers

1. Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 SUBMITTALS

A. ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 SUBMITTAL PROCEDURES:

1. Product Data

- a. Waybills and delivery tickets, during progress of the work.
- b. Documentation indicating distance between manufacturing facility and the project site.

2. Test Reports

a. Sampling and Testing

1) Copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating temperature



viscosity relationship for cutback asphalt, compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.6 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. Apply bituminous coat only when the atmospheric temperature in the shade is 77 degrees F or above and when the temperature has not been below 59 degrees F for the 12 hours prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 TACK COAT

Provide asphalt conforming to ASTM D 2027 or AASHTO M82 Grade MC-70.

1. Cutback Asphalt

a. Provide cutback asphalt conforming to ASTM D 2027, Grade MC-70.

2. Emulsified Asphalt

a. Provide emulsified asphalt conforming to ASTM D 977, Type SS1h. Dilute the emulsified asphalt with equal parts of water. The base asphalt used to manufacture the emulsion shall show a negative spot when tested in accordance with AASHTO T 102 using standard naphtha.

PART 3 EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

A. The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the APE.

1. Tack Coat

a. Apply bituminous material for the tack coat in quantities of not less than 0.05 gallon nor more than 0.15 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE

A. Viscosity Relationship

1. Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the APE.

3.4 APPLICATION

A. General

1. Following preparation and subsequent inspection of the surface, apply the bituminous tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the ASPA. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are 3.4.1a part of the equipment are permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

B. Tack Coat

1. Apply tack coat at the locations shown on the drawings. Apply the tack coat when the surface to be treated is dry. Immediately following the preparation of the surface for treatment, apply the bituminous material by means of the bituminous distributor, within the limits of temperature at a rate of not less than 0.05 gallon nor more than 0.15 gallon of diluted emulsion per square yard. Apply the bituminous material so that uniform distribution is obtained over the entire surface to be treated. Treat lightly coated areas and spots missed by the distributor with the bituminous material. Following the application of bituminous material, allow the surface to cure without being disturbed for period of time necessary to permit setting of the tack coat. Apply the bituminous tack coat only as far in advance of the placing of the overlying layer as required for



that day's operation. Maintain and protect the treated surface from damage until the succeeding course of pavement is placed.

3.5 CURING PERIOD

A. Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas.

3.6 SAMPLING AND TESTING

A. Perform sampling and testing by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

1. Sampling

a. The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140/D 140M or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the APE within 15 days after the award of the contract.

2. Calibration Test

a. Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with ASTM D 2995.

3.7 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

END OF SECTION

Section 32 12 13.23 - Asphaltic Prime Coats

PART 1 GENERAL

1.1 SUMMARY

Description: This Section includes the furnishing and application of asphaltic prime coat to prepared base course as indicated on the drawings and as specified herein.

1.2 REFERENCES

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 82 (1975; R 2008) Standard Specification for Cut- Back Asphalt (Medium-Curing Type)
2. AASHTO T 40 (2002; R 2006) Sampling Bituminous Materials

B. ASTM INTERNATIONAL (ASTM)

1. ASTM D 140/D 140M (2009) Sampling Bituminous Materials
2. ASTM D 2027 (2010) Cutback Asphalt (Medium-Curing Type)
3. ASTM D 2995 (1999; R 2009) Determining Application Rate of Bituminous Distributors
4. ASTM D 977 (2005) Emulsified Asphalt

1.3 SYSTEM DESCRIPTION

A. General Requirements

1. Plant, equipment, machines and tools used in the work are subject to approval and shall be maintained in a satisfactory working condition at all times. Calibrated equipment such as asphalt distributors, scales, batching equipment, spreaders and similar equipment, should have been recalibrated by a calibration laboratory within 12 months prior to commencing work.

B. Bituminous Distributor

1. Provide a distributor with pneumatic tires of such size and number that the load produced on the base surface does not exceed 650 psi of tire width to prevent rutting, shoving or otherwise damaging the base surface or other layers in the pavement structure. Design and equip the

distributor to spray the bituminous material in a uniform coverage at the specified temperature, at readily determined and controlled rates from 0.05 to 2.0 gallons per square yard, with a pressure range of 25 to 75 psi and with an allowable variation from the specified rate of not more than plus or minus 5 percent, and at variable widths. Include with the distributor equipment a separate power unit for the bitumen pump, full-circulation spray bars, tachometer, pressure gauges, volume-measuring devices, adequate heaters for heating of materials to the proper application temperature, a thermometer for reading the temperature of tank contents, and a hand hose attachment suitable for applying bituminous material manually to areas inaccessible to the distributor. Equip the distributor to circulate and agitate the bituminous material during the heating process.

C. Heating Equipment for Storage Tanks

1. The equipment for heating the bituminous material shall be steam, electric, or hot oil heaters. Provide steam heaters consisting of steam coils and equipment for producing steam, so designed that the steam cannot get into the material. Fix an armored thermometer to the tank with a temperature range from 40 to 400 degrees F so that the temperature of the bituminous material may be determined at all times.

D. Power Brooms and Power Blowers

1. Use power brooms and power blowers suitable for cleaning the surfaces to which the bituminous coat is to be applied.

1.4 SUBMITTALS

A. ASPA is required for submittals. Submit the following in accordance with Section 01 30 00 SUBMITTAL PROCEDURES:

Product Data

Waybills and delivery tickets, during progress of the work.

Test Reports

Sampling and Testing

Copies of all test results for emulsified asphalt, and bituminous materials, within 24 hours of completion of tests. Certified copies of the manufacturer's test reports indicating temperature viscosity relationship for cutback asphalt, compliance with applicable specified requirements, not less than 30 days before the material is required in the work.

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect the materials delivered to the site for contamination and damage. Unload and store the materials with a minimum of handling.

1.6 ENVIRONMENTAL REQUIREMENTS

Apply bituminous coat only when the surface to receive the bituminous coat is dry. Apply bituminous coat only when the atmospheric temperature in the shade is 77 degrees F or above and when the temperature has not been below 59 degrees F for the 12 hours prior to application, unless otherwise directed.

PART 2 PRODUCTS

2.1 PRIME COAT

A. Provide asphalt conforming to AASHTO M 82, Grade MC-70 and specified in the following two subparagraphs.

1. Cutback Asphalt

a. Provide cutback asphalt conforming to ASTM D 2027, Grade MC-70.

2. Emulsified Asphalt

a. Provide emulsified asphalt conforming to ASTM D 977, Type SS1h.

PART 3 – EXECUTION

3.1 PREPARATION OF SURFACE

Immediately before applying the bituminous coat, remove all loose material, dirt, clay, or other objectionable material from the surface to be treated by means of a power broom or blower supplemented with hand brooms. The surface shall be dry and clean at the time of treatment.

3.2 APPLICATION RATE

A. The exact quantities within the range specified, which may be varied to suit field conditions, will be determined by the APE.

1. Prime Coat

a. Apply bituminous material for the prime coat in quantities of not less than 0.15 gallon nor more than 0.40 gallon per square yard of pavement surface.

3.3 APPLICATION TEMPERATURE



A. Viscosity Relationship

1. Asphalt application temperature shall provide an application viscosity between 10 and 60 seconds, Saybolt Furol, or between 20 and 120 centistokes, kinematic. Furnish the temperature viscosity relation to the APE.

3.4 APPLICATION

A. General

1. Following preparation and subsequent inspection of the surface, apply the bituminous prime tack coat with the Bituminous Distributor at the specified rate with uniform distribution over the surface to be treated. Properly treat all areas and spots missed by the distributor with the hand spray. Until the succeeding layer of pavement is placed, maintain the surface by protecting the surface against damage and by repairing deficient areas at no additional cost to the ASPA. If required, spread clean dry sand to effectively blot up any excess bituminous material. No smoking, fires, or flames other than those from the heaters that are a part of the equipment are permitted within 25 feet of heating, distributing, and transferring operations of bituminous material other than bituminous emulsions. Prevent all traffic, except for paving equipment used in constructing the surfacing, from using the underlying material, whether primed or not, until the surfacing is completed. The bituminous coat shall conform to all requirements as described herein.

B. Prime Coat

1. Apply prime coat on the prepared aggregate base course. The prime coat is required if it will be at least 7 days before the surfacing (Asphalt cement hot mix concrete) layer is constructed on the underlying (base course) compacted material. The type of liquid asphalt and application rate will be as specified herein. Protect the underlying from any damage (water, traffic, etc.) until the surfacing is placed. If the Contractor places the surfacing within seven days, the choice of protection measures or actions to be taken is at the Contractor's option. Repair (re-compact or replace) damage to the underlying material caused by lack of, or inadequate, protection by approved methods at no additional cost to the ASPA. If the Contractor opts to use the prime coat, apply as soon as possible after consolidation of the underlying material. Apply the bituminous material uniformly over the surface to be treated at a pressure range of 25 to 75 psi and at the rate of not less than 0.20 gallon not more than 0.30 gallon per square yard. To obtain uniform application of the prime coat on the surface treated at the junction of previous and subsequent applications, spread building paper on the surface for a sufficient distance back from the ends of each application to start and stop the prime coat on the paper and to ensure that all sprayers will operate at full force on the surface to be treated. Immediately after application remove and destroy the building paper.

3.5 CURING PERIOD



Following application of the bituminous material and prior to application of the succeeding layer of pavement, allow the bituminous coat to cure and to obtain evaporation of any volatiles or moisture. Maintain the coated surface until the succeeding layer of pavement is placed, by protecting the surface against damage and by repairing and recoating deficient areas. Allow the prime coat to cure without being disturbed for a period of at least 48 hours or longer, as may be necessary to attain penetration into the treated course. Furnish and spread enough sand to effectively blot up and cure excess bituminous material.

3.6 SAMPLING AND TESTING

A. Perform sampling and testing by an approved commercial testing laboratory or by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved.

1. Sampling

a. The samples of bituminous material, unless otherwise specified, shall be in accordance with ASTM D 140/D 140M or AASHTO T 40. Sources from which bituminous materials are to be obtained shall be selected and notification furnished the APE within 15 days after the award of the contract.

2. Calibration Test

a. Furnish all equipment, materials, and labor necessary to calibrate the bituminous distributor. Calibration shall be made with the approved job material and prior to applying the bituminous coat material to the prepared surface. Calibrate the bituminous distributor in accordance with ASTM D 2995.

3.7 TRAFFIC CONTROLS

Keep traffic off surfaces freshly treated with bituminous material. Provide sufficient warning signs and barricades so that traffic will not travel over freshly treated surfaces.

END OF SECTION

Section 32 12 16 - Asphalt Paving

PART 1 GENERAL

1.1 SUMMARY

Description: This Section includes the furnishing and reconstructing of the existing asphalt road pavement for restoration to its original condition as a result of sewer utilities trenching.

1.2 REFERENCES

A. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO MP 1a (2004) Performance Graded Asphalt Binder

B. ASPHALT INSTITUTE (AI)

1. AI MS-02 (6th Edition; 1997) Mix Design Methods for Asphalt

C. ASTM INTERNATIONAL (ASTM)

1. ASTM C 117 (2004) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
2. ASTM C 127 (2007) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
3. ASTM C 128 (2007a) Standard Test Method for Density, relative Density (Specific Gravity), and Absorption of Fine Aggregate
4. ASTM C 131 (2006) Standard Test Method for Resistance to Degradation of Small-Size Course Aggregate by Abrasion and Impact in the Los Angeles Machine
5. ASTM C 136(2006) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
6. ASTM C 188 (1995; R 2003) Standard Test Method for Density of Hydraulic Cement
7. ASTM C 29/C 29M (2007) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
8. ASTM C 88 (2005) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate



9. ASTM D 1073 (2007) Fine Aggregate for Bituminous Paving Mixtures
10. ASTM D 1188 (2007) Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin- Coated Specimens
11. ASTM D 1559 (1989) Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
12. ASTM D 2041 (2003a) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
13. ASTM D 2172 (2005) Quantitative Extraction of Bitumen from Bituminous Paving Mixtures
14. ASTM D 242/D 242M (2009) Mineral Filler for Bituminous Paving Mixtures
15. ASTM D 2726 (2009) Bulk Specific Gravity and Density of Non- Absorptive Compacted Bituminous Mixtures
16. ASTM D 4867/D 4867M (2009) Effect of Moisture on Asphalt Concrete Paving Mixtures
17. ASTM D 546 (2005) Sieve Analysis of Mineral Filler for Bituminous Paving Mixtures
18. ASTM D 692/D 692M (2009) Coarse Aggregate for Bituminous Paving Mixtures
19. ASTM D 70 (2009e1) Specific Gravity and Density of Semi- Solid Bituminous Materials (Pycnometer Method)
20. ASTM D 75/D 75M (2009) Standard Practice for Sampling Aggregates
21. ASTM D 854 (2006e1) Specific Gravity of Soil Solids by Water Pycnometer
22. ASTM D 979 (2001; R 2006e1) Sampling Bituminous Paving Mixtures
23. ASTM D 995 (1995b; R 2002) Mixing Plants for Hot-Mixed, Hot- Laid Bituminous Paving Mixtures

1.3 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 SUBMITTAL PROCEDURES:

Design Data

Job-mix formula

Submit a job-mix formula, prepared specifically for this project, for approval by the ASPA prior to preparing and placing the bituminous mixture. Design mix using procedures contained in Chapter V, Marshall Method of Mix Design, of AI MS-02. Formulas shall indicate physical properties of the mixes as shown by tests made by a commercial laboratory approved by the APE, using materials identical to the materials used in the existing asphalt concrete pavement to be provided on this project. Submit formulas with material samples. Job-mix formula for each mixture shall be in effect until modified in writing by the Contractor and approved by the APE. Provide a new job-mix formula for each source change. Submittal shall include all tests indicated in MIX DESIGN section of this specification.

Test Reports

Specific gravity test of asphalt Coarse aggregate tests Weight of slag test Percent of crushed pieces in gravel

Fine aggregate tests

Specific gravity of mineral filler Bituminous mixture tests Aggregates tests Bituminous mix tests

1.4 QUALITY ASSURANCE

A. Safety Requirements

1. Provide adequate and safe stairways with handrails to the mixer platform, and safe and protected ladders or other means for accessibility to plant operations. Guard equipment and exposed steam or other high temperature lines or cover with a suitable type of insulation.

B. Required Data

1. Job-mix formula shall show the following:

- a. Source and proportions, percent by weight, of each ingredient of the mixture;
- b. Correct gradation, the percentages passing each size sieve listed in the specifications for the mixture to be used, for the aggregate and mineral filler from each separate source and from each different size to be used in the mixture and for the composite mixture;
- c. Amount of material passing the No. 200 sieve determined by dry sieving;

- d. Number of blows of hammer compaction per side of molded specimen;
- e. Temperature viscosity relationship of the asphalt cement;
- f. Stability, flow, percent voids in mineral aggregate, percent air voids, unit weight;
- g. Asphalt absorption by the aggregate;
- h. Effective asphalt content as percent by weight of total mix;
- i. Temperature of the mixture immediately upon completion of mixing;
- j. Asphalt performance grade, viscosity grade, penetration range; and

C. Charts

- 1. Plot and submit, on a grain size chart, the specified aggregate gradation band, the job-mix gradation and the job-mix tolerance band.

D. Selection of Optimum Asphalt Content

- 1. Base selection on percent of total mix and the average of values at the following points on the curves for each mix:
 - a. Stability: Peak
 - b. Unit Weight: Peak
 - c. Percent Air Voids: Median

1.5 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage and store with a minimum of handling. Store aggregates in such a manner as to prevent segregation, contamination, or intermixing of the different aggregate sizes.

1.6 ENVIRONMENTAL CONDITIONS

Place bituminous mixture only during dry weather and on dry surfaces. Place courses only when the surface temperature of the underlying course is greater than 45 degrees F for course thicknesses greater than one.

1.7 CONSTRUCTION EQUIPMENT



A. Calibrated equipment, such as scales, batching equipment, spreaders and similar equipment, shall have been recalibrated by a calibration laboratory approved by the APE within 6 months of commencing work.

1. Mixing Plant

a. Design, coordinate, and operate the mixing plant to produce a mixture within the job-mix formula tolerances and to meet the requirements of ASTM D 995, including additional plant requirements specified herein. The plant shall be a batch type, continuous mix type or drum-dryer mixer type, and shall have sufficient capacity to handle the new bituminous construction. The mixing plant and equipment shall remain accessible at all times for inspecting operation, verifying weights, proportions and character of materials, and checking mixture temperatures.

b. Cold Aggregate Feeder

1) Provide plant with a feeder or feeders capable of delivering the maximum number of aggregate sizes required in their proper proportion. Provide adjustment for total and proportional feed and feeders capable of being locked in any position. When more than one cold elevator is used, feed each elevator as a separate unit and install individual controls integrated with a master control.

c. Dryer

1) Provide rotary drum-dryer which continuously agitates the mineral aggregate during the heating and drying process. When one dryer does not dry the aggregate to specified moisture requirements, provide additional dryers.

d. Plant Screens and Bins for Batch and Continuous Mix Plants

1) Use screen to obtain accurate gradation and allow no bin to contain more than 10 percent oversize or undersize. Inspect screens each day prior to commencing work for plugged, worn, or broken screens. Clean plugged screens and replace worn or broken screens with new screens prior to beginning operations. Divide hot aggregate bins into at least three compartments arranged to ensure separate and adequate storage of appropriate fractions of the aggregate.

e. Testing Laboratory

1) Provide a testing laboratory for control and acceptance testing functions during periods of mix production, sampling and testing, and whenever materials subject to the provisions of these specifications are being supplied or tested. The laboratory shall provide adequate equipment, space, and utilities as required for the performance of the specified tests.

f. Surge and Storage Bins

1) Use for temporary storage of hot bituminous mixtures will be permitted under the following conditions:

- a) When stored in surge bins for a period of time not to exceed 3 hours.
- b) When stored in insulated and heated storage bins for a period of time not to exceed 12 hours. If it is determined by the APE that there is an excessive amount of heat loss, segregation and oxidation of the mixture due to temporary storage, discontinue use of surge bins or storage bins.

g. Drum-Dryer Mixer

1) Do not use drum-dryer mixer if specified requirements of the bituminous mixture or of the completed bituminous pavement course cannot be met. If drum-dryer mixer is prohibited, use either batch or continuous mix plants meeting the specifications and producing a satisfactory mix.

2. Paving Equipment

a. Spreading Equipment

1) Self-propelled electronically controlled type, unless other equipment is authorized by the APE. Equip spreading equipment of the self-propelled electronically controlled type with hoppers, tamping or vibrating devices, distributing screws, electronically adjustable screeds, and equalizing devices. Capable of spreading hot bituminous mixtures without tearing, shoving, or gouging and to produce a finished surface of specified grade and smoothness. Operate spreaders, when laying mixture, at variable speeds between 5 and 45 feet per minute. Design spreader with a quick and efficient steering device; a forward and reverse traveling speed; and automatic devices to adjust to grade and confine the edges of the mixture to true lines. The use of a spreader that leaves indented areas or other objectionable irregularities in the fresh laid mix during operations is prohibited.

b. Rolling Equipment

1) Self-propelled pneumatic-tired rollers supplemented by three-wheel and tandem type steel wheel rollers. The number, type and weight of rollers shall be sufficient to compact the mixture to the required density without detrimentally affecting the compacted material. Rollers shall be suitable for rolling hot-mix bituminous pavements and capable of reversing without backlash. Pneumatic-tired rollers shall be capable of being operated both forward and backward without turning on the mat, and without loosening the surface being rolled. Equip rollers with suitable devices and apparatus to keep the rolling surfaces wet and prevent adherence of bituminous mixture. Vibratory rollers especially designed for bituminous concrete compaction may be used provided rollers do not impair stability of pavement structure and underlying layers. Repair depressions in pavement surfaces resulting from use of vibratory rollers. Rollers shall be self-propelled, single or dual vibrating drums, and steel drive wheels, as applicable; equipped with variable amplitude and separate controls for energy and propulsion.

c. Hand Tampers

- 1) Minimum weight of 25 pounds with a tamping face of not more than 50 square inches.

d. Mechanical Hand Tampers

- 1) Commercial type, operated by pneumatic pressure or by internal combustion.

PART 2 PRODUCTS

2.1 AGGREGATES

A. Grade and proportion aggregates and filler so that combined mineral aggregate conforms to specified grading.

1. Coarse Aggregates

a. ASTM D 692/D 692M, except as modified herein. At least 75 percent by weight of aggregate retained on the No. 4 sieve shall have two or more fractured faces. Percentage of wear, Los Angeles test, except for slag, shall not exceed 40 in accordance with ASTM C 131. Weight of slag shall not be less than 70 pounds per cubic foot. Soundness test is required in accordance with ASTM C 88; after 5 cycles, loss shall not be more than 12 percent when tested with sodium sulfate or 18 percent when tested with magnesium sulfate.

2. Fine Aggregate

a. ASTM D 1073, except as modified herein. Fine aggregate shall be produced by crushing stone, slag or gravel that meets requirements for wear and soundness specified for coarse aggregate. Where necessary to obtain the gradation of aggregate blend or workability, natural sand may be used. Quantity of natural sand to be added shall be approved by the APE and shall not exceed 15 percent of weight of coarse and fine aggregate and material passing the No. 200 sieve.

3. Mineral Filler

a. Non-plastic material meeting the requirements of ASTM D 242/D 242M.

4. Aggregate Gradation

a. The combined aggregate gradation shall conform to gradations specified in Table I, when tested in accordance with ASTM C 136 and ASTM C 117, and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice versa, but grade uniformly from coarse to fine.

Table I. Aggregate Gradations

Sieve Size, inch	Gradation Percent Passing by Mass
1/2	100
3/8	76 – 96
No. 4	58 – 78
No. 8	40 – 60
No. 16	28 – 48
No. 30	18 – 38
No. 50	11 – 27
No. 100	6 – 18
No. 200	3 – 6

2.2 ASPHALT CEMENT BINDER

Asphalt cement binder shall conform to AASHTO M320, Performance Grade. Test data indicating grade certification shall be provided by the supplier at the time of delivery of each load to the mix plant. Copies of these certifications shall be submitted to the APE for approval.

2.3 MIX DESIGN

A. The Contractor shall develop the mix design. The asphalt mix shall be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). No hot-mix asphalt for payment shall be produced until a JMF has been approved. The hot-mix asphalt shall be designed using procedures contained in MS-02 and the criteria shown in Table II. If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ASTM D4867/D 4867M is less than 75, the aggregates shall be rejected or the asphalt mixture treated with an approved anti-stripping agent. The amount of anti-stripping agent added shall be sufficient to produce a TSR of not less than 75. If an anti-strip agent is required, it shall be provided by the Contractor at no additional cost.

B. JMF Requirements

1. The job mix formula shall be submitted in writing by the Contractor for approval at least 14 days prior to the start of the test section and shall include as a minimum:

- Percent passing each sieve size.
- Percent of asphalt cement.
- Percent of each aggregate and mineral filler to be used.
- Asphalt viscosity grade, penetration grade, or performance grade.
- Number of blows of hammer per side of molded specimen.
- Laboratory mixing temperature.

- g. Lab compaction temperature.
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.
- j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-02.
- k. Specific gravity and absorption of each aggregate.
- l. Percent natural sand.
- m. Percent particles with two or more fractured faces (in coarse aggregate).
- n. Fine aggregate angularity.
- o. Percent flat or elongated particles (in coarse aggregate).
- p. Tensile Strength Ratio.
- q. Anti-strip agent (if required) and amount.
- r. List of all modifiers and amount.

Table II. Marshall Design Criteria

Test Property	75 Blow Mix	50 Blow Mix
Stability, pounds minimum	*2150	*1350
Flow, 0.01 inch	8-16	100
Air voids, percent	3-5	76-96
Percent voids in mineral aggregate (minimum)	See Table III	See Table III
TSR, minimum percent	75	75

* This is a minimum requirement. The average during construction shall be significantly higher than this number to ensure compliance with the specifications.

Table III. Minimum Percent Voids in Mineral Aggregate (VMA)**

Aggregate (See Table I)	Minimum VMA, percent
Gradation 1	15

** Calculate VMA in accordance with MS-02, based on ASTM D 2726 bulk specific gravity for the aggregate.

C. Adjustments to JMF

1. The JMF for each mixture shall be in effect until a new formula is approved in writing by the APE. Should a change in sources of any materials be made, a new mix design shall be performed and a new JMF approved before the new material is used. The Contractor will be allowed to adjust the JMF within the limits specified below to optimize mix volumetric properties. Adjustments to the JMF shall be limited to plus or minus 3 percent on the 1/2 inch, No. 4, and No. 8 sieves; plus or minus 1.0 percent on the No. 200 sieve; and plus or minus 0.40 percent binder content. If adjustments are needed that exceed these limits, a new mix design shall be developed. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table I; this is acceptable.

2.4 SOURCE QUALITY CONTROL

A. Employ a commercial laboratory approved by the APE to perform testing. The laboratory used to develop the JMF and the laboratory used to perform all sampling and testing shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements or clearly listing all deficiencies shall be submitted to the APE prior to the start of construction. The certification shall contain as a minimum:

1. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
2. A listing of equipment to be used in developing the job mix.
3. A copy of the laboratory's quality control system.
4. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

B. Tests

1. Perform testing in accordance with the following:

- a. Specific Gravity Test of Asphalt: ASTM D 70
- b. Coarse Aggregate Tests:

1) Bulk Specific Gravity: ASTM C 127

2) Abrasion Loss: ASTM C 131

3) Soundness Loss: ASTM C 88

c. Weight of Slag Test: ASTM C 29/C 29M

d. Percent of Crushed Pieces in Gravel: Count by observation and weight

e. Fine Aggregate Tests:

- 1) Bulk Specific Gravity: ASTM C 128
- 2) Soundness Loss: ASTM C 88
- f. Specific Gravity of Mineral Filler: ASTM C 188 or ASTM D 854
- g. Bituminous Mixture Tests:
 - 1) Bulk Specific Gravity: ASTM D 1188 or ASTM D 2726
 - 2) Theoretical Maximum Specific Gravity: ASTM D 2041
 - 3) Tensile Strength Ratio: ASTM D 4867/D 4867M

PART 3 EXECUTION

3.1 PREPARATION

A. Preparation of Asphalt Binder Material

1. The asphalt cement material shall be heated avoiding local overheating and providing a continuous supply of the asphalt material to the mixer at a uniform temperature. The temperature of unmodified asphalts shall be no more than 325 degrees F when added to the aggregates. Modified asphalts shall be no more than 350 degrees F when added to the aggregate.

B. Preparation of Mineral Aggregates

1. Store different size aggregate in separate stockpiles so that different sizes will not mix. Stockpile different-sized aggregates in uniform layers by use of a clam shell or other approved method so as to prevent segregation. The use of bulldozers in stockpiling of aggregate or in feeding aggregate to the dryer is prohibited. Feed aggregates into the cold elevator by means of separate mechanical feeders so that aggregates are graded within requirements of the job-mix formulas and tolerances specified. Regulate rates of feed of the aggregates so that moisture content and temperature of aggregates are within tolerances specified herein. Dry and heat aggregates to the temperature necessary to achieve the mixture determined by the job mix formula within the job tolerance specified. Provide adequate dry storage for mineral filler.

C. Preparation of Bituminous Mixture

1. Accurately weigh aggregates and dry mineral filler and convey into the mixer in the proportionate amounts of each aggregate size required to meet the job-mix formula. In batch mixing, after aggregates and mineral filler have been introduced into the mixer and mixed for not less than 15 seconds, add asphalt by spraying or other approved methods and continue mixing for a period of not less than 20 seconds, or as long as required to

obtain a homogeneous mixture. The time required to add or spray asphalt into the mixer will not be added to the total wet-mixing time provided the operation does not exceed 10 seconds and a homogeneous mixture is obtained. When a continuous mixer is employed, mixing time shall be more than 35 seconds to obtain a homogeneous mixture. Additional mixing time, when required, will be as directed by the APE) When mixture is prepared in a twin-pug mill mixer, volume of the aggregates, mineral filler, and asphalt shall not extend above tips of mixer blades when blades are in a vertical position. Overheated and carbonized mixtures, or mixtures that foam or show indication of free moisture, will be rejected. When free moisture is detected in batch or continuous mix plant produced mixtures, waste the mix and withdraw the aggregates in the hot bins immediately and return to the respective stockpiles; for drum-dryer mixer plants, waste the mix, including that in surge or storage bins that is affected by free moisture.

D. Transportation of Bituminous Mixtures

1. Transport bituminous material from the mixing plant to the paving site in trucks having tight, clean, smooth beds that have been coated with a minimum amount of concentrated solution of hydrated lime and water or other approved coating to prevent adhesion of the mixture to the truck. Petroleum products will not be permitted for coating truck. If air temperature is less than 60 degrees F or if haul time is greater than 30 minutes, cover each load with canvas or other approved material of ample size to protect the mixture from the loss of heat. Make deliveries so that the spreading and rolling of all the mixture prepared for one day's run can be completed during daylight, unless adequate approved artificial lighting is provided. Deliver mixture to area to be paved so that the temperature at the time of dumping into the spreader is within the range specified herein. Reject loads that are below minimum temperature, that have crusts of cold unworkable material, or that have been wet excessively by rain. Hauling over freshly laid material is prohibited.

E. Surface Preparation of Underlying Course

1. Prior to the laying of the asphalt concrete, clean underlying course of foreign or objectionable matter with power blowers or power brooms, supplemented by hand brooms and other cleaning methods where necessary. During the placement of multiple lifts of bituminous concrete, each succeeding lift of bituminous concrete shall have its underlying lift cleaned and provided with a bituminous tack coat if the time period between the placements of each lift of bituminous concrete exceeds 14 days, or the underlying bituminous concrete has become dirty.

3.2 PLACEMENT

A. Machine Spreading

1. The range of temperatures of the mixtures at the time of spreading shall be between 250 degrees F and 300 degrees F. Bituminous concrete having temperatures less than minimum spreading temperature when dumped into the spreader will be rejected. Adjust spreader and regulate speed so that the surface of the course is smooth and continuous without tears

and pulling, and of such depth that, when compacted, the surface conforms with the cross section, grade, and contour indicated. Unless otherwise directed, begin the placing along the centerline of areas to be paved on a crowned section or on the high side of areas with a one-way slope. Place mixture in consecutive adjacent strips having a minimum width of 10 feet, except where the edge lanes require strips less than 10 feet to complete the area. Construct longitudinal joints and edges to true line markings. Establish lines parallel to the centerline of the area to be paved, and place string lines coinciding with the established lines for the spreading machine to follow. Provide the number and location of the lines needed to accomplish proper grade control. When specified grade and smoothness requirements can be met for initial lane construction by use of an approved long ski-type device of not less than 30 feet in length and for subsequent lane construction by use of a short ski or shoe, in-place string lines for grade control may be omitted. Place mixture as nearly continuous as possible and adjust the speed of placing as needed to permit proper rolling.

B. Shoveling, Raking, and Tamping After Machine-Spreading

1. Shovelers and rakers shall follow the spreading machine. Add or remove hot mixture and rake the mixture as required to obtain a course that when completed will conform to requirements specified herein. Broadcasting or fanning of mixture over areas being compacted is prohibited. When segregation occurs in the mixture during placing, suspend spreading operation until the cause is determined and corrected. Correct irregularities in alignment left by the spreader by trimming directly behind the machine. Immediately after trimming, compact edges of the course by tamping laterally with a metal lute or by other approved methods. Distortion of the course during tamping is prohibited.

C. Hand-Spreading in Lieu of Machine-Spreading

1. In areas where the use of machine spreading is impractical, spread mixture by hand. The range of temperatures of the mixtures when dumped onto the area to be paved shall be between 250 and 300 degrees F. Mixtures having temperatures less than minimum spreading temperature when dumped onto the area to be paved will be rejected. Spread hot mixture with rakes in a uniformly loose layer of a thickness that, when compacted, will conform to the required grade, thickness, and smoothness. During hand spreading, place each shovelful of mixture by turning the shovel over in a manner that will prevent segregation. Do not place mixture by throwing or broadcasting from a shovel. Do not dump loads any faster than can be properly handled by the shovelers and rakers.

3.3 COMPACTION OF MIXTURE

A. Compact mixture by rolling. Begin rolling as soon as placement of mixture will bear rollers. Delays in rolling freshly spread mixture shall not be permitted. Start rolling longitudinally at the extreme sides of the lanes and proceed toward center of pavement, or toward high side of pavement with a one-way slope. Operate rollers so that each trip overlaps the previous adjacent strip by at least one foot. Alternate trips of the roller shall be of slightly different lengths. Conduct tests for conformity with the specified crown, grade and smoothness immediately after

initial rolling. Before continuing rolling, correct variations by removing or adding materials as necessary. If required, subject course to diagonal rolling with the steel wheeled roller crossing the lines of the previous rolling while mixture is hot and in a compactible condition. Speed of the rollers shall be slow enough to avoid displacement of hot mixture. Correct displacement of mixture immediately by use of rakes and fresh mixture, or remove and replace mixture as directed. Continue rolling until roller marks are eliminated and course has a density of at least 96 percent but not more than 100 percent of that attained in a laboratory specimen of the same mixture prepared in accordance with ASTM D 1559. During rolling, moisten wheels of the rollers enough to prevent adhesion of mixture to wheels, but excessive water is prohibited. Operation of rollers shall be by competent and experienced operators. Provide sufficient rollers for each spreading machine in operation on the job and to handle plant output. In places not accessible to the rollers, compact mixture thoroughly with hot hand tampers. Skin patching of an area after compaction is prohibited. Remove mixture that becomes mixed with foreign materials or is defective and replace with fresh mixture compacted to the density specified herein. Roller shall pass over unprotected edge of the course only when laying of course is to be discontinued for such length of time as to permit mixture to become cold.

3.4 JOINTS

A. Joints shall present the same texture and smoothness as other portions of the course, except permissible density at the joint may be up to 2 percent less than the specified course density. Carefully make joints between old and new pavement or within new pavements in a manner to ensure a thorough and continuous bond between old and new sections of the course. Vertical contact surfaces of previously constructed sections that are coated with dust, sand, or other objectionable material shall be painted with a thin uniform coat of emulsion or other approved bituminous material just before placing fresh mixture.

1. Transverse

a. Roller shall pass over unprotected end of freshly laid mixture only when laying of course is to be discontinued. Except when an approved bulkhead is used, cut back the edge of previously laid course to expose an even, vertical surface for the full thickness of the course. When required, rake fresh mixture against joints, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll. Transverse joints in adjacent lanes shall be offset a minimum of 2 feet.

2. Longitudinal Joints

a. Space 6 inches apart. Do not allow joints to coincide with joints of existing placed lanes 2 to 3 inches and be of such height to permit compaction to produce a smooth dense joint. With a lute, push back mixture placed on the surface of previous lanes to the joint edge. Do not scatter mix. Remove and waste excess material. When edges of longitudinal joints are irregular, honeycombed, or poorly compacted, cut back unsatisfactory sections of joint and expose an even vertical surface for the full thickness of the course. When required, rake fresh



mixture against joint, thoroughly tamp with hot tampers, smooth with hot smoothers, and roll while hot.

3.5 FIELD QUALITY CONTROL

A. Sampling

1. Aggregates at Source

a. Prior to production and delivery of aggregates, take at least one initial sample in accordance with ASTM D 75/D 75M at the source or from each stockpile. Collect each sample by taking three incremental samples at random from the source material to make a composite sample of not less than 50 pounds. Repeat the sampling when the material source changes or when testing reveals unacceptable deficiencies or variations from the specified grading of materials.

2. Cold Feed Aggregate Sampling

a. Take two samples daily from the belt conveying materials from the cold feed. Collect materials in three increments at random to make a representative composite sample of not less than 50 pounds. Take samples in accordance with ASTM D 75/D 75M.

3. Coarse and Fine Aggregates

a. Take a 50 pound sample from the cold feed at least once daily for sieve analysis and specific gravity tests. Additional samples may be required to perform more frequent tests when analysis shows deficiencies, or unacceptable variances or deviations. The method of sampling is as specified herein for aggregates.

4. Mineral Filler

a. ASTM D 546. Take samples large enough to provide ample material for testing.

5. Pavement and Mixture

a. Take plant samples for the determination of mix properties and field samples for thickness and density of the completed pavements. Furnish tools, labor and material for samples, and satisfactory replacement of pavement. Take samples and tests at not less than frequency specified hereinafter and at the beginning of plant operations; for each day's work as a minimum; each change in the mix or equipment; and as often as directed. Accomplish sampling in accordance with ASTM D 979.

B. Testing

1. Aggregates Tests

a. Gradation: ASTM C 136.

b. Mineral Filler Content: ASTM D 546.

2. Bituminous Mix Tests

a. Test one sample for each 50 tons, or fraction thereof, of the un-compacted mix for extraction in accordance with ASTM D 2172; perform a sieve analysis on each extraction sample in accordance with ASTM C 136 and ASTM C 117. Test one sample for each 50 tons or fraction thereof for stability and flow in accordance with ASTM D 1559. Test one sample for each material blend for Tensile Strength Ratio in accordance with ASTM D 4867/D 4867M.

3. Pavement Courses

a. Perform the following tests:

1) Density: For each 100 tons of bituminous mixture placed, determine the representative laboratory density by averaging the density of four laboratory specimens prepared in accordance with ASTM D 1559. Samples for laboratory specimens shall be taken from trucks delivering mixture to the site; record in a manner approved by the APE the project areas represented by the laboratory densities. From each representative area recorded, determine field density of pavement by averaging densities of 4 inch diameter cores obtained from leveling, binder, and wearing courses; take one core for each 2000 square yards or fraction thereof of course placed. Determine density of laboratory prepared specimens and cored samples in accordance with ASTM D 1188 or ASTM D 2726, as applicable. Separate pavement layers by sawing or other approved means. Maximum allowable deficiency at any point, excluding joints, shall not be more than 2 percent less than the specified density for any course. The average density of each course, excluding joints, shall be not less than the specified density. Joint densities shall not be more than 2 percent less than specified course densities and are not included when calculating average course densities. When the deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

2) Thickness: Determine thickness of binder and wearing courses from samples taken for the field density test. The maximum allowable deficiency at any point shall not be more than 1/4 inch less than the thickness for the indicated course. Average thickness of course or of combined courses shall be not less than the indicated thickness. Where a deficiency exceeds the specified tolerances, correct each such representative area or areas by removing the deficient pavement and replacing with new pavement.

3) Smoothness: Straightedge test the compacted surface of leveling, and wearing courses as work progresses. Apply straightedge parallel with and at right angles to the centerline after final

rolling. Unevenness of leveling course shall not vary more than 1/4 inch in 10 feet; variations in the wearing coarse shall not vary more than 1/8 inch in 10 feet. Correct each portion of the pavement showing irregularities greater than that specified.

4) Finished Grades: Finish grades of each course placed shall not vary from the finish elevations, profiles, and cross sections indicated by more than 1/2 inch. Finished surface of the final wearing course will be tested by running lines of levels at intervals of 25 feet longitudinally and transversely to determine elevations of completed pavement. The APE will inform the Contractor in writing of paved areas that fail to meet the final grades indicated within the specified tolerances. Correct deficient paved areas by removing existing work and replacing with new materials that meet the specifications. Skin patching for correcting low areas is prohibited.

5. Finish Surface Texture of Wearing Course: Visually check final surface texture for uniformity and reasonable compactness and tightness. Final wearing course with a surface texture having undesirable irregularities such as segregation, cavities, pulls or tears, checking, excessive exposure of coarse aggregates, sand streaks, indentations, ripples, or lack of uniformity shall be removed and replaced with new materials.

3.6 PROTECTION

Do not permit vehicular traffic, including heavy equipment, on pavement until surface temperature has cooled to at least 120 degrees F. Measure surface temperature by approved surface thermometers or other satisfactory methods.

END OF SECTION



Section 32 16 13 - Concrete Sidewalks And Curbs And Gutters

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 182 (2005; R 2009) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

2. ASTM A1064/A1064M (2013) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

3. ASTM A615/A615M (2013) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

4. ASTM C143/C143M (2012) Standard Test Method for Slump of Hydraulic-Cement Concrete

5. ASTM C171 (2007) Standard Specification for Sheet Materials for Curing Concrete

6. ASTM C172/C172M (2010) Standard Practice for Sampling Freshly Mixed Concrete

7. ASTM C173/C173M (2012) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

8. ASTM C231/C231M (2010) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

9. ASTM C309 (2011) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

10. ASTM C31/C31M (2012) Standard Practice for Making and Curing Concrete Test Specimens in the Field

11. ASTM C920 (2011) Standard Specification for Elastomeric Joint Sealants



12. ASTM D1751 (2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)

13. ASTM D1752 (2004a; R 2013) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion

14. ASTM D5893/D5893M (2010) Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

1.2 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 - SUBMITTAL PROCEDURES.

Product Data

Concrete

Test Reports

Field Quality Control

1.3 ENVIRONMENTAL REQUIREMENTS

1.3.1 Placing During Warm Weather

The temperature of the concrete as placed shall not exceed 85 degrees F except where an approved retarder is used. The mixing water and/or aggregates shall be cooled, if necessary, to maintain a satisfactory placing temperature. The placing temperature shall not exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 05 15 Portland Cement Concrete and Section and Section 03 30 53 Miscellaneous Cast-In- Place Concrete except as otherwise specified. Concrete shall have a minimum Compressive strength of 3000 psi at 28 days. Maximum size of aggregate shall be 1-1/2 inches. Submit copies of certified delivery tickets for all concrete used in the construction.

2.1.1 Slump



The concrete slump shall be 3 inches plus or minus 1 inch where determined in accordance with ASTM C143/C143M.

2.1.2 Reinforcement Steel

Reinforcement bars shall conform to ASTM A615/A615M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Impervious sheet materials shall conform to ASTM C171, type optional, except that polyethylene film, if used, shall be white opaque.

2.2.2 Burlap

Burlap shall conform to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

White pigmented membrane-forming curing compound shall conform to ASTM C309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Concrete protection materials shall be a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

Contraction joint filler for curb and gutter shall consist of hard-pressed fiberboard.

2.4.2 Expansion Joint Filler, Pre-molded

Expansion joint filler, pre-molded, shall conform to ASTM D1751 or ASTM D1752, 1/2 inch thick, unless otherwise indicated.

2.5 JOINT SEALANTS

Joint sealant, cold-applied shall conform to ASTM C920 or ASTM D5893/D5893M.

2.6 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Forms shall be of wood or steel, straight, of sufficient strength to resist springing during depositing and consolidating concrete. Wood forms shall be surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Wood forms shall have a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness. Steel forms shall be channel-formed sections with a flat top surface and with welded braces at each end and at not less than two intermediate points. Ends of steel forms shall be interlocking and self-aligning. Steel forms shall include flexible forms for radius forming, corner forms, form spreaders, and fillers. Steel forms shall have a nominal length of 10 feet with a minimum of 3 welded stake pockets per form. Stake pins shall be solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.1 Sidewalk Forms

Sidewalk forms shall be of a height equal to the full depth of the finished sidewalk.

2.6.2 Curb and Gutter Forms

Curb and gutter outside forms shall have a height equal to the full depth of the curb or gutter. The inside form of curb shall have batter as indicated and shall be securely fastened to and supported by the outside form. Rigid forms shall be provided for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

The subgrade shall be constructed to the specified grade and cross section prior to concrete placement. Subgrade shall be placed and compacted as directed by APE.

3.1.1 Sidewalk Subgrade

The subgrade shall be tested for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

The subgrade shall be tested for grade and cross section by means of a template extending the full width of the curb and gutter. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

The subgrade shall be maintained in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed. The subgrade shall be prepared and protected to produce a subgrade free from frost when the concrete is deposited.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of 3 stakes per form placed at intervals not to exceed 4 feet. Corners, deep sections, and radius bends shall have additional stakes and braces, as required. Clamps, spreaders, and braces shall be used where required to ensure rigidity in the forms. Forms shall be removed without injuring the concrete. Bars or heavy tools shall not be used against the concrete in removing the forms. Any concrete found defective after form removal shall be promptly and satisfactorily repaired. Forms shall be cleaned and coated with form oil each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section.

After forms are set, grade and alignment shall be checked with a 10 foot straightedge. Forms shall have a transverse slope as indicated 1/4 inch per foot] with the low side adjacent to the roadway. Side forms shall not be removed for 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

The forms of the front of the curb shall be removed not less than 2 hours nor more than 6 hours after the concrete has been placed. Forms back of curb shall remain in place until the face and top of the curb have been finished, as specified for concrete finishing. Gutter forms shall not be removed while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks shall be of the thickness indicated. After concrete has been placed in the forms, a strike-off guided by side forms shall be used to bring the surface to proper section to be compacted. The concrete shall be consolidated by tamping and spading or with an approved vibrator, and the surface shall be finished to grade with a strike off.

3.3.2 Concrete Finishing

After straight edging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. A scored surface shall be produced by brooming with a fiber-bristle brush in a direction transverse to that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

All slab edges, including those at formed joints, shall be finished with an edger having a radius of 1/8 inch. Transverse joint shall be edged before brooming, and the brooming shall eliminate the flat surface left by the surface face of the edger. Corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing shall be cleaned and filled solidly with a properly proportioned mortar mixture and then finished.

3.3.4 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 5/16 inch from the testing edge of a 10- foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Concrete shall be placed to the section required in a single lift. Consolidation shall be achieved by using approved mechanical vibrators. Curve shaped gutters shall be finished with a standard curb "mule".

3.4.2 Concrete Finishing

Exposed surfaces shall be floated and finished with a smooth wood float until true to grade and section and uniform in texture. Floated surfaces shall then be brushed with a fine-hair brush with longitudinal strokes. The edges of the gutter and top of the curb shall be rounded with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, the face of the curb shall be rubbed with a wood or concrete rubbing block and water until blemishes, form marks,

and tool marks have been removed. The front curb surface, while still wet, shall be brushed in the same manner as the gutter and curb top. The top surface of gutter and entrance shall be finished to grade with a wood float.

3.4.4 Joint Finishing

Curb edges at formed joints shall be finished as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces shall not vary more than 1/4 inch from the testing edge of a 10 - foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Sidewalk joints shall be constructed to divide the surface into rectangular areas. Transverse contraction joints shall be spaced at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and shall be continuous across the slab. Longitudinal contraction joints shall be constructed along the centerline of all sidewalks 10 feet or more in width. Transverse expansion joints shall be installed at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, transverse expansion joints shall be installed as indicated. Expansion joints shall be formed about structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

The contraction joints shall be formed in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness, using a jointer to cut the groove, or by sawing a groove in the hardened concrete with a power-driven saw, unless otherwise approved. Sawed joints shall be constructed by sawing a groove in the concrete with a 1/8 inch blade to the depth indicated. An ample supply of saw blades shall be available on the job before concrete placement is started, and at least one standby sawing unit in good working order shall be available at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Expansion joints shall be formed with 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper. Joint filler shall be held in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, joint edges shall be rounded with an edging tool having a radius of 1/8 inch, and concrete over the joint filler shall be removed. At the

end of the curing period, expansion joints shall be cleaned and filled with cold-applied joint sealant. Joint sealant shall be gray or stone in color.

3.5.3 Reinforcement Steel Placement

Reinforcement steel shall be accurately and securely fastened in place with suitable supports and ties before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Curb and gutter joints shall be constructed at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Contraction joints shall be constructed directly opposite contraction joints in abutting portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Contraction joints shall be constructed by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Separators shall be removed as soon as practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

3.6.2 Expansion Joints

Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Expansion joints shall be provided in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement, and shall be of the same type and thickness as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, expansion joints at least 1/2 inch in width shall be provided at intervals not less than 30 feet nor greater than 120 feet. Expansion joints shall be provided in non-reinforced concrete gutter at locations indicated. Expansion joints shall be sealed immediately following curing of the concrete or as soon thereafter as weather conditions permit.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least 7 days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete shall be on hand and ready for use before actual concrete placement begins. Protection shall be provided as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

The entire exposed surface shall be covered with 2 or more layers of burlap. Mats shall overlap each other at least 6 inches. The mat shall be thoroughly wetted with water prior to placing on concrete surface and shall be kept continuously in a saturated condition and in intimate contact with concrete for not less than 7 days.

3.7.1.2 Impervious Sheeting Method

The entire exposed surface shall be wetted with a fine spray of water and then covered with impervious sheeting material. Sheets shall be laid directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. The curing medium shall not be less than 18-inches wider than the concrete surface to be cured, and shall be securely weighted down by heavy wood planks, or a bank of moist earth placed along edges and laps in the sheets. Sheets shall be satisfactorily repaired or replaced if torn or otherwise damaged during curing. The curing medium shall remain on the concrete surface to be cured for not less than 7 days.

3.7.1.3 Membrane Curing Method

A uniform coating of white-pigmented membrane-curing compound shall be applied to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Formed surfaces shall be coated immediately after the forms are removed and in no case longer than 1 hour after the removal of forms. Concrete shall not be allowed to dry before the application of the membrane. If any drying has occurred, the surface of the concrete shall be moistened with a fine spray of water and the curing compound applied as soon as the free water disappears. Curing compound shall be applied in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. The second coat shall be applied in a direction approximately at right angles to the direction of application of the first coat. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel and shall be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, an additional coat shall be applied to the affected areas within 30 Minutes. Concrete surfaces that are subjected to heavy rainfall within 3 hours after the curing compound has been applied shall be re-sprayed by the method and at the coverage specified above.

Areas where the curing compound is damaged by subsequent construction operations within the curing period shall be re-sprayed. Necessary precautions shall be taken to insure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. The top of the joint opening and the joint groove at exposed edges shall be tightly sealed before the concrete in the region of the joint is re-sprayed with curing compound. The method used for sealing the joint groove shall prevent loss of moisture from the joint during the entire specified curing period. Approved standby facilities for curing concrete pavement shall be provided at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or

other conditions that might prevent correct application of the membrane-curing compound at the proper time. Concrete surfaces to which membrane-curing compounds have been applied shall be adequately protected during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from any other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Completed concrete shall be protected from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Concrete that is damaged shall be removed and reconstructed for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Removed damaged portions shall be disposed of as directed.

3.8 FIELD QUALITY CONTROL

Submit copies of all test reports within 24 hours of completion of the test.

3.8.1 General Requirements

Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, take the action and submit reports as required below, and any additional tests to insure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

Provide molded concrete specimens for strength tests. Samples of concrete placed each day shall be taken not less than once a day nor less than once for every 100 cubic yards or fraction thereof of concrete. The samples for strength tests shall be taken in accordance with ASTM C172/C172M. Cylinders for acceptance shall be molded in conformance with ASTM C31/C31M by an approved testing laboratory. Each strength test result shall be the average of 2 test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Slump Test

Two slump tests shall be made on randomly selected batches for every 100 cubic yards, or fraction thereof, of concrete. Additional tests shall be performed when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

The anticipated thickness of the concrete shall be determined prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine.

3.8.4 Surface Evaluation

The finished surface of each category of the completed work shall be uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, high areas shall be reduced either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete shall not exceed 5 percent of the area of any integral slab, and the depth of grinding shall not exceed 1/4 inch. Pavement areas requiring grade or surface smoothness corrections in excess of the limits specified above shall be removed and replaced.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the APE and any deficiencies in appearance will be identified. Areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work shall be removed and replaced.

END OF SECTION



Section 32 17 23 - Pavement Markings

PART 1 GENERAL

1.1 SUMMARY

A. Description: This Section includes the furnishing and applying of paint on restored pavement surfaces as shown on the drawings and as specified herein.

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 ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

1. AASHTO M 247 (2009) Standard Specification for Glass Beads Used in Pavement Markings

B. ASTM INTERNATIONAL (ASTM)

1. ASTM D 4280 (2008) Extended Life Type, Non-plowable, Raised, Retro-reflective Pavement Markers

2. ASTM D 4505 (2005) Preformed Retro-reflective Pavement Marking Tape for Extended Service Life

3. ASTM D 792 (2008) Density and Specific Gravity (Relative Density) of Plastics by Displacement

4. ASTM E 28 (1999; R 2009) Softening Point of Resins Derived from Naval Stores by Ring and Ball Apparatus

C. U.S. GENERAL SERVICES ADMINISTRATION (GSA)

1. FS TT-B-1325 (Rev D) Beads (Glass Spheres) Retro-Reflective (Metric)

1.3 SYSTEM DESCRIPTION

All machines, tools and equipment used in the performance of the work shall be approved and maintained in satisfactory operating condition. Equipment operating on roads shall display low speed traffic markings and traffic warning lights.

1.3.1 Paint Application Equipment

1.3.1.2 Hand-Operated, Push-Type Machines

All machines, tools, and equipment used in performance of the work shall be approved and maintained in satisfactory operating condition. Applicator machine shall be equipped with the necessary paint tanks and spraying nozzles, and shall be capable of applying paint uniformly at coverage specified. Sandblasting equipment shall be provided as required for cleaning surfaces to be painted. Hand-operated spray guns shall be provided for use in areas where push-type machines cannot be used.

1.3.2 Surface Preparation Equipment

1.3.2.1 Sandblasting Equipment

Sandblasting equipment shall include an air compressor, hoses, and nozzles of proper size and capacity as required for cleaning surfaces to be painted. The compressor shall be capable of furnishing not less than 150 cfm of air at a pressure of not less than 90 psi at each nozzle used, and shall be equipped with traps that will maintain the compressed air free of oil and water.

1.3.2.2 Water-blast Equipment

The water pressure shall be specified at 2600 psi at 140 degrees F in order to adequately clean the surfaces to be marked.

1.4 SUBMITTALS

ASPA approval is required for submittals. Submit the following in accordance with Section 01 30 10 SUBMITTAL PROCEDURES:

Product Data

1. Equipment Lists of proposed equipment, including descriptive data, and notifications of proposed Contractor actions as specified in this section.
2. Composition Requirements Manufacturer's current printed product description and Material Safety Data Sheets (MSDS) for each type paint/color proposed for use.

Qualifications

Documentation on personnel qualifications, as specified.

Test Reports

Sampling and Testing

Certified copies of the test reports, prior to the use of the materials at the jobsite. Testing shall be performed in an approved independent laboratory.

Certificates

Volatile Organic Compound (VOC)

Certificate stating that the proposed pavement marking paint meets the VOC regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located.

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of chemicals.

1.5.2 Traffic Controls

Suitable warning signs shall be placed near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Small markers shall be placed along newly painted lines to control traffic and prevent damage to newly painted surfaces. Painting equipment shall be marked with large warning signs indicating slow-moving painting equipment in operation.

1.5.3 Maintenance of Traffic

1.5.3.1 Roads

When traffic must be rerouted or controlled to accomplish the work, the necessary warning signs, flag persons, and related equipment for the safe passage of vehicles shall be provided.

1.6 DELIVERY, STORAGE, AND HANDLING

All materials shall be delivered and stored in sealed containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's name, and directions, all of which shall be plainly legible at time of use.

1.7 ENVIRONMENTAL REQUIREMENTS

Pavement surface shall be free of dirt or foreign matter. Surface temperature shall be at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting. Operation shall cease during rainfall, except for water blasting and removal of previously applied chemicals. Water blasting shall cease where surface water accumulation alters the effectiveness of material removal.

PART 2 PRODUCTS

2.1 PAINT

The paint shall be homogeneous, easily stirred to smooth consistency, and shall show no hard settlement or other objectionable characteristics during a storage period of 6 months.

Paints shall conform to FS TT-P-1952, color to match the existing. Pavement marking paints shall comply with applicable state and local laws enacted to ensure compliance with Federal Clean Air Standards. Paint materials shall conform to the restrictions of the local Air Pollution Control District.

2.2 SAMPLING AND TESTING

Materials proposed for use shall be stored on the project site in sealed and labeled containers, or segregated at source of supply, sufficiently in advance of needs to allow 60 days for testing. Upon notification by the Contractor that the material is at the site or source of supply, a sample shall be taken by random selection from sealed containers in the presence of the APE. Samples shall be clearly identified by designated name, specification number, batch number, manufacturer's formulation number, project contract number, intended use, and quantity involved. Testing shall be performed in an approved independent laboratory. If materials are approved based on reports furnished by the Contractor, samples will be retained by the ASPA for possible future testing should the material appear defective during or after application.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Thoroughly clean surfaces to be marked before application of the pavement marking material. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required. Rubber

deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Areas of old pavement affected with oil or grease shall be scrubbed with several applications of tri-sodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint. Pavement surfaces shall be allowed to dry, when water is used for cleaning, prior to striping or marking. Surfaces shall be re-cleaned, when work has been stopped due to rain.

3.1.1 Pretreatment for Early Painting

Where early painting is required on rigid pavements, apply a pretreatment with an aqueous solution, containing 3 percent phosphoric acid and 2 percent zinc chloride, to prepared pavement areas prior to painting.

3.1.2 Cleaning Existing Pavement Markings

In general, markings shall not be placed over existing pavement marking patterns. Remove existing pavement markings, which are in good condition but interfere or conflict with the newly applied marking patterns. Deteriorated or obscured markings that are not misleading or confusing or interfere with the adhesion of the new marking material do not require removal. New preformed and thermoplastic pavement markings shall not be applied over existing preformed or thermoplastic markings. Whenever grinding, scraping, sandblasting or other operations are performed the work must be conducted in such a manner that the finished pavement surface is not damaged or left in a pattern that is misleading or confusing. When these operations are completed the pavement surface shall be blown off with compressed air to remove residue and debris resulting from the cleaning work.

3.1.3 Cleaning Concrete Curing Compounds

On new portland cement concrete pavements, cleaning operations shall not begin until a minimum of 30 days after the placement of concrete. All new concrete pavements shall be cleaned by either sandblasting or water blasting. When water blasting is performed, thermoplastic and preformed markings shall be applied no sooner than 24 hours after the blasting has been completed. The extent of the blasting work shall be to clean and prepare the concrete surface as follows:

- a. There is no visible evidence of curing compound on the peaks of the textured concrete surface.
- b. There are no heavy puddled deposits of curing compound in the valleys of the textured concrete surface.
- c. All remaining curing compound is intact; all loose and flaking material is removed.



d. The peaks of the textured pavement surface are rounded in profile and free of sharp edges and irregularities.

e. The surface to be marked is dry.

3.2 APPLICATION

All pavement markings and patterns shall be placed as shown on the plans.

3.2.1 Paint

Paint shall be applied to clean, dry surfaces, and only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Paint temperature shall be maintained within these same limits. New asphalt pavement surfaces and new Portland concrete cement shall be allowed to cure for a period of not less than 30 days before applications of paint. Paint shall be applied pneumatically with approved equipment at rate of coverage specified. Provide guide lines and templates as necessary to control paint application. Edges of markings shall be sharply outlined.

3.2.1.1 Rate of Application

Non-reflective Markings: Paint shall be applied evenly to the pavement surface to be coated at a rate of 105 plus or minus 5 square feet/gallon.

3.2.1.2 Drying

The maximum drying time requirements of the paint specifications will be strictly enforced to prevent undue softening of bitumen, and pickup, displacement or discoloration by tires of traffic. If there is a delay in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

END OF SECTION



Section 32 31 13 - Chain Link Fences And Gates

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.

ASTM INTERNATIONAL (ASTM)

ASTM A116 (2005) Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric

ASTM A121 (2007) Standard Specification for Metallic Coated Carbon Steel Barbed Wire.

ASTM A153/A153M (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A702 (1989; R 2006) Standard Specification for Steel Fence Posts and Assemblies, Hot Wrought

ASTM A780/A780M (2009) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM A90/A90M (2009) Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

ASTM C 94/C 94M (2010a) Standard Specification for Ready-Mixed Concrete

ASTM F 1043 (2011) Strength and Protective Coatings on Metal Industrial Chain-Link Fence Framework

ASTM F 1083 (2010) Standard Specification for Pipe, Steel, Hot-Dipped Zinc Coated (Galvanized) Welded, for Fence Structures

ASTM F 567 (2011) Standard Practice for Installation of Chain Link Fence

ASTM F 883 (2009) Padlocks

U.S. GENERAL SERVICES ADMINISTRATION (GSA)



FS RR-F-191 (Rev K) Fencing, Wire and Post Metal (and Gates, Chain- Link Fence Fabric, and Accessories)

FS RR-F-191/1 (Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Fabric)

FS RR-F-191/2 (Rev E) Fencing, Wire and Post, Metal (Chain-Link Fence Gates)

FS RR-F-191/3 (Rev E; Am 1) Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)

FS RR-F-191/4 (Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

1.2 SUBMITTALS

ASPA approval is required for submittals. Submittals determined by APE as not requiring ASPA approval will be for Contractor Quality control approval. Submit the following in accordance with Section 01 30 10 – SUBMITTAL PROCEDURES.

Shop Drawings

Fence Assembly

Location of Gate, Corner, End, and Pull Posts

Gate Assembly

Gate Hardware and Accessories

Erection/Installation Drawings

Product Data

Fence Assembly

Gate Assembly

Barbed Wire

Gate Hardware and Accessories

Zinc Coating Fabric Tension Bars Concrete

Certificates

Certificates of Compliance

Manufacturer's Instructions

Fence Assembly

Gate Assembly

Hardware Assembly

Accessories

1.3 ASSEMBLY AND INSTALLATION INSTRUCTIONS

Submit manufacturer's erection/installation drawings and instructions that detail proper assembly and materials in the design for fence, gate, hardware and accessories.

Submit erection/installation drawings along with manufacturer's catalog data for complete fence assembly, gate assembly, hardware assembly and accessories.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

1.5 QUALITY ASSURANCE

1.5.1 Required Report Data

Submit reports of listing of chain-link fencing and accessories regarding weight in ounces for PVC coating.

1.5.2 Certificates of Compliance

Submit certificates of compliance in accordance with the applicable reference standards and descriptions of this section for the following:

- a. PVC coating
- b. Fabric
- c. Tension bars
- d. Gate hardware and accessories e. Concrete

PART 2 PRODUCTS

2.1 GENERAL

Provide fencing materials conforming to the requirements of ASTM A116, ASTM A702, ASTM F 626, and as specified.

2.2 ZINC COATING

Provide hot-dip galvanized (after fabrication) ferrous-metal components and accessories, except as otherwise specified.

Provide zinc coating of weight not less than 1.94 ounces per square foot, as determined from the average result of two specimens, when tested in accordance with ASTM A90/A90M.

Provide zinc coating conforming to the requirements of the following:

- a. Pipe: FS RR-F-191/3 Class 1 Grade A in accordance with ASTM F 1083.
- b. Hardware and accessories: ASTM A153/A153M, Table 1.
- c. Surface: ASTM F 1043
- d. External: Type B-B surface zinc with organic coating, 0.97 ounce per square foot minimum thickness of acrylated polymer.
- e. Internal: Surface zinc coating of 0.97 ounce per square foot minimum.

Provide galvanizing repair material that is cold-applied zinc-rich coating conforming to ASTM A780/A780M.

2.3 FABRIC

FS RR-F-191 and detailed specifications as referenced and other requirements as specified. FS RR-F-191/1; Type IV, Polyvinyl chloride (PVC) coated with green over zinc coated steel.

Provide fabric consisting of No. 9-gage wires woven into a 2-inch diamond mesh, with dimensions of fabric and wire conforming to ASTM A116, ASTM A702 and ASTM F 626, with 2.0 ounces per square foot.

Provide one-piece fabric widths for fence heights.

2.4 TOP AND BOTTOM SELVAGES

Provide knuckled selvages at top and bottom.

2.5 POSTS, TOP RAILS, BOTTOM RAILS AND BRACES



FS RR-F-191/3 line posts; Class 1, steel pipe, Grade A. End, corner, and pull posts; Class 1, steel pipe, Grade A. Braces and rails; Class 1, steel pipe, Grade A, in minimum sizes listed in FS RR-F-191/3 for each class and grade. Provide PVC green color coating with minimum thickness of 0.01 inch.

2.6 LINE POSTS

Grade A: 2 inch pipe weighing 3.65 pounds per linear foot. All posts are painted field green.

2.7 END, CORNER, AND PULL POSTS

Provide minimally acceptable end, corner, and pull posts as follows:

Grade A: 2 inch pipe weighing 5.79 pounds per linear foot painted with field green.

2.8 SLEEVES

Provide sleeves for setting into concrete construction of the same material as post sections, sized as indicated on the drawings. Weld flat plates to each sleeve base to provide anchorage and prevent intrusion of concrete.

2.9 TOP RAIL

Provide a minimum of 1 1/4 inch diameter pipe rails. Grade A weighing 2.27 pounds per linear foot. Provide expansion couplings 6-inches long at each joint in top rails.

2.10 CENTER RAILS BETWEEN LINE POSTS

Provide 1 5/8 inch outside diameter pipe center rails; Grade A weighing 2.27 pounds per linear foot.

2.11 BOTTOM RAIL

Provide bottom rail conforming to minimum sizes specified in FS RR-F-191/3 for each class and grade unless members are to be oversized.

2.12 POST-BRACE ASSEMBLY

Provide bracing consisting of 1 1/4 inch diameter pipe Grade A weighing 2.27 pounds per linear foot and 3/8 inch adjustable truss rods and turnbuckles.

2.13 TENSION WIRE

Provide galvanized wire, No. 7-gage, coiled spring wire, provided at the top and bottom of the fabric. Provide zinc coating that weighs not less than 2.0 ounces per square foot.

2.14 TENSION (STRETCHER) BARS

Provide bars that have one-piece lengths equal to the full height of the fabric with a minimum cross section of 1/4 by 3/4 inch, in accordance with ASTM A116, ASTM A702 and ASTM F 626.

2.15 POST TOPS

Provide tops that are steel, wrought iron, or malleable iron designed as a weather tight closure cap. Provide one cap for each post, unless equal protection is provided by a combination post-cap and barbed-wire supporting arm. Provide caps with an opening to permit through passage of the top rail.

2.16 TENSION BAR BANDS

Provide bar bands for securing stretcher bars to posts that are steel, wrought iron, or malleable iron spaced not over 16 inches on center. Bands may also be used in conjunction with special fittings for securing rails to posts. Provide bands with projecting edges chamfered or eased.

2.17 GATE POSTS

Provide a gate post for supporting each gate leaf as follows:

3 1/2 inch diameter pipe Grade A weighing 9.11 pounds per linear foot and painted with field green.

2.18 GATES

FS RR-F-191/2; Type II, double swing. Shape and size of gate frame, as indicated. Framing and bracing members, round of steel alloy. Steel member finish, zinc - coated. Provide gate frames and braces of minimum sizes as shown on the drawings. Gate fabric, is as specified for fencing fabric. Coating for steel latches, stops, hinges, keepers, and accessories, galvanized. Provide plunger rod type gate latches. Attach gate fabric to gate frame in accordance with manufacturer's standards, except that welding is not permitted. Arrange padlocking latches to be accessible from both sides of gate, regardless of latching arrangement.

Provide gate frame assembly that is welded or assembled with special malleable or pressed-steel fittings and rivets to provide rigid connections. Install fabric with stretcher bars at vertical edges; stretcher bars may also be used at top and bottom edges. Attach stretcher bars and fabric to gate frames on all sides at intervals not exceeding 15 inches. Attach hardware with rivets or by other means which provides equal security against breakage or removal.



Provide diagonal cross-bracing, consisting of 3/8-inch diameter adjustable-length truss rods on welded gate frames, where necessary to obtain frame rigidity without sag or twist. Provide non-welded gate frames with diagonal bracing.

2.19 GATE HARDWARE AND ACCESSORIES

Provide gate hardware and accessories that conforms to ASTM A116, ASTM A702, ASTM F 626, and as specified:

Provide malleable iron or pressed steel hinges to suit gate size, non-lift-off type, offset to permit 180-degree opening.

Provide latch that permits operation from either side of the gate, with a padlock eye provided as an integral part of the latch.

Provide stops and holders of malleable iron for vehicular gates. Provide stops that automatically engage the gate and hold it in the open position until manually released.

Provide double gates with a cane bolt and ground-set keeper, with latch or locking device and padlock eye designed as an integral part.

2.20 MISCELLANEOUS HARDWARE

Provide miscellaneous hot-dip galvanized hardware as required.

2.21 TIE WIRES

Provide 12-gage galvanized steel wire for tying fabric to line posts, spaced 12 inches on center. For tying fabric to rails and braces, space tie wires 24 inches on center. For tying fabric to tension wire, space 0.105-inch hog rings 24 inches on center.

Manufacturer's standard procedure will be accepted if of equal strength and durability. FS RR-F-191/4. Provide wire ties constructed of the same material as the fencing fabric.

2.22 BARBED WIRE

ASTM A121 zinc-coated, Type Z, Class 3, 4-point barbs spaced no more than 5 inches apart.

2.23 CONCRETE

Provide concrete conforming to ASTM C 94/C 94M, and obtaining a minimum 28-day compressive strength of 2,500 psi.

2.24 GROUT

Provide grout of proportions one part Portland cement to three parts clean, well- graded sand and a minimum amount of water to produce a workable mix.

2.25 PADLOCKS

Provide padlocks conforming to ASTM F 883, with chain.

PART 3 EXECUTION

Provide complete installation conforming to ASTM F 567.

3.1 GENERAL

Ensure final grading and established elevations are complete prior to commencing fence installation.

3.2 EXCAVATION

Provide excavations for post footings of minimum sizes as indicated.

Space footings for line posts 10 feet on center maximum and at closer intervals when indicated, with bottoms of the holes approximately 3-inches below the bottoms of the posts. Set bottom of each post not less than 36-inches below finished grade when in firm, undisturbed soil. Set posts deeper, as required, in soft and problem soils and for heavy, lateral loads.

Uniformly spread soil from excavations adjacent to the fence line or on areas of the project site, as directed.

When solid rock is encountered near the surface, drill into the rock at least 12 inches for line posts and at least 18 inches for end, pull, corner, and gate posts. Drill holes at least 1 inch greater in diameter than the largest dimension of the placed post.

If solid rock is below the soil overburden, drill to the full depth required except that penetration into rock need not exceed the minimum depths specified above.

3.3 SETTING POSTS

Remove loose and foreign materials from holes and the soil moistened prior to placing concrete.

Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts. Set hold-open devices, sleeves, and other accessories in concrete.



Keep exposed concrete moist for at least 7 calendar days after placement or cured with a membrane curing material, as approved.

Grout all posts set into sleeved holes in concrete with an approved grouting material. Maintain vertical alignment of posts set in concrete construction until concrete has set.

3.3.1 Earth and Bedrock

Provide concrete bases of dimensions indicated except in bedrock. Compact concrete to eliminate voids, and finish to a dome shape. In bedrock, set posts with a minimum of 1 inch of grout around each post. Work grout into hole to eliminate voids, and finish to a dome shape.

3.3.2 Bracing

Brace gate, corner, end, and pull posts to nearest post with a horizontal brace used as a compression member, placed at least 12 inches below top of fence, and a diagonal tension rod.

3.4 CONCRETE STRENGTH

Provide concrete that has attained at least 75 percent of its minimum 28-day compressive strength, but in no case sooner than 7 calendar days after placement, before rails, tension wire, or fabric are installed. Do not stretch fabric and wires or hang gates until the concrete has attained its full design strength.

Take samples and test concrete to determine strength as specified.

3.5 TOP RAILS

Provide top rails that run continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer.

3.6 CENTER RAILS

Provide single piece center rails between posts set flush with posts on the fabric side, using special offset fittings where necessary.

3.7 BRACE ASSEMBLY

Provide bracing assemblies at end and gate posts and at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric.



Install brace assemblies so posts are plumb when the diagonal rod is under proper tension. Provide two complete brace assemblies at corner and pull posts where required for stiffness and as indicated.

3.8 TENSION WIRE INSTALLATION

Install tension wire by weaving them through the fabric and tying them to each post with not less than 7-gage galvanized wire or by securing the wire to the fabric with 10-gage ties or clips spaced 24 inches on center.

3.9 FABRIC INSTALLATION

Provide fabric in single lengths between stretch bars with bottom barbs placed approximately 2 1/2-inches above the ground line. Pull fabric taut and tied to posts, rails, and tension wire with wire ties and bands. Install fabric on the security side of fence, unless otherwise directed. Ensure fabric remains under tension after the pulling force is released.

3.10 TENSION BAR INSTALLATION

Thread tension bars through or clamped to fabric 4 inches on center and secured to posts with metal bands spaced 16 inches on center.

3.11 GATE INSTALLATION

Install gates plumb, level, and secure, with full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricated where necessary.

3.12 TIE WIRES

Provide tie wires that are U-shaped to the pipe diameters to which attached. Twist ends of tie wires not less than two full turns and bent so as not to present a hazard.

3.13 FASTENERS

Install nuts for tension bands and hardware on the side of the fence opposite the fabric side. Peen ends of bolts to prevent removal of nuts.

3.14 ZINC-COATING REPAIR

Clean and repair galvanized surfaces damaged by welding or abrasion, and cut ends of fabric, or other cut sections with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

3.15 TOLERANCES

Provide posts that are straight and plumb within a vertical tolerance of 1/4 inch after the fabric has been stretched. Provide fencing and gates that are true to line with no more than 1/2 inch deviation from the established centerline between line posts. Repair defects as directed.

3.16 SITE PREPARATION

3.16.1 Clearing and Grading

Clear fence line of trees, brush, and other obstacles to install fencing. Establish a graded, compacted fence line prior to fencing installation.

3.17 FENCE INSTALLATION

Install fence on prepared surfaces to line and grade indicated. Secure fastening and hinge hardware in place to fence framework by peening or welding. Allow for proper operation of components. Coat peened or welded areas with a repair coating matching original coating. Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

3.17.1 Post Spacing

Provide line posts spaced equidistantly apart, not exceeding 10 feet on center. Provide gate posts spaced as necessary for size of gate openings. Provide corner or pull posts, with bracing in both directions, for changes in direction of 15 degrees or more, or for abrupt changes in grade. Provide drawings showing location of gate, corner, end, and pull posts.

3.17.2 Top and Bottom Tension Wire

Install top and bottom tension wires before installing chain-link fabric, and pull wires taut. Place top and bottom tension wires within 8 inches of respective fabric line.

3.18 ACCESSORIES INSTALLATION

3.18.1 Post Caps

Install post caps as recommended by the manufacturer.

3.18.2 Padlocks

Provide padlocks for gate openings and provide chains that are securely attached to gate or gate posts. Provide padlocks keyed alike, and provide two keys for each padlock.

3.19 Supporting Arms and Barbed Wire

Install barbed wire supporting arms and barbed wire as indicated on the drawings and as recommended by the manufacturer. Anchor supporting arms to the posts with 3/8 inch diameter plain pin rivets or, at the Contractor's option, with studs driven by low-velocity explosive-actuated tools for steel, wrought iron, ductile iron, or malleable iron. Studs driven by an explosive-actuated tool shall not be used with gray iron or other material that can be fractured. Use a minimum of two studs per support arm. Pull barbed wire taut and attach to the arms with clips or other means that will prevent easy removal.

3.20 CLEANUP

Remove waste fencing materials and other debris from the work site.

END OF SECTION



DIVISION 33 - UTILITIES



Section 33 10 00 - Water Laterals & Service Line

Sub-Section 33 10 01 - PVC Pipe Schedule 80

This specification covers PVC Schedule 80 pipe and fittings for pressure applications. This system is intended for pressure applications where the operating temperature will not exceed 140° F

A. STANDARDS:

ASTM D 1784: Rigid Vinyl Compounds
ASTM D 1785: PVC Plastic Pipe, Schedule 80
ASTM D 2464 or D 2467: PVC Threaded Fittings, Schedule 80
ASTM D 2467: PVC Socket Fittings, Schedule 80
ASTM D 2564: Solvent Cements for PVC Pipe and Fittings
ASTM D 2774: Underground Installation of Thermoplastic Pressure Piping
ASTM F 1668: Procedures for Buried Plastic Pipe
NSF Standard 14: Plastic Piping Components & Related Materials
NSF Standard 61: Drinking Water System Components–Health Effects

B. MATERIALS

Refer to ASPA material Specifications;

C. HANDLING AND STORAGE

1.1. Receiving Pipe:

1.1.1. As pipe is received, it must always be thoroughly inspected, prior to unloading. The person receiving the pipe must look for any transportation damage caused by over-tightened tie-down straps, improper treatment, or a shift in the load.

1.1.2. Pipe received in a closed trailer must be inspected as the trailer is opened. Take extra time to ensure that the pipe has not been damaged by other materials having been stacked on top of it, load shift, or rough handling.

1.1.3. Visually examine the pipe ends for any cracks, splits, gouges, or other forms of damage. Additionally, the pipe should be inspected for severe deformation which could later cause joining problems. The entire inside diameter of larger diameter pipe (4" and above) must be checked for any internal splits or cracks which could have been caused by loading or transit. The use of a flashlight may be necessary to perform this inspection.

1.1.4. Any damages must be observed by all parties involved, including the driver, and should be clearly noted on the bill of lading and/or delivery ticket. A copy of this document should be retained by the receiver. In addition, the manufacturer and carrier should be notified, within 24 hours, of any damages, shortages, or mis-shipped products.

1.2. Handling pipe

- 1.2.1. The pipe should be handled with reasonable care. Throwing is not allowed.
- 1.2.2. The pipe should never be dragged or pushed from a truck bed.
- 1.2.3. Removing and handling pallets of pipe should be done with a forklift. Loose pipe lengths require special handling to avoid damage. Precautions to follow when unloading and handling loose pieces include not banging lengths together or dropping lengths, even from low heights, on hard or uneven surfaces.
- 1.2.4. In all cases, severe contact with any sharp objects (rocks, angle irons, forks on forklifts, etc.) should be avoided. Also, the pipe should never be lifted or moved by inserting the forks of a forklift into the pipe ends.

1.3. Storing Pipe:

- 1.3.1. Pipe should be stored inside. When this is not possible, the pipe should be stored on level ground which is dry and free from sharp objects. If different schedules of pipe are stacked together, the pipe with the thickest walls should be on the bottom.
- 1.3.2. If the pipe is in pallets, the pallets should be stacked with the pallet boards touching, rather than pallet boards being placed on the pipe. This will prevent damage to or bowing of the pipe.
- 1.3.3. If the pipe is stored in racks, it should be continuously supported along its length. If this is not possible, the spacing supports should be determined based on the pipe diameter. In general, supports and spacing that would provide for no more than 1/2" in deflection of the pipe should be acceptable.
- 1.3.4. The pipe should be protected from the sun and be in an area with proper ventilation. This will lessen the effects of ultraviolet rays and help prevent heat build-up.

D. INSTALLATION

Installation shall conform to all applicable plumbing, fire, and building code requirements. Buried pipe shall be installed in accordance with ASTM F 1668 and ASTM D 2774. Solvent cement joints shall be made in a two-step process with a primer meeting ASTM F 656 and a medium- or heavy-bodied solvent cement conforming to ASTM D 2564. The system shall be protected from chemical agents, fire-stopping materials, thread sealant, plasticized-vinyl products or other aggressive chemical agents not compatible with PVC compounds. The system shall be hydrostatically tested after installation. **WARNING!** Never test with or transport/store compressed air or gas in PVC pipe or fittings. Doing so can result in explosive failures and cause severe injury or death.

1.4. Installation Procedure

- 1.4.1. Cut pipe square with the axis. All joints are sealed at the base of the fitting hub. An angled cut may result in joint failure.
- 1.4.2. Acceptable tools include ratchet type pipe cutter, miter saw or wheel type pipe cutter. Wheel type pipe cutters must employ a blade designed to cut plastic pipe. Ratchet cutters should

be sharpened regularly. If any indication of damage or cracking is evident at the tube end, cut off at least 2" of pipe beyond any visible cracks.

1.4.3. Remove all pipe burrs from inside and outside diameter of pipe with a knife edge, file or de-burring tool. Chamfer (bevel) the end of the pipe 10° - 15°.

1.4.4. Remove surface dirt, grease or moisture with a clean dry cloth.

1.4.5. With light pressure, pipe should go one half to two thirds of the way into the fitting hub. Pipe and fittings that are too tight or too loose should not be used.

1.4.6. Use an applicator that is one half the size of the pipe's diameter. Daubers, natural bristle brushes or swabs are recommended. Rollers are not recommended. Too large an applicator will force excess primer or cement into the inside of the fitting. Too small an applicator will not apply sufficient cement.

1.4.7. Apply primer to the fitting socket aggressively working it into the surface. Apply primer to the pipe surface to a point ½" beyond the hub depth. Aggressively work the primer into the surface.

1.4.8. Apply a second coat of primer to the fitting socket aggressively working it into the surface.

1.4.9. Cement must be applied while primer is wet. Stir or shake the cement prior to use. Apply a full even layer of cement to the pipe surface to a point ½" beyond the hub depth. Aggressively work the cement into the surface.

1.4.10. Without re-dipping the applicator in the cement, apply a medium layer of cement to the fitting socket aggressively working it into the surface. On bell end pipe do not coat beyond the socket depth. Apply a second full coat of cement to the pipe surface aggressively working it in. Do not allow cement to puddle or accumulate inside the system.

1.4.11. Solvent cement should conform to the appropriate ASTM standard for the piping system as shown in the accompanying table. All-purpose cement is not recommended.

1.4.12. Assemble pipe and fittings quickly while cement is fluid. If cement has hardened, cut pipe, dispose of fitting and start over. Insert pipe into the fitting hub giving a quarter turn as the pipe is being inserted, ensuring an even distribution of the cement within the joint. Do not quarter turn the pipe after contact with socket bottom. Once the pipe contacts the socket bottom hold pipe and fitting together until the pipe does not back out.

1.4.13. Remove excess cement from the exterior. A properly made joint will show a continuous bead of cement around the perimeter. If voids appear sufficient cement may not have been applied and joint failure may result. Align all piping system components properly without strain. Do not bend or pull pipe into position after being solvent welded.

1.5. Joint Curing:

1.5.1. The joint should not be disturbed until it has initially set. The chart below shows the recommended initial set and cure times;

Temperature Range	Diameter ½" to 1¼"	Diameter 1½" to 3"	Diameter 4" to 8"	Diameter 10" to 16"
60° - 100° F	15 min	30 min	1 hr	2 hr
40° - 60° F	1 hr	2 hr	4 hr	8 hr
0° - 40° F	3 hr	6 hr	12 hr	24 hr

Recommended Curing Time Before Pressure Testing

RELATIVE HUMIDITY 60% or Less*	CURE TIME Diameter ½" to 1¼"		CURE TIME Diameter 1½" to 3"		CURE TIME Diameter 4" to 8"		CURE TIME Diameter 10" to 16"
Temperature Range During Assembly and Cure Periods	Up to 180 psi	Above 180 to 370 psi	Up to 180 psi	Above 180 to 315 psi	Up to 180 psi	Above 180 to 315 psi	Up to 100 psi
60° - 100° F	1 hr	6 hr	2 hr	12 hr	6 hr	24 hr	24 hr
40° - 60° F	2 hr	12 hr	4 hr	24 hr	12 hr	48 hr	48 hr
0° - 40° F	8 hr	48 hr	16 hr	96 hr	48 hr	8 days	8 days

1.6. Underground Installation:

1.6.1. Plastic pipe should always be buried in strict accordance with the ASTM standard relevant to the type of plastic piping system being installed.

E. Abandonment of Service Lines:

The Contractor shall accomplish all cutting, capping, and plugging necessary to isolate new service lines transferred to new and existing mains from those abandoned, including service lines.

END OF SECTION



Sub-Section 33 10 02 - Trace Wire for Laterals and Service Lines

A. Trace wire

All trace wire and trace wire products shall be domestically manufactured in the U.S.A.

All trace wire shall have HDPE insulation intended for direct bury, color coated per APWA standard for the specific utility being marked.

Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break

B. Connectors

All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.

Direct bury wire connectors – shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.

Non locking friction fit, twist on or taped connectors are prohibited.

C. Termination/Access

All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.

All grade level/in-ground access boxes shall be appropriately identified with “sewer” or “water” cast into the cap and be color coded.

A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.

All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.

Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.

- **Service Laterals on public property** - Trace wire must terminate at an approved grade level/inground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.

- **Service Laterals on private property** - Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- **Hydrants** – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)

Long-runs, in excess of 500 linear feet without service laterals or hydrants - Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.

D. Grounding

Trace wire must be properly grounded at all dead ends/stubs

Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #12 red HDPE insulated copper clad steel wire connected to anode (minimum 1.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.

When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.

When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.

Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

E. Installation

Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.

Trace wire must be properly grounded as specified.

Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)

At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. (See Grounding)

Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline deadend, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.

All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.

In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

F. Water System

A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.

Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.

Trace wire on all water service laterals must terminate at an approved trace wire access box color coded blue and located directly above the service lateral at the edge of road right of way.

Above-ground tracer wire access boxes will be installed on all fire hydrants.

All conductive and non-conductive service lines shall include tracer wire.

G. Prohibited Products and Methods

1. The following products and methods shall not be allowed or acceptable
2. Uninsulated trace wire
3. Trace wire insulations other than HDPE
4. Trace wires not domestically manufactured
5. Non locking, friction fit, twist on or taped connectors
6. Brass or copper ground rods
7. Wire connections utilizing taping or spray-on waterproofing
8. Looped wire or continuous wire installations, that has multiple wires laid side-by-side or in close
9. proximity to one another
10. Trace wire wrapped around the corresponding utility
11. Brass fittings with trace wire connection lugs
12. Wire terminations within the roadway, i.e. in valve boxes, cleanouts, manholes, etc.
13. Connecting trace wire to existing conductive utilities

H. Testing

1. All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership.
2. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.
3. Continuity testing in lieu of actual line tracing shall not be accepted.

END OF SECTION



Sub-Section 33 10 03 - Water Laterals & Service Line Pressure Testing

Once an installation is completed and cured the system should be filled with water and pressure tested in accordance with local code requirements and this specifications.

Test all piping and appurtenances installed under this Contract. Testing shall be performed concurrent with installation. Do not install more than 1,000 feet of pipe without being tested, unless approved by ASPA. Test service line at a minimum of one test report per customer account to be performed in the presence of ASPA representative.

All pipelines shall be pressure tested using water only. Testing of pipelines using air is not permitted due to the risk of catastrophic failure.

The piping system should be adequately anchored to limit movement. Water under pressure exerts thrust forces in piping systems. Thrust blocking should be provided at changes of direction, change in size and at dead ends.

The piping system should be slowly filled with water, taking care to prevent surge and air entrapment. The flow velocity should not exceed 5-feet per second. All trapped air must be slowly released. All valves and air relief mechanisms should be opened so that the air can be vented while the system is being filled.

Any leaking joints or pipe must be cut out and replaced and the line recharged and retested.

Contractor shall;

1. Prepare and submit schedules and procedures to ASPA for approval.
2. Furnish the pump, pipe connections, and all necessary apparatus for the pressure and leakage tests including gauges and metering devices.
3. Contractor shall provide **Pressure Test Results Form** to include needed data such as but not limited to;
 - a. Pipe Section
 - b. Contractor's Name
 - c. Contractor's QC Manager
 - d. Witness by
 - e. Date
 - f. Start Time
 - g. Ambient Temperature
 - h. System Test Pressure
 - i. Hourly Pressure for 4hours
 - j. Added volume of water per hour
 - k. Maximum allowable leak
 - l. Test Results (Pass/Fail)

END OF SECTION

Sub-Section 33 10 04 - Water Service Stub

General Description:

The **Water Service Stub** is a crucial component of the ASPA water supply system, connecting the water main to a point between the curb line and property line, extending up to and including the curb box and curb stop.

Materials:

Pipe Material:

The water service stub shall be constructed using ductile iron pipe conforming to ASTM A746 standard.

Fittings:

All fittings shall be made of ductile iron and must comply with ASTM A536. Threaded joints shall be avoided where possible, but if necessary, they shall be tapered pipe threads in accordance with ANSI/ASME B1.20.1.

Installation:

- The water service stub shall be installed by qualified personnel in accordance with ASPA guidelines and local building codes.
- Trenching and backfilling shall be performed carefully to prevent damage to the pipe and fittings.
- Bedding material shall consist of clean, well-compacted granular material in accordance with ASTM D2321.
- The water service stub shall be laid at a minimum depth of 36" below finished grade.

Minimum Spacing:

- The Water Service Stub shall maintain a minimum horizontal spacing of 10' from any other utility lines, such as gas, electric, or telecommunication lines.
- Vertical spacing between the water service stub and other utilities shall be 3'.
- The minimum horizontal spacing between two adjacent water service stubs shall be 4'.
- The minimum spacing for road crossing is 500'-0". The contractor shall verify the actual count of houses prior to any road cuts.

Connection to Water Main:

- The connection to the water main shall be a restrained joint to ensure stability and prevent separation.
- All connections shall comply with ASPA standards and regulations.

Tapping:

- Tapping saddles and corporation stops are required.
- Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605.

- Tapping shall be performed only with the use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED.
- Tapping shall be performed in accordance with the applicable sections for saddle tapping as per "Uni-Pub-8: Tapping Guide for PVC Pressure Pipe by Uni-Bell PVC Pipe Association."
- Equipment used for tapping shall be made specifically for tapping PVC pipe, with slotted "shell" style cutters.
- 'Hole saws' made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
- Taps may be performed while the pipeline is filled with water and under pressure ('wet' tap) or when the pipeline is not filled with water and not under pressure ('dry' tap).

Curb Box and Curb Stop:

- The curb stop shall be of the compression type and comply with AWWA C800 standards.
- Both curb box and curb stop shall be installed flush with the finished grade.
- Curb stops with boxes shall be placed on each new service line at the property line or as shown on the approved plans and marked with a steel fence post.
- All curb boxes shall be adjustable and installed to finish grade.
- Curb stops must have a concrete collar made of 3500 psi concrete with a minimum thickness of 6" and an area of 4' x 4'.
- Concrete collar must have #4 rebars spaced at 6" o.c. both ways.
- Curb stop valve box assembly shall be placed between the sidewalk and curb.

Water Service Transfer:

- Upon connecting the new water main to the current water system and establishing parallel live mains, the Contractor shall promptly initiate the transfer of all water services and meters from the existing system to the new water main.
- Additionally, the Contractor must undertake all necessary tasks for the permanent abandonment of the current water system.
- The transfer of services and the abandonment of the existing water system must be completed before the contractor proceeds with the installation of additional water main pipes, as outlined in the Contract.

Compliance:

- The Water Service Stub shall comply with all relevant standards, codes, and regulations, including but not limited to ASTM, AWWA, and ASPA guidelines.

Maintenance and Repair:

- The Water Service Stub should be regularly inspected for any signs of damage or deterioration.
- In the event of a malfunction or damage, repairs shall be carried out promptly by qualified personnel.



Testing:

- Prior to backfilling, the water service stub shall undergo pressure testing in accordance with AWWA C600.
- The pressure test shall ensure that the system is free of leaks and can withstand the specified pressure for a minimum duration.

Maximum Number of Connections:

- Each Water Service Stub shall be designed to accommodate a maximum of 3 individual customer connections.
- The design shall consider future expansion and increased demand, ensuring scalability.

Contractor's Deliverables:

- The contractor shall provide the following deliverables upon completion of the Water Service Stub installation:
- As-built drawings indicating the precise location and details of the installed water service stub.
- Pipe material certificates confirming the use of ductile iron pipe meeting ASTM A746 standards.
- Pressure test reports demonstrating the water service stub's ability to withstand specified pressures.
- Installation details outlining compliance with ASPA guidelines and local building codes.
- Documentation for tapping procedures, including saddle tapping in accordance with relevant standards.
- Certification of the concrete collar for curb stops, attesting to the use of 3500 psi concrete and adherence to specified dimensions and rebar spacing.
- Verification reports for minimum spacing requirements and compliance with additional specifications.
- Service order requests to ASPA Customer Service for water meter relocation, including payment receipts for all associated costs.
- Any other documentation required by ASPA to ensure the integrity, safety, and compliance of the water service stub.

END OF SECTION

Sub-Section 33 10 04 - Customer Water Meter

1. Scope

This technical specification outlines the requirements for the supply, installation, and testing of customer water meters in accordance with industry standards and regulations. The contractor is responsible for providing all necessary materials, equipment, and labor to complete the installation.

2. Applicable Standards and Regulations

All work must comply with the following standards and regulations:

- American Water Works Association (AWWA) Standards
- National Plumbing Code
- Local Water Authority Regulations

3. Materials

3.1 Water Meters:

- Meters shall comply with AWWA Standard C700 for cold-water meters.
- Meters must be of the positive displacement type, with a minimum accuracy class of 1%.

3.2 Piping:

- Pipes shall be Type K copper, complying with ASTM B88 standards.
- All fittings and connections must be lead-free and comply with NSF/ANSI 61.

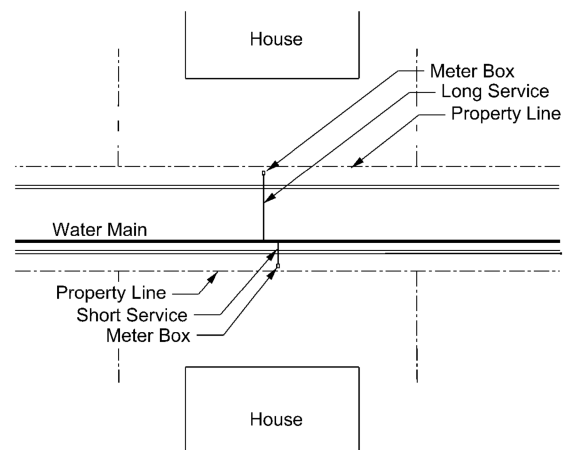
3.3 Valves:

- Non-rising stem gate valves shall be installed on both sides of the meter for maintenance purposes.
- Valves must comply with AWWA C509 standards.

4. Installation Requirements

4.1 Location:

- Meters should be installed in a location easily accessible for reading and maintenance.
- The installation should comply with local building codes and water authority regulations.
- When replacing an existing water service, the contractor shall pothole the private, customer side of the existing meter box before any water service disruption to



determine the fittings required for reconnection and the final location of the new meter box.

- Meter boxes shall not be located in areas subject to vehicular traffic.
- The maximum allowed location for the water meter shall be 10'-0" from the nearest edge of the existing main road.
- Only ASPA is allowed to relocate water meters. It shall be the contractor's responsibility to request a service order to ASPA Customer Service and pay all associated costs.

4.2 Meter Setting:

- Meters must be set level and securely anchored to prevent movement.
- The meter face should be easily readable and oriented for convenient reading.

4.3 Paving Considerations:

- Meter boxes or vaults must be located within the public right-of-way (ROW), water easement.
- Each meter must be located out of a driveway, paved area, or sidewalk. If located in a paved area, a traffic-rated meter box and separation pavers or expansion joints shall be required.
- Water meters shall not be located in areas subject to vehicular traffic.

5. Testing and Commissioning

5.1 Leak Test:

- Conduct a pressure test to ensure there are no leaks in the system.
- Repair any identified leaks before proceeding with commissioning.

5.2 Accuracy Test:

- Perform a flow test to verify the accuracy of the water meter.
- Adjust or replace any meters not meeting the specified accuracy requirements.

6. Documentation

The contractor shall provide the following documentation upon completion:

6.1 As-Built Drawings:

- Detailed drawings indicating the as-installed location of the water meter, valves, and associated piping.

6.2 Testing and Certification:

- A report documenting all testing procedures, results, and certifications for the installed water meter.

6.3 Operation and Maintenance Manual:

- A comprehensive manual outlining the operation, maintenance, and troubleshooting procedures for the customer water meter.



7. Contractor's Deliverables

The contractor is responsible for delivering the following:

7.1 Materials:

- All materials (not listed in the ASPA supplied materials) must be delivered to the site in accordance with the project schedule.

7.2 Installation:

- The completed installation of the water meter system, meeting all specified requirements and standards.

7.3 Documentation:

- As-built drawings, testing and certification reports, and an operation and maintenance manual must be submitted to the client upon completion.

8. Compliance and Inspection

The installation will be subject to inspection by ASPA to ensure compliance with the specified standards and regulations. The contractor shall coordinate with the relevant authorities for inspections and approvals.

9. Health and Safety

All work must be conducted in compliance with relevant health and safety regulations. The contractor is responsible for providing a safe working environment and ensuring the well-being of their personnel and others on-site.

END OF SECTION



Section 30 20 00 - Water Transmission & Distribution Mains

1.1. GENERAL

1.1.1. SECTION INCLUDES

This section includes water pipe, gate valves, hydrants, preparation, bedding, installation, and disinfection.

1.2. STANDARDS

1.2.1. ANSI/AWWA C104/A21.4 – Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water

1.2.2. AWWA C105 – Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.

1.2.3. ANSI/AWWA C110/A21.10 – Ductile Iron and Gray Iron Fittings, 3 Inch Through 48 Inch, for Water and Other Liquids

1.2.4. ANSI/AWWA C111/A21.11 – Rubber-Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings

1.2.5. ANSI/AWWA C150/A21.50 – Thickness Design of Ductile Iron Pipe

1.2.6. ANSI/AWWA C151/A21.51 – Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids

1.2.7. ANSI/AWWA C153/A21.53 – Ductile Iron Compact Fittings, 3 Inch through 16 Inch, for Water and Other Liquids

1.2.8. ANSI/AWWA C502 – Dry Barrel Fire Hydrants

1.2.9. AWWA C503 – Wet-Barrel Fire Hydrants

1.2.10. AWWA C504 – Rubber-Sealed Butterfly Valves

1.2.11. ANSI/AWWA C509 – Resilient Seat Gate Valves for Water and Sewerage Systems

1.2.12. ANSI/AWWA C515 – Reduced Wall, Resilient Seated Gate Valve for Water Supply Service

1.2.13. ANSI/AWWA C600 – Installation of Ductile Iron Water Mains and Their Appurtenances

1.2.14. ANSI/AWWA C605 – Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

1.2.15. ANSI/AWWA C651 – Disinfecting Water Mains

1.2.16. ANSI/AWWA C900 – Polyvinyl Chloride (PVC) Pressure Pipe, 4 Inch through 12 Inch, for Water Distribution

1.2.17. AWWA C901 – Polyethylene (PE) Pressure Pipe, Tubing, and Fittings, ¾ inch through 3 inch, for Water.

1.2.18. ASTM D 1785 – Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

1.2.19. ASTM D 2241 – Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).

1.2.20. ASTM D 2466 – Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.

1.2.21. ASTM D 2855 – Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

1.2.22. ASTM D 2239 – Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter.



- 1.2.23. ASTM D 3139 – Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
- 1.2.24. ASTM F 477 – Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- 1.2.25. Standard Methods for Examination of Water and Wastewater
- 1.2.26. NSF 60 - Drinking Water Treatment Chemicals
- 1.2.27. NSF 61 - Drinking Water System Components

1.3. SUBMITTALS

- 1.3.1. Water Main and Fittings
- 1.3.2. Special Anchoring Retainer Glands
- 1.3.3. Gate Valves and Boxes
- 1.3.4. Fire Hydrants and Flush Hydrants
- 1.3.5. Warning Tape
- 1.3.6. Tracing wire, Box and Splice Materials
- 1.3.7. Method of Disinfection
- 1.3.8. Water Testing Lab
- 1.3.9. Method of Connection to Existing Distribution System
- 1.3.10. Method of Pressure Testing
- 1.3.11. Pressure Test Certification Forms

1.4. QUALITY ASSURANCE

- 1.4.1. Water testing shall be done by the AS-EPA certified laboratory.
- 1.4.2. Pipe: Perform work in accordance with the manufacturer's recommended procedures.
- 1.4.3. Valves: Mark manufacturer's name and pressure rating on valve body.

1.5. INSTALLATION

- 1.5.1. Maintain separation distances of water main from sewer pipe as per American Samoa Environmental Protection Agency specifications.
- 1.5.2. Route pipe in straight line.
- 1.5.3. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- 1.5.4. Install water mains and appurtenances in the locations and of the sizes and materials shown on the drawings and bid schedule.
- 1.5.5. Ensure that ends of pipe in the trench are plugged during all work interruptions and all other times necessary to prevent soil, rodents and trench water from entering the pipeline or contaminating the joints.
- 1.5.6. Promptly remove all debris that enters the pipeline and swab the area with a 1% hypochlorite solution.
- 1.5.7. Install pipe with a minimum cover depth of 36-inches measured from finished grade to top of pipe.
- 1.5.8. Install thrust restraint on all fittings and appurtenances.
- 1.5.9. Pour thrust blocks against the fitting and undisturbed earth. Place concrete thrust blocks so that the pipe and joints will be accessible for repair.
- 1.5.10. Install rebar around the fitting and embed rebar in concrete thrust block as shown on detailed drawings.



- 1.5.11. Use full 20-foot sections of pipe out of fittings or valves, otherwise use restrained joints within 20-feet of fitting or valve.
- 1.5.12. Form and place concrete for thrust restraints at each elbow or direction change of pipe main.
- 1.5.13. Install Metallic Tracer Tape buried continuously at 12 inches below finish grade.
- 1.5.14. Backfill per Section Excavating, Trenching and Backfilling.
- 1.5.15. Install marker post at all bends, gate valves...etc. as shown on details.
- 1.5.16. Provide accurate As-built Drawings and Reference Points to accurate locations with a minimum of 2 points for minor and 3 points for major appurtenances.

Sub-Section 33 20 01 - Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe

1.1. SCOPE OF WORK

This section specifies molecularly oriented polyvinyl chloride (PVCO) pressure pipe, including standards for dimensionality, testing, quality, practice, safe handling and storage.

1.2. STANDARDS

- AWWA C909-09 : Molecularly Oriented Polyvinyl Chloride (PVCO) Pressure Pipe 4” through 24” (100 mm through 600mm) for Water, Wasterwater and Reclaimed Water Services
- ASTM F1483: Standard Specification for Oriented Poly (Vinyl Chloride) (PVCO) Pressure Pipe.
- ASTM D1784: Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
- ASTM D3139: Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals.
- ASTM F477: Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipes.
- NSF-14: Plastics Piping System Components and Related Materials
- NSF-61: Drinking Water System Components--Health Effects

1.3. WARRANTY

A one-year warranty for the pipe shall be included from the Contractor, and shall cover the cost of replacement pipe and freight to project site, should the pipe have any defects in material or workmanship.

Unless otherwise specified, the warranty periods shall begin after the Certificate of Acceptance is issued for the contract.

1.4. PRODUCTS

ASPA supplied materials refer to Material Specifications and list of materials provided by ASPA. Contractor will provide any and all materials needed to complete the works not included in the list of materials.

1.5. SUBMITTALS

General: Provide all submittals, including the following prior to pipe installations.

- Pipe joints, fittings, sleeves and cleanouts. Where special designs or fittings are required, show the work in large detail and completely describe and dimension all items.

- Fully dimensioned drawings of piping layouts, including fittings, couplings, sleeves, cleanouts, valves, supports and anchors. Label pipe size, materials, type, and class on drawings and include the limits of each reach of restrained joints. Provide cross sections showing elevations of cleanouts, pipes, fittings, sleeves, and valves.
- Field quality-control test reports.

1.6. EXECUTION

Delivery and Off-Loading

- a. All pipes shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer or engineer.
- b. All pipes shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer or engineer.
- c. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify the Engineer or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.
- d. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier's guidelines shall be followed
- e. Off-loading devices such as chains, wire rope, chokers, or other pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.
- f. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.
- g. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that the pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

Handling and Storage

- a. Any length of pipe showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the Engineer or engineer.
- b. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the Engineer or engineer.
- c. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
- d. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

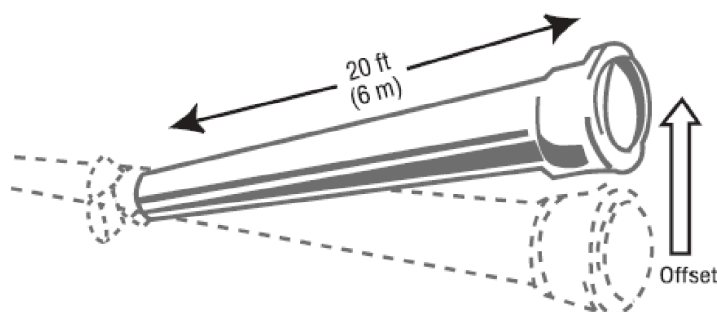
- e. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

1.7. CURVATURE OF THE PIPELINE:

1. Pipeline Curvatures can be achieved by using PVC Fittings. Standard elbows for molded fittings include 22 1/2, 45 and 90 degrees. The cut lengths and radii are as follows:

Size		Cut Length		Radius	
in	mm	in	mm	ft	m
6	150	36	910	22	6.7
8	200	36	910	21	6.3
10	250	42	1070	26	7.9
12	300	48	1220	30	9.2
14	350	60	1520	40	12.2
16	400	72	1830	48	14.6
18	450	74	1870	49	14.8
20	500	82	2080	54	16.5
24	600	98	2480	67	20.3

2. The procedure for offsetting pipe gasketed joint is shown below. Warning: **“DO NOT COMBINE THIS METHOD WITH BENDING THE PIPE BARREL”**.
3. Make a concentric assembly, but push the spigot into the bell only to a point about ½ inch (13 mm) short of the reference line (the first reference line if there are two). This incomplete assembly permits more movement of the end of the pipe at the bottom of the bell.
4. Without delay, shift the loose bell end of the assembled length by not more than the following recommended maximum offsets. Use only manual effort.



Maximum Recommended Offsets, To Achieve Minimum Curve Radius By Deflecting A Straight Length Of Pipe At The Joint.

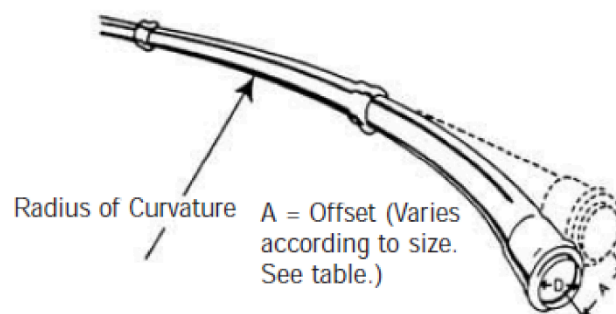
Pipe Size		Max Offset		Angle at One Bell	Resulting Radius of Curvature Using 20ft (6m) Lengths	
in	mm	in	mm			
4	100	12½	320	3°	382 ft	116 m
6	150	12½	320	3°	382 ft	116 m
8	200	12½	320	3°	382 ft	116 m
10	250	12½	320	3°	382 ft	116 m
12	300	10½	270	2.5°	458 ft	140 m
14 - 24	350 - 600	6¼	160	1.5°	764 ft	233 m
30 - 48	750 - 1200	4	100	1.0°	1146 ft	349 m
At Molded PVC Fittings (all sizes)		4	100	1.0°**	1146 ft	349 m

** Bell-by-Bell fittings such as tees and couplings offer a total of 2° deflection per fitting.

5. Smaller diameters of PVC-O Pressure pipes can be laid to the line of the curved trench by bending the pipe barrel into curved shape. The procedure is as follows:
 - a. Make a concentric assembly in the usual way. Keep the spigot in straight alignment with the bell.
 - b. Place compacted backfill around the assembled joint to restrict its movement while the curvature is being made.
 - c. Place compacted backfill at the inside of the curve, at the midpoint of the pipe length, to form a fulcrum.

Using only manual effort, move the leading bell of the pipe length to be curved by no more than the offset distance shown in the following table below.

Tapping bent PVCO pipe is permitted BUT it is recommended to tap on straight or not bended pipe.



NOTE: Bent Pipes should be clearly marked along their length to avoid the possibility that they will be tapped in the future.

MAXIMUM RECOMMENDED OFFSETS, TO ACHIEVE MINIMUM RADII OF CURVATURE BY BENDING THE BARREL OF 20 ft (6 m) LENGTHS.

**CIOD Pipe – Blue Brute™
& Bionax® C909 Pipe**

Pipe Size D	Max Offset		Resulting Angle of Deflection	Resulting Radius of Curvature	
in	mm	in	mm	ft	m
4	100	24	600	5.7°	100 30
6	150	17	430	4.0°	144 44
8	200	13	300	3.0°	188 58
10	250	10	254	2.5°	232 71
12	300	8.7	221	2.1°	275 84

NOTE: Minimum radius is approximately 250 times nominal OD

**IPS OD Pipe – Cycle Tough™
F1483 Pipe**

Pipe Size D	Max Offset A		Resulting Angle of Deflection	Resulting Radius of Curvature	
in	mm	in	mm	ft	m
4	100	32	813	7.6°	75 23
6	150	22	560	5.2°	111 34
8	200	17	430	4.0°	144 44
10	250	13	330	3.2°	179 55
12	300	11	280	2.7°	213 65

NOTE: Minimum radius is approximately 200 times nominal OD

* SDR and DR both refer to the outside diameter of the pipe divided by pipe thickness: $\frac{O.D.}{t}$

1.8. JOINT THRUST RESTRAINT (BELL RESTRAINT HARNESS SERIES)

- A split ring shall be used behind the pipe bell and a split serrated ring shall be used to grip the pipe.
- Hardware: Sufficient number of bolts shall be used to connect the bell ring and the gripping ring. The combination shall have a minimum pressure ratings as shown on the table below:

Nominal Pipe Size	Series Number	A	B	C	D	Thrust Bolt (Number - Size)
		Pipe O.D.	Maximum Bell O.D. Cleared	Max. Restraint O.D. (Casing Clearance)	Overall Length	
4	1604	4.80	6.75	9.25	13	2 - ¾ x 13
6	1606	6.90	8.75	11.25	18	2 - ¾ x 18
8	1608	9.05	12.25	14.75	18	2 - ¾ x 18
10	1610	11.10	14.20	16.85	22	4 - ¾ x 22
12	1612	13.20	16.90	19.45	22	4 - ¾ x 22

NOTE: Dimensions are in inches and are subject to change without notice.

Installation Instruction:

- Assemble the push-on joints as per the pipe manufacturer's instructions.
- Install both halves of the non- serrated bell ring around the pipe behind the bell. Install the side bolts and tighten each to 60 ft-lbs (110 ft-lbs on 8, 10 and 12 inches diameters).
- Slide the bell ring toward the bell so it fits snugly behind the bell.
- Remove the side bolts from the serrated restraint ring. Use the tie bolts to determine the proper location of the restraint ring on the spigot Allow enough room on the tie bolt to fully engage the butts.

- v. Install both half of the restraint ring at the proper location, tapping each half into place. Make sure that the complete ID is touching the pipe before installing the side bolts evenly to 60 ft-lbs (110 ft-lbs on 8, 10 and 12 inches diameters). Place nuts on the tie bolts and tighten until they are snug. Allow enough room on the tie bolt to fully engage the nut with several threads showing. Do not tighten these bolts to force the spigot into the bell of the joint.

1.9. JOINT THRUST RESTRAINT (CONCRETE THRUST BLOCKS)

Design Mix: One part Portland cement, 2 ½ part of fine aggregate, 3 ½ parts coarse aggregate and just enough water for a workable consistency with slump of 4" maximum.

Rebars: #4 Epoxy coated rebars to be provided by the contractor

Fittings used for changes in direction and all in-line valves will require thrust blocking or restraints, which must be formed against a solid wall.

Do not machine dig at these fitting areas because the excavator will usually dig too far and damage the bearing surface of the trench wall. A small amount of hand digging just behind the fitting location will ensure a solid trench wall for thrust block construction later on.

1.10. PIPE LUBRICANT

Pipe joint lubricant must be tested and approved (NSF approved) for potable water service. Do not use non-approved lubricant, which may harbor bacteria or damage the gaskets or drinking water.

After spigot end is lubricated, do not allow it to contact the bedding material. Small pieces of stone or soil may adhere to the lubricant and may become lodged between the spigot and the gasket upon assembly, resulting in a possible leak

1.11. DETECTABLE WARNING TAPE

Install locator tape directly above new pipe approximately 15 inches below finished grade. Bring tape to surface and terminate in valve box or other structure.

Tape shall be detectable metallic locator tape, specifically manufactured for marking utilities with a minimum width of 6 inches and detectable at a depth of 18".

Tape for potable water shall be marked "WATER" and blue colored

1.12. PVCO PIPELINE CONSTRUCTION

Pipe and accessories should be inspected for defects and cleanliness prior to lowering into the trench.

Any defective, damaged or unsound material should be repaired or replaced and foreign matter or dirt should be removed from the interior of the pipe and accessories before lowering into the trench.

All pipe, fittings, valves and accessories should be carefully lowered into the trench using suitable equipment in such a manner as to prevent damage to pipe and accessories. **PIPE AND ACCESSORIES SHOULD NEVER BE DROPPED OR DUMPED INTO THE TRENCH.**

The joint assembly is a push-on assembly in which the lubricated spigot end is inserted under the rubber gasket and into the bell as described in this installation guide. The joint assembly provides for the completion of tight, dependable joints in minimum time when the following procedure is adhered to.

- Make certain that the gasket and bell is clean, with no dirt or foreign material that could interfere with proper seating of the gasket or assembly. If necessary, wipe the gasket and bell with a clean, dry cloth.
- Lubricating the gasket is not recommended.
- Make sure pipe end is clean. Wipe with a clean dry cloth around the entire circumference from the end to 1 inch beyond the reference mark.
- Lubricate the spigot end of the pipe. Be sure to cover the entire spigot end circumference, with particular attention paid to the beveled end of the spigot. The coating should be the equivalent of a brush coat of enamel paint. Lubricant can be applied to the pipe by hand, cloth, pad, sponge or glove. Lubrication of the gasket and/or ring groove may result in displacement during assembly.
- Insert the beveled spigot end into the bell so that it is in contact with the gasket. Hold the pipe lengths being joined close to the ground and keep the lengths in proper alignment. Brace the bell while the spigot end is inserted under the gasket, so that previously completed joints in the line will not be closed up or over-assembled.
- Push the spigot end in until the reference mark on the spigot end is flush with the end of the bell, as seen in Stabbing is not recommended and should be avoided to prevent damage to the gasket and joint.
- If a pry bar, or backhoe is used for any assembly, a wood plank should be placed between the pipe and the machine to prevent damage. In addition, the force applied must be steady and constant. Do not ram or hit the pipe. For all pipe, a come-a-long jack is recommended over a backhoe.
- The method of attachment to the pipe must not abrade or damage the pipe in any way. Steps must be taken during installation using these methods to maintain correct alignment of the pipe. As well, a helper should be present in all cases to assist the operator in knowing when the reference mark is reached properly.

A square cut is essential to ensure proper assembly and/or beveling. PVC pipe can easily be cut with a fine-toothed hacksaw, handsaw or a power type saw with a steel blade or abrasive disc. Do not use standard pipe cutters. The cutting wheel may crush or damage the pipe. It is recommended that the pipe be marked around its entire circumference prior to cutting to ensure a square cut. Do not burn the pipe while cutting.

Use a factory-finished beveled end as a guide to determine the angle and length of taper. The end may be beveled using a plastic pipe-beveling tool which will cut the correct taper automatically or such tools as the Stanley “Surform” No. 399, a coarse file or rasp. A portable sander or abrasive disc may also be used to bevel the pipe end. Remove all burrs and raised edges prior to assembly to avoid cutting the gasket.

With a pencil, crayon or permanent marker, locate the reference mark at the proper distance from the beveled end. The reference mark may also be located accurately by using a factory-marked end of the same pipe as a guide.

A. BEDDING, HAUNCHING AND INITIAL BACKFILL MATERIAL

Imported Bedding, Haunching and Initial Backfill Materials: Use one of the following materials.

- Native bedding, native haunching and native initial backfill material free from particles greater than 1-inch in dimension.
- Black sand or 1/4" minus crushed rock.

B. FINAL BACKFILL MATERIAL

- Free from soil chunks larger than 3-inches in dimension.
- Free from stones or rocks larger than 3-inches in dimension.
- Free from organic materials.
- Free from frost chunks.
- Free of Toxic Waste or Hazardous Chemicals per American Samoa Environmental Protection Agency Requirements. Certified if possible.

C. SLURRY MIX / CONTROLLED LOW STRENGTH MATERIAL (CLSM)

Conform to American Samoa Department of Public Works Standard Specification for Construction of Local Streets and Roads as applicable.

General Requirements: Pipe cushion and pipe bedding shall conform to ASPA Requirements. ASPA requires the use of CLSM for trench backfills where specified in the construction documents. The purpose of the specification is to mitigate settlement of poorly compacted trench backfill. The use of CLSM applies for all follow-on utility trench work into the existing pavement. This specification does not apply to new pavement. This work shall consist of

furnishing all materials, labor, equipment and incidentals necessary for the backfilling of utility trenches in existing roads and sidewalks.

REFERENCES

- American Samoa Department of Public Works:
- Standard Specifications for Construction of Local Streets and Roads
- Specifications on Road Restoration for backfill requirements under roadways.

SUBMITTALS

Submit manufacturer's certification of CLSM and include unconfined 28-day compressive strength, unit weight test data for each mixture used. Test data shall be current, having been obtained within 6 months of proposed use.

PRODUCTS

CLSM shall include mixture of portland cement, aggregate, admixtures, foaming agents (if required), and water. Provide a flowable CLSM with aggregate in suspension. Proportion CLSM to produce the following:

- Backfill material that is self-compacting and able to be excavated, in the future, with conventional excavation equipment.
- Uniform, flowable mixture that is self-leveling when placed.
- 28-day compressive strength between 50 psi to 150 psi.
- It must be removable with light machinery and also quickly stable to support paving operations.

EXECUTION

Check trench sides and bottom for cracks, voids, or other defects that may cause CLSM to escape trench. Plug or repair as necessary. Do not place CLSM until the APE has been notified and has been given an opportunity to inspect trench. Place CLSM as not to displace the pipe bedding material.

Secure pipes and culverts within backfill area with straps, soil anchors, or other means to restrain pipes and culverts at grades indicated in the contract documents. Submit proposed restraint method.

Seal conduits as necessary to prevent CLSM from flowing into conduits.

Place CLSM by chutes or pumps. Place CLSM around manholes and in utility trenches in a manner to prevent floating conduits due to fluid pressure from CLSM. The maximum layer thickness for CLSM shall be determined by the Contractor. Additional layers shall not be placed until the backfill has lost sufficient moisture to be walked on without indenting more than 2

inches. Allow bleed water to rise and divert away from placement area before the next layer of CLSM is added.

Place CLSM to fill line indicated in the contract documents, without vibration or other means of compaction. Provide sufficient supply to allow CLSM lifts to be placed without interruption.

In pavement trenches, limit fill so top of CLSM will not be higher than bottom of aggregate base course or drainage layer. Fill voids completely with CLSM during backfill operation.

If aggregate base course or drainage layer exists, reconstruct aggregate base course or drainage layer as specified in the contract drawings. If drawings or details do not exist, match existing thicknesses and grades.

Protect CLSM and backfill material from traffic during period before restoration of pavement section. Do not place and compact subbase or base course until a minimum 24-hours after placement.

Application of curing compounds or curing methods to CLSM will not be required.

MEASUREMENT AND PAYMENT

This work shall consist of furnishing all materials, labor, equipment and incidentals necessary for the backfilling of utility trench with CLSM in existing roads utility trench excavations.

D. EXCAVATION

- Conform to applicable safety laws, including, but not limited to, OSHA 29 CFR Part 1926.
- Obtain all permits from the appropriate road agencies for construction within road right of way.
- Repair damage resulting from settlement, slides, cave-ins, water pressure, and other causes.
- Provide traffic control and other temporary provisions in accordance with American Samoa Department of Public Works, Department of Public Safety, and PNRS Encroachment Permit Conditions.
- Remove brush, trees and stumps from excavation and site.
- Strip and stockpile existing topsoil.
- Maintain surface drainage away from trenching or excavation.
- If existing soil cannot provide uniform and stable bearing support along the length of the pipe, or if the existing soil contains stones greater than 1-inch in dimension, then over-excavate 6-inches below the bottom of the pipe.
- If the trench is more than 5' in depth, the contractor must conform to OSHA guidelines on Trench Safety and Shoring. In addition the contractor must conform to all other State and County requirements for Trench Safety and Shoring.
- Contractor will be responsible for disposal of excavated materials during excavation. Contractor must identify, with approval from the Project Engineer or the American Samoa

Environmental Protection Agency, the construction disposal site before construction can begin.

E. TRENCHING

- Total Bottom Width: As indicated on plans.
- Depth: Provide minimum cover as specified, or depths shown on plans.
- Top Width: As needed to meet safety requirements, but minimize the width where possible.
- Trench Walls: Keep trench walls vertical in the pipe embedment zone.
- Length of Open Trench:

Unless authorized by the Project Engineer in writing, the length of trench excavation in advance of pipe being laid shall not exceed 200-feet during active construction.

All trenches must be backfilled during non-work hours, or alternately, up to 20-feet of trench can be left open during non-work hours if the trench is completely barricaded and fenced.

All trenches must be backfilled during non-work hours. If open trenches in excess of this specification result in the wetting of moisture-sensitive stockpiled materials, such that the moisture content makes it impossible to meet compaction requirements, the contractor shall provide imported material that complies with these specifications and haul away the wet materials at no expense to the project or the Owner.

F. BEDDING

Where over excavation is necessary, install a minimum of 6-inches of imported bedding.

Level and form the bottom of the trench to provide uniform bearing support along the length of the pipe

Compaction of Imported Bedding: Meet the following density requirements based on standard proctor (ASTM D698):

Location	Percent of Max. Dry Density Required
Areas of Recent Fill or Embankment	95%

Areas Traveled By Vehicular Traffic, Rights-of-Way	90%
Unimproved Surfaces or Fields	80%

G. HAUNCHING AND INITIAL BACKFILL

Provide complete and uniform bearing and support for the pipe, including allowance for bell holes.

Work material under the pipe haunches and around the pipe to ensure full pipe support.

Place material in lifts no greater than 6-inches thickness in loose measure.

Install initial backfill to a depth of 6-inches over the crown of the pipe.

If deemed necessary by the Project Engineer, and as required by road owner use imported material for PVC and Polyethylene pipe in accordance with ASTM D 2774 and/or road owner requirements.

Pipe Diameter	Maximum Particle Size
4 inch and under	½ inch
6-8 inch	¾ inch
10-16 inch	1 inch
16 inch and larger	1-1/2 inch

Compact haunching material and initial backfill using walk-behind vibratory plate compactor or manual hand-tamping tools. Ensure no contact between compacting equipment and the pipe.

Prohibited Compaction Equipment for Haunching and Initial Backfill:

- hoe-pack
- hydro-hammer
- rammer-tamper
- vibratory rollers

Prevent movement of the pipe during placement or compaction of material.

Meet the following density requirements based on standard proctor (ASTM D698):

Location	Percent of Max. Dry Density Required
Areas of Recent Fill or Embankment	95%
Areas Traveled By Vehicular Traffic, Rights-of-Way	90%
Unimproved Surfaces or Fields	80%

H. FINAL BACKFILL

If moisture content of the native soil results in the inability to meet compaction requirements (due to fines), use imported material

Waste or haul away material not meeting the requirements at contractor's expense.

Repair any trenches improperly backfilled or where settlement occurs, then refill and compact.

I. COMPACTION:

Install 2-feet of total fill over the pipe crown before subjecting the trench to hydro-hammers, hoe-packs, or vehicular traffic.

Backfill in lifts to meet compaction requirements throughout the full depth of backfilled trench.

Compact to the following requirements (Densities as a percent of Standard Proctor):

Use smaller lifts if necessary to meet the in-place density requirements.

J. REMOVAL OF NUISANCE WATER

Control site drainage, springs and runoff, and prevent water from adversely affecting trenching locations.

Remove nuisance water entering the trenches. Water that can be removed through the use of sump or trash pumps will not be considered dewatering.

Keep trenches free from standing water until the facilities are in place, the end plugged against the entrance of water, and backfill has been placed and compacted.

K. LOCATE EXISTING UTILITIES

Field locates all existing underground utilities.

Contact ASPA Water Division, Power Division, and Wastewater Division 48-hours in advance of work in areas needing utility location service. Call 684-699-1234.

L. UTILITY CONFLICTS

Protect existing utilities from damage during excavation and backfilling operations.

Provide temporary support for existing water, gas, telephone, power, or other utility services that cross the trench until the backfilling of trench is complete.

Compact backfill to 95% of maximum density under disturbed utilities.

Coordinate the repair of existing utilities, regardless of whether they were properly located and will be the responsibility of the Contractor to repair, at no cost to the American Samoa Power Authority.

The contractor is responsible for relocating all existing utilities if realignment of the new waterline away from utility is not possible. Contractor must use all means to work around existing utilities and only relocate existing utilities if it is the only feasible option.

END OF SECTION



Sub-Section 33 20 02 - Trace Wire for Mainlines

I. Trace wire

All trace wire and trace wire products shall be domestically manufactured in the U.S.A.

All trace wire shall have HDPE insulation intended for direct bury, color coated per APWA standard for the specific utility being marked.

Trace wire shall be #12 AWG Copper Clad Steel, High Strength with minimum 450 lb. break

J. Connectors

All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At Crosses, the four wires shall be joined using a 4-way connector. Use of two 3-way connectors with a short jumper wire between them is an acceptable alternative.

Direct bury wire connectors – shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.

Non locking friction fit, twist on or taped connectors are prohibited.

K. Termination/Access

All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.

All grade level/in-ground access boxes shall be appropriately identified with “sewer” or “water” cast into the cap and be color coded.

A minimum of 2 ft. of excess/slack wire is required in all trace wire access boxes after meeting final elevation.

All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.

Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.

- **Service Laterals on public property** - Trace wire must terminate at an approved grade level/inground trace wire access box, located at the edge of the road right-of-way, and out of the roadway.

- **Service Laterals on private property** - Trace wire must terminate at an approved above-ground trace wire access box, affixed to the building exterior directly above where the utility enters the building, at an elevation not greater than 5 vertical feet above finished grade, or terminate at an approved grade level/in-ground trace wire access box, located within 2 linear feet of the building being served by the utility.
- **Hydrants** – Trace wire must terminate at an approved above-ground trace wire access box, properly affixed to the hydrant grade flange. (affixing with tape or plastic ties shall not be acceptable)

Long-runs, in excess of 500 linear feet without service laterals or hydrants - Trace wire access must be provided utilizing an approved grade level/in-ground trace wire access box, located at the edge of the road right-of-way, and out of the roadway. The grade level/in-ground trace wire access box shall be delineated using a minimum 48" polyethylene marker post, color coded per APWA standard for the specific utility being marked.

L. Grounding

Trace wire must be properly grounded at all dead ends/stubs

Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20ft of #12 red HDPE insulated copper clad steel wire connected to anode (minimum 1.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.

When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.

When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.

Where the anode wire will be connected to a trace wire access box, a minimum of 2 ft. of excess/slack wire is required after meeting final elevation.

M. Installation

Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512Hz) signal for distances in excess of 1,000 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.

Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.

Trace wire shall be installed at the bottom half of the pipe and secured (taped/tied) at 5' intervals.

Trace wire must be properly grounded as specified.

Trace wire on all service laterals/stubs must terminate at an approved trace wire access box located directly above the utility, at the edge of the road right-of-way, but out of the roadway. (See Trace wire Termination/Access)

At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire. (See Grounding)

Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline deadend, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.

All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.

In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.

N. Water System

A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.

Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.

Trace wire on all water service laterals must terminate at an approved trace wire access box color coded blue and located directly above the service lateral at the edge of road right of way.

Above-ground tracer wire access boxes will be installed on all fire hydrants.

All conductive and non-conductive service lines shall include tracer wire.

O. Prohibited Products and Methods

14. The following products and methods shall not be allowed or acceptable
15. Uninsulated trace wire
16. Trace wire insulations other than HDPE
17. Trace wires not domestically manufactured
18. Non locking, friction fit, twist on or taped connectors
19. Brass or copper ground rods
20. Wire connections utilizing taping or spray-on waterproofing
21. Looped wire or continuous wire installations, that has multiple wires laid side-by-side or in close
22. proximity to one another
23. Trace wire wrapped around the corresponding utility
24. Brass fittings with trace wire connection lugs
25. Wire terminations within the roadway, i.e. in valve boxes, cleanouts, manholes, etc.
26. Connecting trace wire to existing conductive utilities

P. Testing

4. All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the contractor, engineer and facility owner as applicable, prior to acceptance of ownership.
5. This verification shall be performed upon completion of rough grading and again prior to final acceptance of the project.
6. Continuity testing in lieu of actual line tracing shall not be accepted.

END OF SECTION

Sub-Section 33 20 03 - Ductile Iron Fittings for PVC Pipe

A. Standards

- ANSI/AWWA C153/A21.53,11 : Standard for Ductile-Iron Compact Fittings for Water Service
- ANSI/AWWA C600,12 : Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances
- ANSI/AWWA C100/A21 : Shop-applied, cement-mortar linings
- AWWA C111-12 : Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

B. Installation

Fittings must be flanged for above-ground service or **mechanical joint** for buried service unless otherwise indicated or approved, and must meet all requirements of the standards

Solvent Weld PVC fittings can not be used. Use only M.J. fittings approved for use with AWWA C909 pipe

Use fittings of same size as pipe. Reducers are not permitted to facilitate an off-size fitting. Reducing bushings are also prohibited. Make reductions in piping size by reducing fittings.

Where long radius bends are indicated, fittings must have center-to-face and radius dimensions according to the ANSI B16.1 Class 125 standard for long radius bends and must conform to all other applicable requirements of AWWA C110 including pressure rating.

Must be compatible with joint type of adjacent pipe.

Provide all specials, taps, plugs, flanges, and wall fittings, as required.

C. Joint Restraint

Provide thrust blocks for all horizontal or vertical bends, and on all dead-ends, tee fittings, and changes in pipe diameter.

Construct to undisturbed edge of trench for bearing. Install thrust blocks as indicated on standard detail drawing.

Mechanical joints must be protected by felt roofing paper before placing concrete.

Concrete must not cover joints, bolts or nuts, or interfere with the removal of any joint. Wooden side forms or sand bags must be provided for thrust blocks.

Provide minimum bearing area in square feet based on 150 psi test pressure and 2000 psf soil bearing capacity.

Adjust thrust block areas accordingly if pressures or soil bearing capacity varies.

Restraint follower glands for use with mechanical joint fittings must be used in addition to thrust blocks

Restraint gland must have torque limiting twist-off nuts and must meet the requirements of ASTM 1674-96 for use with PVC pipe and be equal to “MEGALUG®” as manufactured by EBAA Iron, Eastland, TX.

D. Gaskets

Because gaskets supplied for typical water pipe projects using push-on or mechanical joints are made of synthetic rubber, they should be stored in a cool location out of direct sunlight and should have no contact with petroleum products.

Gaskets stored in this way will typically last for years in inventory and should be used on a first-in, first-out basis.

Before use, gaskets should be checked for cracking or deterioration by looping the gasket in the manner done when a gasket is being installed.

SBR (Styrene Butadiene) rubber gaskets are standard for normal service temperatures of up to 120F for mechanical joints and 150F for push-on joints.

Be sure the correct gasket is used with the iron bell or fitting. Do not use the PVC gasket.

Bevel on the spigot should approximate the cast iron bevel, which is shorter and steeper. The reason for this is that the depth of the bell or fitting is shorter than the PVC bell. The reduced length of taper will allow a greater flat sealing surface and minimize the possibility of the gasket seating on the bevel, which may cause leakage.

When connecting to a mechanical joint or flanged fitting, a beveled spigot is not recommended or required. Cut off beveled end of pipe prior to insertion into fitting.

E. Polyethylene Encasement Bag

All cast iron and ductile iron fittings shall be provided with 8 mil polyethylene tube protection. Completely cover all fittings and connections with polyethylene film held securely in place with joint tape or strapping according to the provisions of AWWA C105/A21.5, Class “C” blue .

Clean all dirt, cinders, etc., from the surface of the pipe or fittings. Cut polyethylene two (2) feet longer than the pipe/fittings. Slip polyethylene over spigot end and bunch.

Dig bell holes at joint locations, lower pipe into trench and make up joint. Move cable hoist to bell end of pipe/fittings and lift enough to slip polyethylene along pipe.



Pull polyethylene forward from previous joint over the bell and secure in place. Pull polyethylene from new pipe/fittings over this same bell, providing a double layer of polyethylene and secure in place.

Take up slack in the tube along the pipe barrel, making a snug but not tight fit. Fold over on top of pipe and secure in place about every three (3) feet.

Make sure any tears in the polyethylene are repaired with tape or another piece of polyethylene secured over the damaged area.

Backfill the trench according to specifications, being careful not to damage the polyethylene while tamping around pipe. Backfill should not contain material that might damage the polyethylene.

END OF SECTION

Sub-Section 33 20 04 - Fire Hydrant Assembly

1. Scope

This technical specification outlines the requirements for the construction, installation, and testing of a fire hydrant assembly. The scope of work includes all necessary materials, labor, equipment, and supervision required to deliver a fully operational fire hydrant assembly in compliance with industry standards and local regulations.

2. Standards and Codes

All work shall adhere to the latest editions of the following standards and codes:

- National Fire Protection Association (NFPA) Standards, especially NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances.
- American Water Works Association (AWWA) Standards, including AWWA C502 – Dry-Barrel Fire Hydrants.
- Local building codes and regulations.

3. Design

3.1 Location:

- Fire hydrants shall be located at each street intersection.
- The maximum distance between fire hydrants in residential areas, measured along road centerlines, shall not exceed 500 feet.
- At least one fire hydrant shall be located at each intersection.
- In commercial areas, the maximum distance between fire hydrants along road centerlines shall be 300 feet.
- All fire hydrants shall have full vehicular access via a durable surface and shall not be located within 30 feet of a structure.
- Fire hydrant locations shall be coordinated with the ASPA Engineer.

3.2 Water Mains:

- Water mains supplying fire hydrants shall be 6" or larger.
- Only one (1) fire hydrant may be fed from a single feed (or dead end) 6" water main.
- Valves shall be installed on all hydrant branches.

4. Trench Excavation & Preparation

4.1 Excavation:

- The pipeline trench shall be excavated to the line and gradient shown on the approved drawings.
- The length of the trench ahead of pipe laying operations shall be no more than 100 feet and no less than 20 feet unless warranted by special circumstances, and then only upon approval of the ASPA Engineer.

5. Materials

5.1 Fire Hydrants:

- Fire hydrants shall be of the compression type meeting AWWA C502-80 standards.
- Designed for a minimum working pressure of 150 psi and a hydrostatic test pressure of 300 psi with the valve in both open and closed positions.
- All hydrants shall be equipped with two 2½-inch nozzles and one 4-inch pumper nozzle with bronze nozzles and cast iron caps.
- Open-left hydrants with a pentagon-type operating nut.
- "Dry top" type hydrants with the upper rod threads completely enclosed in a sealed grease or oil chamber, equipped with "O" ring seals and a Teflon thrust bearing.
- Hydrant valve opening shall be of sufficient size to ensure flows and corresponding minimum losses as set forth by the American Water Works Association. The minimum valve opening shall be 4½ inches.
- 6-inch shoe or boot, mechanical joint.
- "Safety" type hydrants to ensure valve closure if the upper barrel is broken.
- Furnished with barrel and stem extensions for a nominal minimum bury of three feet, six inches (3'-6") or as indicated on the Drawings.

6. Installation

6.1 Placement:

- Fire hydrants shall be installed at all points indicated on the drawings and in strict accordance with the standard detail.
- Hydrants shall be set plumb with the steamer nozzle facing the street.
- The area surrounding the hydrant shall be generally flat and clear for a distance of 3 feet in each direction of the hydrant.
- Traffic flange shall be 2" above the finish grade.
- New hydrants shall be factory or field epoxy painted.
- Hydrants shall be lubricated upon completion of installation.

7. Fire Flow Testing

7.1 Procedure:

- Follow AWWA Manual M17, 'Installation, Field Testing, and Maintenance of Fire Hydrants,' for conducting flow testing.
- Perform fire flow testing for each hydrant individually to determine its available fire flow.

8. Fire Flow Color Codes

8.1 Painting:

- All hydrants shall arrive on site painted with standard epoxy red color.
- Fire hydrants shall be color-coded on-site by the contractor, following NFPA Standards, to indicate expected fire flows during normal operation.

- Two coats of weatherproofing epoxy paint shall be applied on the top portion of each hydrant to correspond with the following colors:
 - Blue: > 1,500 GPM
 - Green: 1,000 - 1,500 GPM
 - Orange: 500 - 1,000 GPM
 - Red: < 500 GPM

9. Documentation and Deliverables

9.1 As-Built Drawings:

Provide comprehensive as-built drawings reflecting any changes made during construction.

9.2 Operation and Maintenance Manuals:

Supply detailed manuals outlining the operation, maintenance, and troubleshooting procedures for the fire hydrant assembly.

9.3 Warranty:

Include a written warranty covering the hydrant assembly's materials and workmanship for a minimum of one year from the date of completion.

9.4 Test Reports:

Submit detailed reports of fire flow testing and any other relevant tests conducted during the construction process.

This construction technical specification ensures the proper design, installation, functionality, and fire flow testing of the fire hydrant assembly while emphasizing safety, quality, and compliance with applicable standards. The Contractor is responsible for delivering a fully operational and compliant fire hydrant assembly, including the specified documentation and deliverables.

Sub-Section 33 20 05 - Valves, Fittings And Appurtenances

1. SCOPE OF WORK

1.1 Work Description:

The scope of work includes furnishing and installing the following valves, gates, and appurtenances:

- Gate valves
- Check valves
- Altitude valves
- Pressure reducing valves
- Air release and vacuum valves
- Hose valves
- Service saddles
- Corporation stops
- Curb stops
- Valve boxes
- Pressure gauges
- Water meters
- Fire hydrants
- Pipe Hangers and Saddles

2. STANDARDS AND CODES

2.1 Compliance:

2.1.1 All work shall comply with the relevant industry standards and codes specified in the project documentation, including but not limited to:

- American Water Works Association (AWWA)
- American National Standards Institute (ANSI)
- National Fire Protection Association (NFPA)

3. SUBMITTAL REQUIREMENTS

3.1 Contractor Deliverables:

3.1.1 The Contractor shall submit comprehensive shop drawings, manufacturer's literature, samples, certificates, and guarantees for all materials.

4. OPERATING AND MAINTENANCE INSTRUCTIONS

4.1 Documentation:

4.1.1 The Contractor is responsible for providing detailed operating and maintenance instructions along with parts lists for all installed components.

5. MATERIALS

5.1 Material Specifications:

5.1.1 Materials used in the construction shall conform to the specified Material Specifications provided in a separate document.

6. INSTALLATION OF VALVES, GATES, AND METERS

6.1 General Installation:

6.1.1 Valves, gates, and meters shall be installed in their designated positions without distortion or strain, with joints meeting specified standards.

6.1.2 All stem guides shall be accurately aligned, and valves shall be connected to floor stands where required.

6.1.3 Before installation, thorough cleaning and inspection for proper operation and seating of valves and appurtenances are mandatory.

6.1.4 All valves shall be tested in place under specified conditions, and any defects discovered shall be promptly corrected.

6.1.5 Protection of valves, gates, and meters from rust or damage is required before and after erection.

6.1.6 Post-installation, all items except bronze valves and those underground shall be painted as per specified color codes.

7. INSTALLATION OF VALVE BOXES

7.1 Placement and Backfill:

7.1.1 Valve boxes shall be centered and set plumb over valve wrench nuts without transmitting stress to valves.

7.1.2 Valve box covers shall be set flush with finished pavement or at approved levels.

7.1.3 For valves not in pavement, a steel marker post shall be provided at the property line.

7.1.4 Thorough backfilling and compaction around valve boxes are required to maintain alignment and grade.

8. INSTALLATION OF TAPPING SLEEVES AND SERVICE SADDLES

8.1 Compliance:

8.1.1 Service saddles shall be installed according to the manufacturer's recommendations and appropriate for the pipe material.

9. INSTALLATION OF PRESSURE GAUGES

9.1 Positioning and Testing:

9.1.1 Pressure gauges shall be installed vertically unless otherwise indicated, with suitable mounting brackets for flush or wall mounting.

9.1.2 1/4" female connection tee handle shut-off cocks are mandatory between gauge and gauge tap.

9.1.3 All installed gauges shall be tested for proper operation and protected from corrosion and damage.

10. INSTALLATION OF FIRE HYDRANTS

10.1 Hydrant Installation:

10.1.1 Hydrants shall be installed at specified locations with the barrel vertical.

10.1.2 Barrel wedging against the trench side is required after alignment checks, with removal of wedges after concrete anchor block setting.

10.1.3 Concrete anchor block shall be poured as specified and not disturbed for at least three days.

10.1.4 Prior to final inspection, hydrants shall be cleaned, primed, and painted as specified.

11. HYDRANT GUARD POSTS

11.1 Fabrication:

11.1.1 Hydrant guard posts shall be fabricated from steel pipe, welded neatly, cleaned, primed, and painted in compliance with specifications.

12. DOCUMENTATION AND TESTING

12.1 Quality Assurance:

12.1.1 The Contractor shall maintain comprehensive documentation throughout the project, including records of inspections, tests, and compliance with specifications.

12.1.2 Testing procedures shall adhere to industry standards, and results shall be documented and made available for review.

13. DELIVERABLES

13.1 Project Deliverables:



13.1.1 In addition to shop drawings and documentation, the Contractor shall provide a final report summarizing the installation, testing, and compliance of all valves, fittings, and appurtenances.

END OF SECTION

Sub-Section 33 20 06 - Pressure And Leakage Testing

1.1. SCOPE OF WORK

Test all piping, valves, and appurtenances installed under this Contract. Testing shall be performed concurrent with installation.

1.2. SUBMITTALS

Prepare and submit schedules and procedures to ASPA for testing of all parts of the water main installed in accordance with The Bid Documents and Specifications of the Project. Submit the schedule at least seven days prior to any testing.

1.3. MATERIALS

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials necessary for performing the leakage test shall be furnished by Contractor. Excavate, backfill, and furnish all necessary assistance for conducting the tests.

1.4. PRESSURE TEST

1.4.1. All water mains and appurtenances shall be tested as described herein. The pressure test shall not be performed until the following conditions have been met:

- a. In areas where a pavement surfacing is to be constructed, the pressure test shall be made only after other utilities such as, storm sewers, and sanitary sewers have been installed;
- b. Curbs and gutters have been installed and the subgrade materials portion of the pavement area have been constructed to proper grade and all compaction tests including for water trenches have been approved by ASPA;
- c. All services, fire hydrants, meter boxes and other appurtenances have been installed and adjusted to final grade and location;
- d. All concrete anchor and thrust blocks shall have cured at least three (3) days.
- e. Submittal of as-built drawings and all affidavits and certificates of compliance to the Inspector.
- f. A mechanical separation between the backflow device and pipe sections undergoing pressure test has been provided by means of a blind flange as to not allow any pressure to be exerted against the backflow device check valves or OS&Y/NRS valves.

1.4.2. Perform hydrostatic pressure tests in accordance with AWWA C600 Section 5.

1.4.3. The pressure test shall be maintained on the test section not less than two (2) hours. The Contractor shall conduct a preliminary pressure test after items (a) through (e) of this section above are completed prior to the ASPA witness and final pressure test. The results of the preliminary test will not be considered by ASPA.

1.4.4. The test pressure shall be 200 psi as measured at the highest elevation of the water main under test, but not less than 150 psi at the highest point unless otherwise noted.

1.4.5. The length of water main footage to be tested at one time shall be determined by the Engineer or his designee and shall not exceed 1,000lf.

1.4.6. Each section of the water main to be tested shall be slowly filled with water from the nearest source by a means approved by the Engineer. The pipelines shall be filled with water and placed under a slight pressure for at least twenty-four (24) hours before the pressure test.

1.4.7. All air shall be vented from high spots in the water main, fire hydrants and services before making and pressure test. If hydrants or other outlets are not available, taps shall be made at the high points to expel the air by the Contractor at Contractor's expense. The locations shall be reviewed and approved by ASPA prior to installation. These taps shall be capped by the Contractor after testing

1.4.8. The pressure test shall be applied by means of a pump connected to the pipeline in a manner approved by the Engineer. The pump, pipe connections, bulkheads, pressure gages and other equipment, labor and materials required to perform the test shall be furnished by the Contractor.

1.4.9. The Engineer may check the test pressure by installing ASPA's pressure gages in place of the Contractor's gage. In case of a difference in pressure readings between gages, the ASPA's gage reading shall govern.

1.4.10. All appurtenant facilities shall be tested at the same pressure and for the same duration as the mainline pipe.

1.4.11. All valves shall be tested for leak-proof tightness after the mainline pressure test with the test pressure on one side of the valve and atmospheric pressure on the other side.

1.4.12. Wet tap valve sleeves shall be hydrostatically pressure tested for a period of 1 hour at a test pressure of pipe class plus 50 psi. During and at the end of test, a solution of soapy water shall be applied at all joints to test for leakage. No pressure loss or leakage will be permitted.

1.4.13. All testing shall be made in the presence of the Engineer. The Contractor shall notify the Engineer not less than forty eight (48) hours in advance of the actual time of testing so that the Engineer may observe the procedure.

1.4.14. Adequate backflow protection and proper metering of all potable water shall be provided by the Contractor and approved by the ASPA prior to commencement of any procedure(s) hereinafter.

1.5. ALLOWABLE LEAKAGE

1.5.1. All water mains and appurtenances shall be tested as described herein.

1.5.2. The test pressure applied to the water main for the leakage test shall be maintained as constant as possible for not less than two (2) hours.

1.5.3. The leakage test shall be held concurrently with the pressure test. For C-900 PVC pipe (Class 150), the test pressure shall be 225 psi and the test duration shall be four (4) hours.

1.5.4. The length of fire hydrant laterals and service lines are not included in the overall length of pipe in determining the allowable leakage.

1.5.5. All noticeable leaks shall be stopped regardless of the results of the test and defective pipe, fittings, valves, and other appurtenances discovered during the test shall be removed and replaced. Repair clamps of any kind or type are not allowed. The Engineer is to be notified of any repair work performed. The test shall be repeated until satisfactory results are obtained. All gaskets to be used only once.

1.5.6. No pipeline installation will be accepted by ASPA if the leakage is greater than that shown in the following table or the design pipe leakage allowance:

Allowable Leakage/ 1000 feet (gph)				
Pipe Diameter, D	P = 100 psi	P = 150 psi	P = 200 psi	P = 250 psi
4 inch	0.27	0.33	0.38	0.43
6 inch	0.41	0.50	0.57	0.64
8 inch	0.54	0.66	0.76	0.85
10 inch	0.68	0.83	0.96	1.07
12 inch	0.81	0.99	1.15	1.28

The table has been generated from the formula:

$$\frac{S \cdot D \sqrt{P}}{148,000}$$

Where:

L is the allowable leakage in gallons per hour,

S is the length of pipe in feet,

D is the nominal pipe diameter in inches, and

P is the average test pressure in psig.

1.5.7. It is the Contractor's responsibility for locating leaks and restoring the bedding and pipe zone material in accordance with the Standard Plans and these Specifications. Damage to pipe bedding and backfill resulting from leaks discovered during the pressure leakage test need to be restored in compliance with the specification.

1.5.8. Should any test disclose damaged or defective materials or leakage greater than that permitted, the Contractor shall, at the Contractor's expense, locate and repair and/or replace the damaged or defective materials. Materials used for repair must be approved by ASPA and meet the relevant specifications. Repeat the tests until the leakage is within the permitted allowance and is satisfactory to ASPA.

1.6. Documentation:

Complete pressure test certification forms and submit to Project Engineer within three (3) days of pressure test.

END OF SECTION



Sub-Section 33 20 07 - Flushing & Disinfection Of Water Mains

1.1. SCOPE OF WORK

All water mains and appurtenances shall be cleaned and disinfected prior to acceptance by the ASPA for domestic use.

1.2. SUBMITTALS

Prepare and submit schedules and procedures to ASPA for disinfecting of all parts of the water main installed in accordance with The Bid Documents and Specifications of the Project. Submit the schedule at least seven days prior to any testing.

1.3. MATERIALS

The pump, pipe connection, measuring devices, gages and all other equipment, labor and materials necessary for performing the leakage test shall be furnished by Contractor. Excavate, backfill, and furnish all necessary assistance for conducting the tests.

1.4. FLUSHING

1.4.1. The new mains shall be flushed prior to disinfection.

1.4.2. The flushing velocity to be obtained for pipes 12 inches and smaller in diameter shall not be less than 2.5 ft/sec.

1.4.3. The Contractor shall make necessary arrangements to attain the minimum velocity. The Contractor shall take due precaution in providing for adequate drainage from the site. The minimum volume of water to be flushed, at required velocity, shall be not less than the 1.5 times the volume of the pipe line from the point of filling to the point of blow-off.

1.4.4. The Contractor should verify that proposed hydrants to be used have adequate pressure.

1.4.5. Flushing is no substitute for preventive measures. "Pig" line after flushing if sediment or debris is still visible in the discharge. If, in the opinion of the Engineer, dirt which enters the pipe, the interior of the pipe shall be cleaned and swabbed as necessary with five (5) percent hypochlorite disinfecting solution and may require additional bacteria samples.

1.4.6. It is the responsibility of the Contractor to remove the flushing water or the chlorinated water from the project area. The Contractor is responsible for any damage as a result of flushing operations.

1.4.7. The flushed water shall have a residual chlorine content not to exceed 0.10 mg/L prior to discharging into the storm drain system.

1.5. DISINFECTION OF WATER MAINS

1.5.1. Disinfect in accordance with one of the methods outlined in Section 5 of AWWA C651.

1.5.2. Disinfection shall be done after the pressure and leakage tests have been performed and accepted. Contractor must use a qualified company to chlorinate.

1.5.3. Chlorine used for disinfection must be a liquid chlorine solution by directly feeding hypo (sodium hypochlorite less than or equal 15%; typically 12.5%) or by mixing Cal-hypo (calcium hypochlorite 65-70%) granular or tablets into a liquid solution by pre-dissolving or using a



feeder. Either product sodium hypo or calcium hypo shall be NSF 61 approved for potable water use. Tablets inserted (glued) inside each pipe length shall not be used

1.5.4. Safe handling practices contained in A.W.W.A. Manual M-20 shall be followed by the Contractor.

1.5.5. The chlorine solution shall be applied by;

a. Continuous Feed Method:

1. Feed a chlorine solution into water entering the main such that the water will have a 25-mg/L free chlorine concentration.
2. Continue feeding until the entire pipeline to be disinfected is filled with the chlorinated water.
3. At the end of 24-hours, there must be at least 10-mg/L free chlorine residual as evidenced by residual tests taken at approximately 1200 feet intervals along the main.

b. Slug Method:

1. Feed a chlorine solution into water entering the main such that the water will have a 100-mg/L free chlorine concentration.
2. Apply the solution continuously and sufficiently to ensure that a column of water with 100mg/L free chlorine residual is formed in the pipe.
3. Ensure that all parts of the main and its appurtenances are exposed to the column for at least 3-hours.
4. Check the residual of the column at 1200 feet intervals along the main. If it drops below 50mg/L, inject additional chlorine solution into the entire column such that its residual is raised to 100 mg/L.

1.5.6. For test methods 2 and 3 in Article 3.12 Paragraph A, ensure that the chlorine solution is introduced within 10-feet of the end of the section being disinfected and for all cases is being withdrawn or wasted from the most extreme point relative to the point of water introduction. If branches exist, ensure that the chlorinated solution reaches all portions of the branches.

1.5.7. After disinfection, flush chlorinated water from the pipe in an environmentally safe manner. In no case shall direct disposal to a surface water be permitted.

1.5.8. Check the chlorine residual at time of disposal.

1.5.9. If disposal is to the ground surface or ditch, neutralize the chlorine residual if the free residual is above 1 mg/L.

1.5.10. Use the following neutralization chemical schedule:

1. Sulfur dioxide at 0.8 lb/100,000 gals/mg/L of free chlorine
2. Sodium Bisulfite at 1.2 lb/100,000 gals/mg/L of free chlorine
3. Sodium Sulfite at 1.4 lb/100,000 gals/mg/L of free chlorine
4. Sodium Thiosulfate at 1.2 lb/100,000 gals/mg/L of free chlorine

1.5.11. Continue flushing until the residual reaches distribution system levels.

1.5.12. The Contractor is responsible for any damage as a result of the disinfection operation and shall provide adequate drainage from the project site.

1.6. BACTERIOLOGICAL TEST

1.6.1. A twenty-four (24) hour period between the final flushing and the taking of bacteriological samples is required. No flushing or any movement of water in pipe is allowed during sampling phase. After disinfecting and flushing but before the water main is placed in service, collect and test water samples for bacteriological quality.

1.6.2. Samples will be taken in the field by a certified laboratory technician using a digital colorimeter and transported to the laboratory for testing. Such tests shall meet EPA requirements for drinking water standards. The number and location of such samples will be as directed by the Engineer; however, a minimum of one bacteriological test sample per 500 feet of main and a minimum of 2 samples per day, per test section, are required. One set of samples are required for two consecutive days, 24 hours apart. All samples, each day, must indicate absent for total coliform and have a heterotrophic plate count (HPC) of less than 200 CFU/mL.

1.6.3. Failure of any sample will require complete retesting, under these procedures, for two consecutive days. It is very important that all test results be submitted in writing to the ASPA as soon as available.

1.6.4. All laboratory testing shall be at the Contractor's expense. Original report of the test results shall be given directly to the Engineer.

1.6.5. System connections cannot be scheduled until this report is submitted to the Engineer. All results must be submitted to Engineer or his designee no later than three calendar days of sample date or risk resampling all samples.

1.6.6. Upon successful completion of bacteriological testing, the pipeline will be accepted for use.

1.7. Contractor's Responsibility for Testing and Disinfection

1.7.1. It is the sole responsibility of Contractor to construct a water main capable of passing the pressure and leakage test and to effect a disinfection of the water main.

1.7.2. The fact that ASPA provides inspection during the construction and testing of the water facilities and receives laboratory testing results does not relieve Contractor's responsibility in this regard. It's the responsibility of Contractor to prevent the consumption of water for any and all uses from undisinfected mains whether by their workmen, subcontractors or any other person who may come in contact with the water from the undisinfected main. Contractor shall indemnify and save ASPA harmless from any suits, claims, or actions brought by any person or persons for, or on account of, any sickness or death sustained or arising out of the consumption of water from the main until final acceptance by the ASPA.

END OF SECTION

Sub-Section 33 20 08 - Water Mains Inter-Connections & Tie-in

SCOPE:

1. Preparation Prior to Making Inter-Connections:

- a. Verify approximate locations of existing piping systems as per construction documents.
- b. Field-verify the location, size, piping material, and system of the existing pipe.
- c. Obtain all required fittings, including saddles, sleeve-type couplings, flanges, tees, or others as shown in the construction documents.
- d. Install temporary pumps and/or pipes in accordance with established connection plans.
- e. Assemble and successfully test new piping systems unless otherwise approved.

2. Connection to Existing Water Mains:

- Make necessary arrangements with ASPA a minimum of three (3) working days prior to any connections.
- Assemble all materials, equipment, and labor on-site before starting work.
- Start connections promptly and proceed continuously until completion.
- Notify affected customers 24 hours in advance if water shutoff is required.
- No shutoffs permitted overnight, over weekends, or on Federal holidays. Water shut-off is limited to 4 hours maximum.
- Make connections in a neat, workmanlike manner, adhering to manufacturer's recommendations for wet or dry tapping. Leave a smooth end at right angles to the axis of the pipe.
- Take necessary actions to prevent contamination of the existing main during connection, including preventing trench water, mud, or other contaminants from entering the connection line or main.
- Spray or swab all connection components with a 1% hypochlorite solution before installation.
- Visually inspect any joint not pressure tested for leakage.
- Test under system pressure before backfilling.
- Test in the presence of the ASPA representative.
- Repair and retest any joint with leakage until no leakage is visible at no cost to the Engineer.

STANDARDS AND CODES:

1. American Water Works Association (AWWA):

- a. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast
- b. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings

2. ASTM International:

- ASTM D2774 - Underground Installation of Thermoplastic Pressure Piping
- ASTM D2122 - Test Methods for Determining Dimensions of Thermoplastic Pipe and Fittings



3. ASPA Requirements:

Comply with all specifications, guidelines, and regulations stipulated by the American Samoa Power Authority (ASPA).

CONTRACTOR DELIVERABLES:

1. Verification reports for approximate locations and field verification of existing piping systems.
2. Documentation of fittings procurement and installation plans.
3. Records of temporary pump and pipe installation.
4. Comprehensive assembly and testing reports for new piping systems.
5. Communication records with ASPA for water mains connections.
6. Confirmation of material, equipment, and labor readiness.
7. Notification records for water shutoff to affected customers.
8. Photographic evidence of neat and workmanlike connections.
9. Contamination prevention measures documentation.
10. Records of sanitization procedures.
11. Visual inspection and testing reports for joints.
12. Repair and retest documentation for any leaked joints.

Contractors must adhere to specified standards, codes, and deliverables for successful project completion. Any deviations or exceptions must be approved in writing by the Engineer or relevant authority before implementation.

END OF SECTION

Sub-Section 33 20 09 - Protective Coatings for Metal Surfaces

Part 1 - General

1.1 Summary

This section includes the materials and installation procedures for Denso Tape and Profiling Mastic to protect metal surfaces from corrosion.

1.2 References

- ASTM D1000: Standard Test Method for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
- ASTM G14: Standard Guide for Protective Coatings for Steel and Iron

1.3 Submittals

- **Product Data Sheets:** Submit technical data and manufacturer's specifications for Denso Tape and Profiling Mastic.
- **Samples:** Submit 150mm x 150mm samples of Denso Tape and Profiling Mastic.
- **Warranty:** Submit manufacturer's warranty for the protection and longevity of materials.

1.4 Quality Assurance

- **Manufacturer Qualifications:** Denso Tape and Profiling Mastic must be from a manufacturer with a minimum of 5 years of experience in producing corrosion protection materials.
- **Installer Qualifications:** Installer must have at least 3 years of experience with similar corrosion protection systems.

Part 2 - Products

2.1 Materials

A. Denso Tape

Description: Denso Tape is a woven cloth backed with a petroleum-based adhesive, providing excellent corrosion resistance.

- Thickness: 1.5mm to 3mm, depending on application.
- Width: 50mm to 300mm.
- Adhesion to Metal: Minimum of 1.5 N/mm².
- Temperature Range: -20°C to 50°C.
- Elongation: 200% minimum.
-

- Water Vapor Transmission Rate (WVTR): $< 0.05 \text{ g/m}^2/\text{day}$.
- Dielectric Strength: $> 35 \text{ kV}$.

B. Profiling Mastic

Description: Profiling Mastic is a non-hardening, tacky sealant, providing water and air-tight sealing of metal surfaces.

- Composition: Bituminous or rubber-based compounds.
- Density: $1.2 \text{ to } 1.5 \text{ g/cm}^3$.
- Tensile Strength: $0.5 \text{ to } 1 \text{ MPa}$.
- Hardness: 40–60 Shore A.
- Adhesion: Excellent adhesion to metals.
- Temperature Range: -10°C to 50°C .
- Curing Time: Non-hardening, remains pliable.

Part 3 - Execution

3.1 Surface Preparation

1. Clean all metal surfaces to remove rust, scale, oils, and debris using abrasive blasting or power washing.
2. Ensure surfaces are dry and free of contaminants before applying Denso Tape or Profiling Mastic.

3.2 Application of Denso Tape

1. Primer: Apply a compatible primer on the metal surface if required by the manufacturer.
2. Application Method: Unroll the Denso Tape and apply it smoothly around the pipe or metal surface, ensuring full contact and no air gaps.
3. Overlap: Ensure a minimum 50% overlap on each layer of tape.
4. Pressing: Press the tape firmly to ensure proper adhesion and bonding.

3.3 Application of Profiling Mastic

1. **Sealant Application:** Apply Profiling Mastic to joints, seams, and edges before applying Denso Tape, ensuring full coverage of gaps and irregularities.
2. **Surface Finish:** Smooth out the mastic to ensure a continuous, uniform coating over the joint or seam.
3. **Curing Time:** Allow Profiling Mastic to set in place before applying Denso Tape, ensuring a secure bond between the sealant and tape.

3.4 Inspection

1. Inspect all areas where Denso Tape and Profiling Mastic are applied to ensure proper coverage, adhesion, and absence of air pockets.
2. Ensure all protective layers are fully sealed and continuous.

3.5 Cleanup

1. Remove any excess Profiling Mastic or Denso Tape from the application area before it hardens.
2. Clean tools and equipment with recommended solvents.

END OF SECTION