DIVISION 1 – GENERAL REQUIREMENTS

SECTION 01010 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS AND COVENANTS: The General Conditions, General Specifications, Special Provisions, and other applicable documents preceding these specifications shall govern all work specified hereinafter in all Divisions and Sections.

1.02 APPLICABLE REGULATIONS: The Contractor shall comply with all local laws, ordinances, rules and regulations pertaining to such work and must obtain all required permits, licenses, and certificates and publish and post all notices required thereby.

1.03 DESCRIPTION OF THE WORK: These specifications are divided for convenience into titled divisions and sections as set forth in the TABLE OF CONTENTS preceding these specifications and shall not be considered an accurate or complete segregation of the several units of labor and materials. No responsibility, either direct or implied is assumed by the Department of Hawaiian Home Lands (DHHL) for omissions or duplications of the subject matter. The Contractor will be held responsible for the complete work whenever or wherever the parts are described in one or more trade heads. Any mention in these sections or indication on the drawings of articles, materials, operations, or methods, require that the Contractor furnish each item so mentioned or indicated, of the kind, type, or design and quality of each item so mentioned on the drawings, and that the Contractor furnish all labor, materials, equipment, incidentals and supervision necessary to complete the work in accordance with the drawings and the true meaning and intent of these specifications, even though such mention of articles, materials, operations, methods, quality, qualifications or condition is not expressed in complete sentences.

Where devices or items, or parts thereof are referred to in the singular, it is intended that such references shall apply to as many such devices, items, or parts as are required to properly complete the work.

Schedule of work included in these specification sections are given for convenience and shall not be considered as a comprehensive list of items necessary to complete the work of any section.

The Contractor shall employ the usual standard practice of coordinating the work covered in each section with the work of other sections. The necessary information and the items, accessories, anchors, connections, patterns, templates, etc., shall be delivered when required in order to prevent any delay in the progress and completion of the work.

1.04 PLANS AND SPECIFICATIONS: These specifications are intended to cover all labor, materials and standards of workmanship employed in the work indicated on the plans and called for in the specifications or reasonably implied therein. The plans and specifications complement one another. Any part of the work mentioned in one and not represented in the other, shall be done the same as if it had been mentioned or represented in both.

The Contractor shall not alter from the drawings and specifications. In the event of errors or discrepancies, the Contractor shall immediately notify the Project Manager.

All figured dimensions take precedence over scaled measurements. No important dimension shall be determined by scale.

Specifications and drawings are prepared in abbreviated form and may include incomplete sentences. Omissions of words or phrases such as "the Contractor shall", "as shown on the drawing", "a", "an", and "the", are intentional. Omitted words and phrases shall be provided by inference to form complete sentences.

1.05 REFERENCE STANDARDS: All work shall be done in accordance with the most current standards listed below as amended and/or amplified herein.

ASA American Standards Association

ASTM American Society for Testing and Materials

AISC American Institute of Steel Construction

ACI American Concrete Institute

UBC Uniform Building Code - current edition

END OF SECTION

SECTION 01340 - DRAWINGS TO BE FURNISHED BY CONTRACTOR

The following shall supplement the General Conditions.

1.01 Shop drawings and submittals shall be made in accordance with Section 5.5 - Shop Drawings and Other Submittals of the General Conditions.

1.02 All submittals, RFIs, change requests and other documentation shall be submitted electronically via Newforma.

1.03 The Contractor's stamp and verification of drawings shall consist of the following format:

HONOKAI'A NON-POTABLE WATER SYSTEM
DHHL CONTRACT NO. IFB-19-HHL-006

(Contractor's Name) _____

(Signature) _____ (Date) _____

This submittal has been checked and verified in accordance with the requirements of the contract documents and any equipment submitted herewith can be installed in the allocated spaces.

Submittal No. _____

Specification Section No. _____

Paragraph No. _____

Contract Drawing Ref. _____

Subcontractor _____

Supplier _____

Manufacturer _____

Exceptions Taken: Yes _____ No _____

Details of Exception _____

_____

_____

1.04 The person signing the Contractor's submittal stamp shall be the one designated under the contract agreement with the DHHL. The signature shall be in original ink. Stamped signature will not be acceptable. Submittal shall be completely filled out, signed and dated.

1.05 All changes made to the submittal drawings by the Contractor in the form of written or typewritten markings shall be initialed and dated by the Contractor.

1.06 When the Contractor takes any exception to the submittal drawings, such exception shall be brought to the attention of the Project Manager. The exception shall be submitted with the shop drawings together with sufficient details and justifications.

1.07 Within 30 days after receipt of notice to proceed, the Contractor shall submit to the Engineer in duplicate, a schedule, listing all items that will be submitted for review and approval action by the DHHL, the State Department of Transportation, or the County. The schedule shall include, among other things, a list of shop drawings and manufacturer's literature, certificates of compliance, material samples, and guarantees. The schedule shall indicate the type of item, contract requirement reference; the Contractor's scheduled date for submitting the above items and projected needs for approval answers and procurement dates. In preparing the schedule, adequate time (minimum of 15 days) shall be allowed for review and approval; additional time shall be allowed to provide for possible resubmittal. Also, the scheduling shall be coordinated with the approved progress schedule.

1.08 The Contractor shall maintain at the job site two sets of full size contract drawings, marking them in red to show all variations between the construction actually provided and that indicated or specified in the contract documents, including buried or concealed herein, or where variations in scope or character of work from that of the original contract are authorized, the drawings shall be marked to define the construction actually provided. Where equipment installation is involved, the size, manufacturer's name, model number and power input or output characteristics are applicable shall be shown on the as-built drawings. The representations of such changes shall conform to standard and detail as necessary to clearly portray the as-built construction. The drawings shall be maintained and updated on a daily basis.

Monthly and final payments of the Contactor shall be subject to prior approval of the drawings.

On completion of the work, both sets of marked-up drawings shall be delivered to the Engineer, and shall be subject to his approval before acceptance.

END OF SECTION

SECTION 01430 - ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 GENERAL: This section covers prevention of environmental pollution and damage during and as the result of construction operations under this contract and for those measures set forth in other sections of the TECHNICAL SPECIFICATIONS. For the purpose of this specification, environmental pollution and damage is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, as well as other pollutants. It is the responsibility of the Contractor to investigate and comply with all applicable Federal, State and County laws and regulations concerning environmental protection and pollution control, and to secure all necessary permits.

1.02 SUBMITTALS: The Contractor shall submit an environmental protection plan in accordance with the provisions as herein specified and the requirements of the NDPES permit as discussed in the Special Conditions SC-43. The environmental protection plan shall include but not be limited to the following:

A. Methods for protection of features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection; i.e., trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archaeological, and cultural resources.

B. Procedures to be implemented to provide the required environmental protection and to comply with all applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accident, natural causes, or failure to follow the procedures set out in accordance with the environmental protection plan.

C. Drawings showing locations of any proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles or spoil material.

D. Environmental monitoring plans for the job site, including land, water, air and noise monitoring.

E. Methods of protecting surface and groundwater during construction activities.

F. Training for his personnel during the construction period.

1.03 IMPLEMENTATION: After receipt of Notice to Proceed, the Contractor shall submit in writing the above environmental protection plan for approval of the Engineer within 5 days after Notice to Proceed. Approval of the contractor's plan will not relieve the Contractor of his responsibility for adequate and continuing control of pollutants and their environmental protection measures.

1.04 SUBCONTRACTORS: Assurance of compliance with this section by subcontractors will be the responsibility of the Contractor.

1.05 NOTIFICATION: The Engineer will notify the Contractor in writing of any observed noncompliance with the aforementioned Federal, State or local laws or regulations, permits, and other elements of the Contractor's environmental protection plan. The Contractor shall, after receipt of such notice, inform the Engineer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspension.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PROTECTION OF ENVIRONMENTAL RESOURCES: The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine his activities to areas defined by the drawings and specifications.

3.02 PROTECTION OF LAND RESOURCES: Prior to the beginning of any construction, the Contractor shall identify all land resources to be preserved within the Contractor's work area. Except in areas indicated on the drawings or specified to be cleared, the Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without special permission from the Engineer. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

A. Work Area Limits: Prior to any construction, the Contractor shall mark the areas that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area, which are to be saved and protected shall also be marked or fenced. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

B. Protection of Landscape: Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved shall be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques.

C. Reduction of Exposure of Unprotected Erodible Soils: Earthwork brought to final grade shall be finished as indicated and specified. Side slopes and back slopes shall be protected as soon as practicable upon completion of rough grading. All earthwork shall be planned and conducted to minimize the duration of exposure of unprotected

soils. Runoff from the construction site shall be controlled by construction of diversion ditches, benches, and berms to retard and divert runoff to protected drainage courses.

D. Disposal of Solid Waste by Removal From State Property: The Contractor shall transport all solid waste off State property and dispose of it in compliance with Federal, State and local requirements for solid waste disposal.

E. Disposal of Chemical Waste: Chemical waste shall be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State, and local regulations.

3.03 PROTECTION OF WATER RESOURCES: The Contractor shall keep construction activities under surveillance, management and control to avoid pollution of surface and groundwaters. Special management techniques as shall be implemented to control water pollution.

A. Protection of Waterways: Construction of drainage facilities as well as performance of other contract work which will contribute to the control of siltation shall be carried out in conjunction with the earthwork operations or as soon thereafter as is practicable.

Prior to or during any suspension of construction operations for any appreciable length of time, the Contractor shall provide for any temporary erosion control measures deemed necessary. Such measures shall be continued until the permanent drainage facilities have been constructed and when called for, until the protective ground cover is sufficiently established to be an effective erosion deterrent. Should such measures fail and an appreciable quantity of material begins to erode into the natural waterway, the Contractor shall act immediately to bring the siltation under control.

B. Pollution: The Contractor shall exercise every reasonable precaution throughout the life if the project to prevent pollution of rivers, streams or impoundments. Pollutants such as chemicals, fuels, lubricants, bitumens, raw sewage and other harmful waste shall not be discharged into or alongside of the stream, or into natural or manmade channels leading thereto. The Contractor shall also comply with the applicable regulations of the State Department of Land and Natural Resources and other statutes relating to the prevention and abatement of pollution.

The Contractor shall conduct his operations near harbors, bays, swimming and water recreation areas, to avoid and minimize pollution. He shall comply with the applicable regulations of the United States Department of Interior, State Department of Health and other authority having jurisdiction.

Monitoring of water areas affected by construction activities shall be the responsibility of the Contractor. All water areas affected by construction activities shall be monitored by the Contractor.

3.04 PROTECTION OF FISH AND WILDLIFE RESOURCES: The Contractor shall keep construction activities under surveillance, management and control to minimize interference with, disturbance to and damage of fish and wildlife.

3.05 PROTECTION OF AIR RESOURCES: The Contractor shall keep construction activities under surveillance, management and control to minimize pollution of air resources. All activities, equipment, processed, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the State of Hawaii Public Health Regulations, Chapter 43, "Air Pollution Control." Special management techniques as set out below shall be implemented to control air pollution by the construction activities, which are included in the contract.

A. Particulates: Dust particles, aerosols, and gaseous by-products from all construction activities and processing and preparation of materials shall be controlled at all times, including weekends, holidays and hours when work is not in progress. The Contractor shall maintain all excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and all other work areas within or outside the project boundaries free from particulates which would cause the air pollution standards mentioned above to be exceeded or which would cause a hazard or a nuisance. Sprinkling or other methods approved by the Project Manager will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated at such intervals as to keep the disturbed area damp at all times. The Contractor must have sufficient competent equipment available to accomplish this task. Particulate control shall be performed as the work proceeds and whenever a particulate nuisance or hazard occurs.

B. Hydrocarbons and carbon monoxide emissions from equipment shall be controlled to Federal and State allowable limits at all times.

C. Odors shall be controlled at all times for all construction activities, processing and preparation of materials.

D. Monitoring of air quality shall be the responsibility of the Contractor. All air areas affected by the construction activities shall be monitored by the Contractor.

3.06 PROTECTION FROM SOUND INTRUSIONS: The Contractor shall adhere to the requirements of the Department of Health and shall implement acceptable noise abatement methods to minimize the construction noise level.

Noise shall be kept within acceptable levels at all times in conformance with Title II, Administration Rules, Chapter 43, Community Noise Control, State Department of Health, Public Health Regulations. The Contractor shall obtain the pay for community noise permit from the State Department of Health when the construction equipment or other devices emit noise at levels exceeding the allowable limits. .

All internal combustion engine-powered equipment shall have mufflers to minimize noise and shall be properly maintained to reduce noise to acceptable levels.

3.07 POST CONSTRUCTION CLEANUP: The Contractor shall clean up areas used for construction.

3.08 RESTORATION OF LANDSCAPE DAMAGE: The Contractor shall restore all landscape features damaged or destroyed during construction operations outside the limits of the approved work areas. Such restoration shall be in accordance with the plan submitted for approval by the Project Manager. This work will be accomplished at the Contractor's expense.

3.09 MAINTENANCE OF POLLUTION CONTROL FACILITIES: The Contractor shall maintain all constructed facilities and portable pollution control devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.10 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL: The Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities (vegetative covers and instruments required for monitoring purposes) to ensure adequate and continuous environmental pollution control.

END OF SECTION

SECTION 01440 - ARCHAEOLOGICAL FINDINGS

PART 1 - GENERAL

1.01 PRESERVATION AND RECOVERY OF HISTORICAL, ARCHAEOLOGICAL. AND CULTURAL RESOURCES: Existing historical, archaeological, and cultural resources within the Contractor's work area will be so designated by the Project Manager if any have been identified. The Contractor shall take precautions to preserve all such resources as they existed at the time they were pointed out to him. The Contractor shall provide and install all protection for these resources so designated and shall be responsible for their preservation during this contract. If during excavation or other construction activities in areas with existing or known resources, as well as in any other work area, any previously unidentified or unanticipated resources are discovered or found, all activities that may damage or alter such resources shall be temporarily suspended. Such temporary suspension of work shall not be attributable to the Contractor. These resources of cultural remains (prehistoric or historic surface or subsurface) include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rocks or coral alignments, parings, wall, or other constructed features; and any indication or agricultural or other uses. Upon such discovery or find, the Contractor shall immediately notify the Project Manager. When so notified, the Project Manager will notify the State Historic Preservation Officer (SHPO) for further direction.

As directed by the Project Manager, the Contractor may be allowed to continue any operation which would not further disturb the site(s); however, all work within the protected area shall be suspended until the Project Manager is notified by the SHPO that all investigations or salvage operations have been completed.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 01750 - GUARANTEE

PART 1 - GENERAL

1.01 GENERAL

A. The Contractor guarantees all materials and equipment furnished to be in operable condition upon final acceptance of the work and that all such materials and equipment conform to the requirements of this contract and be fit for the use intended.

B. He further guarantees all such materials and equipment against defects and poor workmanship and, to the extent that he is responsible for design, the Contractor guarantees the design to meet the criteria and operating requirements specified against failure to perform in accordance with such criteria and operating requirements.

C. The period of this guarantee shall commence upon acceptance of the work by the appropriate agency, and shall extend through the project performance evaluation period not to exceed 1 year for all materials and equipment, provided that this period shall be extended from the time of correction of any defect or failures, corrected under the terms of this guarantee, for a like period for the corrected work.

D. The Contractor shall correct all defects or failures discovered within the guarantee period. The appropriate agency will give the Contractor prompt written notice of such defects or failures following their discovery. The Contractor shall commence corrective work within five (5) days following notification and shall diligently prosecute such work to completion. The Contractor shall bear all costs of corrective work, which shall include necessary disassembly, transportation, reassembly and retesting, as well as repair or replacement of the defective material or equipment, and any necessary disassembly and reassembly of adjacent work.

E. Any period that a particular equipment is not operable due to its failure shall not be considered as a part of the guarantee period. The guarantee period shall be extended for a like period. If due to failure of other equipment the equipment is unable to perform its intended function, the guarantee period shall be extended for a like period. Time that equipment is operating shall be counted as applying to the warranty. Such time shall be determined by use of plant operator's log or other suitable documentation.

F. If the Contractor falls to perform corrective work in the manner and within the time stated, the Department of Hawaiian Home Lands (DHHL) may proceed to have such work performed at the

G. Contractor's expense and his sureties will be liable therefor. The DHHL shall be entitled to reasonable attorney's fees and court costs necessarily incurred by the Contractor's refusal to honor and pay such costs of corrective work.

H. The Contractor's performance bond shall continue in full force and effect during the period of this guarantee.

I. The rights and remedies of the DHHL under this provision do not preclude the exercise of any other rights or remedies provided by this contract or by law with respect to unsatisfactory work performed by the Contractor.

J. This guarantee shall be deemed supplemental to guarantee provisions provided in other sections of the specifications for the individual units and systems of units so specified.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

DIVISION 2 - SITE WORK

SECTION 02100 - CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

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

1.02 WORK INCLUDED

A. Furnish all labor, materials, equipment and tools necessary to clear and grub the entire construction area, accumulate and dispose of all debris and water materials, and lay out the entire work, as indicated on the drawings and specified herein.

B. It shall be the responsibility of the Contractor to examine the project site and determine for himself the existing conditions.

C. Obvious conditions of the site existing on the date of the bid opening shall be accepted as part of the work, even though they may not be clearly indicated on the plans and/or described herein or may vary therefrom.

D. All debris of any kind accumulated from clearing or grubbing shall be disposed of off-site weekly and the whole area left clean. The Contractor shall be required to make all necessary arrangements related to the proposed place of disposal.

E. Burning onsite will not be permitted.

F. Dust Control: Use all means necessary to protect existing objects designated to remain and, in the event of damage, immediately make repairs and replacements necessary to the satisfaction of the Project Manager at no additional cost.

1.03 REFERENCES

A. Subsurface soil investigations have been made at the project site by Geolabs, Inc. entitled “Geotechnical Engineering Exploration Honokaia Non-Potable Water System, Department of Hawaiian Homelands, Hamakua District, Island of Hawaii” dated February 25, 2015. Test pit logs are shown in the soils report. A copy of the complete soils report is available as part of the bid documents.

B. The soils report and its recommendations are made part of these specifications except where expressly modified herein.

PART 2 – PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SEQUENCE OF WORK

All sequence of work shall be subject to the approval of the Project Manager.

3.02 PROTECTION

A. Adequate precautions shall be taken before commencing and during the course of the work to insure the protection of life, limb and property.

B. The Contractor shall protect from damage all surrounding structures, trees, plants, grass, walks, pavements, utility boxes, etc. Any damages will be repaired or replaced by the Contractor to the satisfaction of the Project Manager and at no cost to the Department.

3.03 PERMITS: The Contractor shall apply for and obtain the necessary permits prior to the commencement of work. The Contractor shall pay for all fees.

3.04 BARRICADE

Erect temporary barricade to prevent people and animals from entering the project area, to the extent as approved by the Project Manager. Such barricades shall not be less than 5'-0" in height. The extent of barricades may be adjusted as necessary with the approval of the Project Manager. This work shall be accomplished to the satisfaction of the Department and at no extra cost to the Department. Barricades shall be removed upon completion of work and job site premises left clean.

3.05 MAINTAINING TRAFFIC

A. The Contractor shall conduct operations with minimum interference to streets, driveways, sidewalks, etc.

B. When necessary, the Contractor shall provide, erect and maintain lights, barriers, etc., as required by traffic and safety regulations with special attention to protection of life.

3.06 CONSTRUCTION LINES, LEVELS AND GRADES

A. The Contractor shall verify all lines, levels and elevations indicated on the plans before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Project Manager and any change shall be made in accordance with his instruction. The Contractor shall not be entitled to extra payment if he fails to report the discrepancies before proceeding with any work whether within the area affected or not.

B. All lines and grades shall be established by a Surveyor licensed in the State of Hawaii.

C. Starting of clearing and grubbing operations will be construed to mean that the Contractor agrees that the existing grades, inverts, and improvements are essentially correct as indicated.

3.07 CLEARING AND GRUBBING

A. The Contractor shall clear off and remove from the entire area to be graded, all rubbish, grass and weeds, stumps, large roots, buried logs, garbage, boulders, asphalt, concrete or masonry, abandoned vehicles, boats, appliances, fences and other unsuitable material. Where soft wet soils are encountered, light equipment should be used.

B. Any stumps and roots larger than 3 inches in diameter shall be removed to a depth not less than 18 inches below the original grade level. Fill voids with select fill to maintain indicated grade. Providing material to fill void, placement and compaction to be considered incidental.

C. No excavation or filling shall be undertaken until area has been cleared and grubbed.

3.08 DISPOSAL

A. All removed materials with no salvage value shall be removed from the premises. All removed material with salvage value as determined by the Project Manager shall be neatly stored on the premise as direction by Department.

B. Excessive accumulation of debris, rubbish and dirt will not be permitted. All material or debris shall be removed regularly from the site. A fog spray or other dust settling method shall be employed to dampen areas where there is excessive dust and dirt.

C. All items to be later reused shall be carefully removed, inspected by the Project Manager and neatly stored away. Items damaged during the removal work shall be replaced with new of the matching type, size and shape at no cost to Department.

D. The Contractors shall comply with Federal, State and local hauling and disposal regulations.

3.09 CLEAN-UP

Clean up and remove all debris accumulated from construction operations from time to time, when and as directed by the Project Manager. Upon completion of the construction work and before final acceptance of work, remove all surplus materials, equipment, etc., and leave entire job site clean and neat.

END OF SECTION

SECTION 02210 – SITE EARTHWORK

PART 1 – GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Furnish all labor, materials, services, equipment and related items necessary to excavate, fill, remove, transport, stockpile and dispose of all materials within the limits of the project required to construct the site work improvements in accordance with these specifications, dimensions, sections and details shown on the plans, and the approval of the Department.

1.03 RELATED WORK IN OTHER SECTIONS

SUBSURFACE SOIL DATA: Subsurface soil investigations have been made at the project site by Geolabs, Inc. entitled "Geotechnical Engineering Exploration Honokaia Non-Potable Water System, Department of Hawaiian Homelands, Hamakua District, Island of Hawaii" dated February 25, 2015. Test pit logs are shown in the soils report. A copy of the complete soils report is appended at the end of this section.

The Contractor is expected to examine the site and decide for himself the character of materials to be encountered. The Department will not assume responsibility for variations of subsoil quality or condition at locations other than places shown and at the time investigations were made.

1.04 PROTECTION

A. Erosion Control: The Contractor shall incorporate into his work schedule the Temporary Erosion Control Measures and the Permanent Erosion Control procedures indicated on the plans and as specified in the contract.

B. Dust Control: Every effort shall be made by the Contractor to keep dust to a minimum. Spraying the ground with water or other means of control shall be used wherever possible. The Contractor shall have an adequate supply of water for moisture conditioning of fill material.

Without limiting the generality or applicability of other indemnity provisions of the contract, the Contractor agrees that he shall indemnify and hold harmless the Department from and against all suits, actions, claims, demands, damages, costs and expenses (including but not limited to attorney's fees) arising out of any damage to any property whatsoever or injury to any person whomsoever, in any way caused or contributed to by dust from the Contractor's operations.

C. Existing Utilities and Work Areas: The Contractor shall be responsible for the protection of existing surface and subsurface utilities and poles within and abutting the project site, trench excavations and other work areas.

D. Finished Grades and Subgrades: All subgrades shall be kept moist until covered by subbase, base course, or concrete. All finished grades shall be kept moist until

covered by landscaping or other permanent groundcover. Where shrinkage cracks are noted after compaction of the subgrade or finished grade, the subgrade or finished grade shall be rescarified, moisture-conditioned to above the optimum moisture content, and recompacted to the specified requirement at no additional cost to the Department. During construction, the Contractor shall properly grade and maintain all excavated surfaces to provide positive drainage and prevent ponding of water. In the event that ponding of water caused softening of the subgrades, the Contractor shall remove the soft soils and shall backfill the excavation with compacted fill at no additional cost to the Department.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GRADING

A. Excavations: All excavation shall be made to the lines and grades as shown on the project plans.

Suitable material from excavation shall be used in the fill, and unsuitable material free of organic material from excavation shall be disposed of offsite unless otherwise directed by the Project Manager.

B. Drainage: Care shall be exercised during grading so that areas involved will drain properly. Water shall be prevented from running over the slopes by the temporary berms or drainage swales. Runoff diversion by ditches shall be completed in the time specified in the Proposal.

C. Supervision: At all times, the Contractor shall have a responsible field superintendent on the project in full charge of the work with authority to make decisions. He shall cooperate with the Project Manager in carrying out the work. Any instructions given to him by the Project Manager shall be considered to have been given to the Contractor personally.

D. Rainy Weather: No fill shall be placed, spread or rolled during unfavorable weather. When the work is interrupted by rain, operations shall not be resumed until field tests by the Project Manager indicate that conditions will permit satisfactory results.

E. Unforeseen Conditions: If unforeseen or undetected soil conditions such as soft spots, existing utility trenches, structure foundations, voids or cavities, boulders, seepage water or expansive soil pockets, etc. are encountered, the Contractor at his sole expense shall make all necessary corrective measures in the field as such conditions are detected. Providing, placing and compacting of replacement materials shall be at the Contractor's expense and at no additional cost to the Department.

3.02 PROTECTIVE MEASURES

A. All excavation shall be protected and guarded against danger to life, limb and property in accordance with applicable regulations.

B. Shoring, as required to safely preserve the excavations, existing electrical hand-hole boxed, earth banks, etc. free from damages resulting from the work, shall be provided and installed by the Contractor.

C. All excavations shall be kept free from standing water. The Contractor shall do all pumping and draining that may be necessary to remove water to the extent required in carrying on work. Grading shall be controlled so that the ground surface is properly sloped to prevent water run-off from entering open trenching excavations.

D. The Contractor shall confine all work, equipment, materials and personnel as much as possible to the work area as indicated. The Contractor shall schedule all work that involves excessive noise, dust, dirt, or any other detrimental aspect of this work in order that there will be minimum disruptions to neighbors.

E. When necessary and when directed, the Contractor shall provide and erect barriers, etc. with special attention to the protection of personnel.

3.03 UNSUITABLE EXCAVATED MATERIAL

The Contractor shall remove from the site all unsuitable excavated material unless specified otherwise by the Project Manager. The unsuitable material not containing organic material shall be hauled and placed in the excavation for coralline material where shown on the drawings. Unsuitable material containing organic material shall be disposed of off-site.

Removal, including hauling and disposal, of the unsuitable material will not be paid for directly, but shall be considered incidental to the project.

END OF SECTION

SECTION 02270 – TEMPORARY SOIL EROSION CONTROL

PART 1 – GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: Submit three (3) sets of the erosion control materials for approval by the Project Manager. Furnish all labor, materials, services, equipment and related items necessary to implement the temporary erosion control measures, submitted separately, as required by these specifications and as ordered by the Project Manager during the life of the contract to control water pollution through the use of berms, dikes, dams, sediment basins, fiber mats, netting, gravel, mulches, grasses, slope drains, and other erosion control devices or methods.

A. Temporary erosion and siltation control measures as described herein shall be applied to any erodible material within this project, including local material sources and work areas.

B. The Contractor shall be responsible for providing the necessary erosion control measures which are shown on the plans or which may be ordered by the Project Manager. All grading operations shall be performed in conformance with the applicable provisions of the "Water Pollution Control and Water Quality Standards" contained in the "Public Health Regulations," State Department of Health.

C. The Contractor shall be responsible for promptly (next day after storms) removing all silt and debris resulting from his work and deposited in drainage facilities, roadways, neighboring lands, and other areas.

1.03 RELATED WORK IN OTHER SECTIONS

Work shall be governed by the Counties' "Standard Specifications for Road and Bridge Construction", dated 2005 and "Standard Details for Public Works Construction" (Standard Specifications), dated September 1984 as revised, except as amended in the plans and/or specifications herewith. (Paragraphs concerning Measurements and Payments in the Sections are not applicable to this project).

Site Earthwork ..... Section 02210

PART 2 – PRODUCTS

2.01 MATERIALS

A. Mulches: To be bagasse, hay, straw, fiber mats, netting, wood cellulose, bark, wood chips, or other suitable material acceptable to the Project Manager and shall be reasonably clean and free of noxious weeds and deleterious materials.

B. Slope Drains: To be constructed of fiber mats, plastic sheets, or other materials acceptable to the Project Manager.

PART 3 – EXECUTION

3.01 TEMPORARY EROSION CONTROL

A. The Project Manager has the authority to limit the surface area exposed by clearing and grubbing and to limit the surface area exposed by excavation, borrow and fill operations. The Project Manager may also direct the Contractor to provide immediate, permanent, or temporary pollution control measures to prevent contamination of streams, lakes, ponds, drainage channels and pipes, roads, neighboring lands, and other areas.

   Except for specified measures which may be shown on the plans, the Contractor shall determine the appropriate erosion control measures to use. Such work may involve the construction of temporary berms, dikes, dams, sediment basins, and slope drains, and the use of temporary mulches, mats, and grassing, or the construction and use of other control devices or methods as necessary to control erosion.

B. The Contractor shall incorporate all erosion control measures shown in the plans. The erosion controls may be modified as necessary to adjust to conditions that develop during construction. All modifications are subject to approval by the Project Manager.

C. The Contractor shall limit the surface area exposed by grubbing, stripping of topsoil, and grading to that which is necessary for him to perform the next operation and which is within his capability and progress in keeping the finish grading, mulching, grassing, and other such pollution control measures current.

   The grubbing of the vegetative root mat and stumps and the stripping of topsoil shall be confined within the limits of grading which can be actively and continuously prosecuted within 15 calendar days. The area to be graded shall be limited to the minimum area necessary to accommodate the Contractor's equipment and work force and shall not at any time exceed 15 acres, unless otherwise stated on plans, without prior approval of the Project Manager.

   Any area remaining bared or cleared for more than 10 calendar days and which is not within the limits of active construction shall be immediately hydro-mulch seeded or remedied as directed by the Project Manager at the Contractor's expense without cost to the Department. All areas where finish grading has been completed shall be grassed within three calendar days after the completion of grading for that area.

D. The Contractor shall, at the end of each work operation in any one day, shape the earthwork in such a manner as to control and direct the runoff to minimize the erosion of soils. He shall construct earth berms along the top edges of embankments or along the property line with adjacent properties, streams and water channels, to intercept any runoff. Temporary slope drains shall be provided by carry runoff from the top of cuts and fills. Temporary facilities for controlled discharges shall be provided for runoff impounded, directed, or controlled by project activities or by any erosion control measure employed.

E. Cut slopes shall be shaped, topsoil added if necessary, and planted as the work progresses. In no case shall the exposed surface be greater than 15 feet in height. Whenever major excavation is suspended or halted and the slope is bared for more than 15 consecutive days, the exposed surfaces shall be hydro-mulch seeded or protected as directed by the Project Manager at the Contractor's expense without cost to the Department.

   Fill slopes shall be finished as specified and in accordance with the requirements outlined for cut slopes above.

F. Construction of berms, cofferdams, or other such construction in or near the vicinity of streams, ponds, waterways, or other bodies of water shall be with approved materials.

G. The temporary erosion and siltation control measures outlined in these specifications are minimum requirements and shall not preclude the provision of any additional measures which the Contractor may deem necessary. Damages caused by the erosion of soils and the pollution of downstream areas shall be the responsibility of the Contractor and all costs for repairing, correcting, replacing and cleaning damaged or polluted facilities shall be borne by the Contractor.

END OF SECTION

SECTION 02275 - GROUTED RUBBLE PAVING

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

This specification covers the requirements for furnishing and installing grouted rubble paving.

1.02 REFERENCES

Work shall be governed by the Counties' "Standard Specifications for Road and Bridge Construction", dated 2005 and "Standard Details for Public Works Construction" (Standard Specifications), dated September 1984 as revised, except as amended in the plans and/or specifications herewith. (Paragraphs concerning Measurements and Payments in the Sections are not applicable to this project).

PART 2 - PRODUCTS

2.01 MATERIALS

A. Stones shall be clean, sound, durable, free from organic material. Except for stones used for filling voids, stones shall have a thickness or not less than 6-inches and width of not less than 1-1/2 times the thickness of the pad, but not less than 12-inches.

B. Grout shall consist of one part Portland cement to three parts fine aggregate by volume.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Clear and grub and excavate in accordance with Section 02210 – Site Earthwork.

B. Compact excavated bed and finish to smooth surface.

C. Prior to laying stone, moisten bedding material with water and wet stones. Lay stones in a full bed of grout having stiff consistency. Use selected stones and shape roughly to make joints between 1/4 inch and 1/2 inch in width.

D. Bed stones in grout and form uniform planar surface with broken joints.

Within 24 hours after placing stones, point joints with grout to create 1/4 inch recesses. Keep paving surface wet throughout pointing process. Texture of recessed pointing shall not be smooth, but shall match texture of stone used. Visible grout on exposed rock surface will not be allowed.

E. Finished surface shall not deviate more than 3/8-inch with a 10-foot straightedge.

F. Contractor shall restore the surface of the adjacent area and dispose of surplus material.

END OF SECTION

SECTION 02500 – ROAD PAVEMENT

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

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

1.02 WORK INCLUDED

Furnish all labor, materials, tools, equipment and related items necessary to complete, in place, asphalt concrete pavement for roads in conformity with the dimensions, profiles, sections and details shown on the plans and specified herein.

1.03 REFERENCES

Work shall be governed by the Counties' "Standard Specifications for Road and Bridge Construction", dated 2005 and "Standard Details for Public Works Construction" (Standard Specifications), dated September 1984 as revised, except as amended in the plans and/or specifications herewith. (Paragraphs concerning Measurements and Payments in the Sections are not applicable to this project).

1.04 SUBMITTALS

Product Certificates: The Contractor shall submit for approval certificates from manufacturers or supplier to verify that types of materials being supplied meet the requirements of these specifications.

PART 2 – PRODUCTS

2.01 MATERIALS: Materials for roads shall be in accordance with the following sections of the State of Hawaii Standard Specifications for Road and Bridge Construction, except as amended on the plans and/or in the specifications herewith:

Aggregate Base Course ..... Section 703.06

Hot Mix Asphalt Pavement ..... Section 401

PART 3 – EXECUTION

3.01 INSTALLATION

A. Stake out the areas to be paved using grade stakes on which the final finish elevations, base course and subgrade elevations are clearly marked. All stakes and elevations shall be approved by the Project Manager before any work is done.

B. Contractor shall fine grade the subgrade under the pavement by bringing the subbase or coralline material to the proper grade from the mass grade elevations to the proper shape before installing the base course.

C. Install roadways in accordance with the applicable sections noted hereinbefore.

3.02 COMPACTION TESTING

The Contractor shall notify the Project Manager at least 5 days prior to the start of fine grading for the roadway subgrade. Field density tests will be taken on the roadway subgrade, and aggregate base course by the Geotechnical Engineer retained by the Contractor. The Contractor shall be responsible for any corrective measures required as a result of inadequate compaction.

3.03 CLEANING OF SURFACES

Immediately before applying the prime coat or tack coat, the surface to be treated shall be swept clean of all loose material, dirt, excess dust or other objectionable material. No application shall be permitted when the surface to be treated is appreciably damp or when weather conditions are unsuitable.

3.04 REPAIRS OF EXISTING ASPHALT CONCRETE PAVEMENTS

Repair to the original conditions and to the satisfaction of the Project Manager all existing asphaltic concrete pavements that have been damaged by construction activities, including damage done by heavy equipment.

3.05 PLACING ASPHALT CONCRETE PAVEMENT

Install asphalt concrete pavement as specified in Section 401 of the Standard Specifications.

END OF SECTION

SECTION 02510 – HDPE POTABLE WATER PIPE

PART 1 – GENERAL

1.01 DESCRIPTION

The work in this section consists of providing High Density Polyethylene (HDPE) pipe and fittings.

1.02 QUALITY ASSURANCE

References, American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), Federal Specifications (FS), International Standards Organization (ISO), and manufacturer's printed recommendations.

1.03 SUBMITTALS

Material list naming each product to be used identified by manufacturer and type number, in accordance with Section 01340 DRAWINGS TO BE FURNISHED BY THE CONTRACTOR.

1.04 PRODUCT HANDLING

Handle pipe and fittings to insure delivery in a sound undamaged condition.

1.05 JOB CONDITIONS

Do not lay pipe when trenches or weather conditions are not suitable for such work.

PART 2 – PRODUCTS

2.01 PIPE

A. 2 Inches and Smaller Pipe shall be manufactured from a PE 3408 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350-02 with a cell classification of PE:345464C. Pipe shall have a manufacturing standard of ASTM D2737 (CTS). Pipe shall be DR 9 (200psi WPR) unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure conduits, and per AWWA C901, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe. Pipe shall also have the following agency listing of NSF 61.

B. 3 Inches and Larger - Pipe shall be manufactured from a PE 3408 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material will meet the specifications of ASTM D3350 with a cell classification of PE:345464C. Pipe shall have a manufacturing standard of ASTM F714. Pipe shall be DR 17 (100psi WPR) for pipe sizes up to 36" unless otherwise specified on the plans. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All pipes shall be suitable for use as pressure

conduits, listed as NSF 61, and per AWWA C906 Pressure Class (PC) 100 have a nominal burst value of three and one-half times the Working Pressure Rating (WPR) of the pipe. Peak flow water velocity of 5 ft/sec shall be used in the hydraulics engineering design.

2.02 FITTINGS

A. Butt Fusion Fittings - Fittings shall be PE3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02, and approved for AWWA use. Butt Fusion Fittings shall have a manufacturing standard of ASTM D3261. Molded & fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using Data Loggers. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.

B. Electrofusion Fittings - Fittings shall be PE3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02. Electrofusion Fittings shall have a manufacturing standard of ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be suitable for use as pressure conduits, and per AWWA C906, have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.

C. Flanged and Mechanical Joint Adapters - Flanged and Mechanical Joint Adapters shall be PE 3408 HDPE, Cell Classification of 345464C as determined by ASTM D3350-02. Flanged and Mechanical Joint Adapters shall have a manufacturing standard of ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

PART 3 – EXECUTION

3.01 GENERAL

Pipe and Fittings: Size as indicated on the plans. Install as shown in accordance with manufacturer’s recommendations.

3.02 HAULING, UNLOADING AND DISTRIBUTING PIPE

During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes. During transportation each pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place. Any pipe damaged shall be replaced as no additional cost to the Department.

3.03 FUSION

A. Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The

butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All welds will be made using a Data Logger to record temperature, fusion pressure, with a graphic representation of the fusion cycle shall be part of the Quality Control records.

B. Sidewall fusions for connections to outlet piping shall be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼ inch larger than the size of the outlet branch being fused.

C. Mechanical joining will be used where the butt fusion method can not be used. Mechanical joining will be accomplished by either using a HDPE flange adapter with a Ductile Iron back-up ring or HDPE Mechanical Joint adapter with a Ductile Iron back-up ring.

D. Socket fusion, hot gas fusion, threading, solvents, and epoxies will not be used to join HDPE pipe.

3.04 INSTALLATION

A. The installation, testing, disinfection and acceptance of water lines shall be governed by the DWS Standards and the Uniform Plumbing Code.

B. The Contractor shall be responsible for precisely laying out the various utility lines shown on the contract plans as provided elsewhere in these specifications. The location shown on the contract plans of the various existing utility lines which the new lines are to cross over or under or connect to were determined on the basis of the best information available; however, no assurance can be provided that the actual locations will be precisely as shown on the contract plans.

C. In performing all work, the Contractor shall exercise due care and caution necessary to avoid any damage to and impairment in the use of any existing utility lines. Any damage inflicted on existing lines resulting from the Contractor's operations shall be immediately repaired and restored as directed by the Project Manager at the Contractor's expense.

D. Connections to or the lowering or relocation of existing mains shall be done by the Contractor in accordance with the DWS Standards. The Contractor shall furnish all necessary pipe, fittings, appurtenances and other incidental materials.

E. Trenching, pipe cushion and backfilling for the water main shall be in accordance with the DWS Standards.

F. The Contractor shall coordinate the connection of the new water line with the Project Manager. The Contractor shall inform the Project Manager a minimum of one week prior to the date of the actual connection. The inverts shown on the plans are

approximate only, and the Contractor shall adjust the slope of the new water line as necessary to construct a fully functional and acceptable system. The Contractor shall ensure that all piping, fittings, materials, tools, equipment and incidentals are at the site and ready for connection.

3.05 INSPECTION

Inspect the pipe for defects before installation and fusion. Defective, damaged or unsound pipe will be rejected.

3.06 TESTING

Pressure testing shall be conducted in accordance with ASTM F2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure. The HDPE pipe shall be filled with water, raised to test pressure and allowed to stabilize. The test pressure shall be 1.5 times the operating pressure at the lowest point in the system. In accordance with section 9.8, the pipe shall pass if the final pressure remains within 5% of the test pressure for 1 hour. For safety reasons, hydrostatic testing only will be used.

END OF SECTION

SECTION 02820 - FENCES AND GATES

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

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

1.02 GENERAL REQUIREMENTS

Furnish materials, labor and equipment necessary to install all fences and gates to the limits shown and as detailed on the plan and as specified herein. All material shall be new, specifically purchased for this project.

1.03 SUBMITTALS

A. Submit in accordance with Section 01340 – DRAWINGS TO BE FURNISHED BY CONTRACTOR.

B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, and schedule of components.

C. Product Data: Submit data in the form of manufacturer's technical data, specifications, and installations for fence, posts, gates, gate hardware and accessories.

D. Manufacturer's Installation Instructions: Submit installation requirements.

1.04 CLOSEOUT SUBMITTALS

Project Record Documents: Accurately record locations of property perimeter posts relative to property lines or easements.

1.05 DELIVERY STORAGE AND HANDLING

A. Deliver, store, protect and handle products with adequate protection against damage.

B. Deliver fence fabric and accessories in packed cartons or firmly tied rolls.

C. Identify each package with manufacturer's name.

D. Store fence fabric and accessories in secure and dry place.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Fence wire shall be a minimum of 11- gauge woven wire. Spacing between wires shall be 12” or less.

B. All barbed wire shall be double stranded.

C. Gate Hardware:

1. Hinges shall be heavy duty offset type permitting 180-degree swing using double clamping method of attachment and manufactured or forged malleable iron. All hinges shall be of appropriate size and capacity for the particular gate being supported and/or operated.

2. Unless otherwise shown or specified, padlocking provisions for a drive gate shall be an industrial drop rod guide and latch assembly as detailed in the plans.

3. Padlocks are to be of good quality, heavy duty and weather resistant and provided by the Contractor for all gates. All padlocks shall be keyed alike and a minimum of twelve (12) keys shall be provided. The Contractor shall provide a submittal of the padlocks for acceptance by the Project Manager.

D. Posts and Braces shall be of standard weight, hot-dipped galvanized, welded and seamless steel pipes conforming to ASTM A120. Size, length, and painted as shown on the plans.

E. Concrete for post footings shall be Class 2500 as specified in Section 03300 CAST-IN-PLACE CONCRETE.

2.02 OTHER MATERIALS

All other materials not specifically listed herein-in, but required for the successful installation of the work included, are subject to acceptance.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Beginning of work means installer accepted existing surface and substrate conditions.

3.02 INSTALLATION AND WORKMANSHIP

A. Install framework, accessories and gates in accordance with ASTM F567 and as noted on drawings.

B. Gates shall be of size specified in plans. The corners of gate frames shall be fastened together and reinforced with malleable iron fittings or by welding as approved. Welds shall all be ground smooth. Where sizes permit, frames shall be galvanized after fabrication, otherwise all welds shall be finished as specified for touching up abrasions and field welds. The gates shall be hung by at least two

hinges. For the drive gates, latches of the crop rod type shall be provided and shall be of the full gate height, arranged to engage the gate catch. Catch for the drop rod shall be galvanized pipe and set in concrete. Gate hold-backs shall be positioned to secure and support the free end of the gate in full open position and/or as shall be accessible from both sides of the gates.

3.03 ADJUSTING

Adjust gates for smooth and balanced operation.

3.04 FINAL CLEAN-UP

All surplus earth resulting from fencing work that is not used in the grading work shall be cleaned up and disposed of off-site. All debris resulting from work of this section shall be removed from the site.

END OF SECTION

DIVISION 3 – CONCRETE

SECTION 03200 – REINFORCING STEEL

PART 1 – GENERAL

1.01 WORK INCLUDED

Furnish all labor, materials, tools and equipment necessary for completing the installation of reinforcing steel in accordance with County of Hawaii Standard Specifications for Public Works Construction, September 1986, Section 48 and as indicated on the drawings and as specified herein.

1.02 RELATED SECTIONS

A. CAST-IN-PLACE CONCRETE……...Section 03300

1.03 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Steel reinforcement

2. Reinforcement accessories

1.04 QUALITY ASSURANCE

A. Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 315, "Details and Detailing of Concrete Reinforcement."

2. CRSI, "Manual of Standard Practice"

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Store bar bundles off the ground and in a manner that does not leave the bundles exposed to the elements.

PART 2 – PRODUCTS

2.01 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed. The use of re-rolled rail steel or cold twisted bars will not be permitted.

B. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets. See Drawings for gauge of wire and dimensions of mesh required.

C. All reinforcing shall be new, free from dirt, detrimental scale, paint, oil or other foreign substances. No material cleaned by sand blasting will be allowed.

2.02 ACCESSORIES

A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

2. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

B. Tie Wires: Tie wires shall be black annealed iron wire No. 16 B.W.G. for No. 5 bars and lighter, and No. 14 B.W.G. for heavier bars.

2.03 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

B. Fabricated bars shall be bundled up like-kind and tagged with an identification mark matching the marks in the approved shop drawings.

C. Field bending of reinforcing shall not be permitted, unless approved in writing by the Engineer.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, soil, and other foreign materials.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain the minimum concrete cover specified. Do not tack weld crossing reinforcing bars.

1. No Shop- or field-weld of reinforcement is permitted.

D. Orient ends of wire ties pointing into concrete, away from the concrete surface.

E. Install welded wire fabric by rolling out fabric flat and firmly holding in place to the lines and grade as shown on the plans, in the longest practicable lengths, on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets of fabric at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.02 CONSTRUCTION JOINTS

A. No construction joints are indicated on Contract Drawings. Request for construction joints and the location shall be approved by Engineer prior to installation.

B. Place joints perpendicular to main reinforcement, if not specifically shown on the Contact Drawings.

C. Continue reinforcement across construction joints, unless otherwise indicated.

3.03 FLOOR SLAB PENETRATIONS

A. Provide additional reinforcing around floor slab penetrations as detailed.

B. Locate diagonal bars detailed around openings inside the main reinforcing layers, unless noted otherwise. Position mid-length of diagonal bar at centerline of opening and bend ends of diagonal parallel with slab edge where specified length of diagonal will not fit in concrete section as a straight bar.

END OF SECTION

SECTION 03300 – CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.01 WORK INCLUDED

Furnish all labor, materials, tools and equipment necessary for completing work of installing cast-in-place concrete in accordance with Hawaii Standard Specifications for Road and Bridge Construction, dated 2005, and as indicated on the drawings and as specified herein.

1.02 RELATED SECTIONS

A. Reinforcing Steel…… Section 03200

1.03 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: Provide concrete mix design for each class of concrete to be used. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Specify where each of the mixes is to be used in the project.

C. Material Certificates: Signed by manufacturers certifying that each of the following items complies with project requirements:

1. Cementitious materials and aggregates.

2. Admixtures.

3. Curing materials

4. Concrete repair materials.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

C. Testing Agency Qualifications: An independent testing agency, acceptable to the Owner, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and all admixtures from the same manufacturer.

E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

F. ACI Publications: Comply with the following, unless more stringent provisions are indicated:

1. ACI 301, "Specification for Structural Concrete."

2. ACI 318, “Building Code Requirements for Structural Concrete.”

3. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.05 DELIVERY, STORAGE, AND HANDLING

A. Cement and aggregates shall be stored in a manner to prevent deterioration or the intrusion of foreign matter. Any material which has deteriorated or that has been damaged shall not be used for concrete and shall be promptly removed from the batching site.

PART 2 – PRODUCTS

2.01 CEMENT, WATER & AGGREGATES

A. General: Materials shall be in conformance with County of Hawaii, Standard Specifications for Public Works Construction, September 1986, Section 39.

B. Portland Cement: ASTM C 150, Type I or Type II.

C. Pozzolans

1. Fly Ash: ASTM C 618, Class C or F.

2. Blended Hydraulic Cement: ASTM C595M.

D. Blended Hydraulic Cement: ASTM C 595M; Type IP - portland/pozzolan cement, or Type I (PM) - pozzolan-modified portland cement.

E. Normal-Weight Aggregate: ASTM C 33, uniformly graded, and as follows:

1. Class: Moderate weathering region, but not less than 3M.

2. Aggregate Size: No. 57 (1 inch to 3/8 inch).

F. Water: Potable and complying with ASTM C 94 or non potable meeting ASTM C-94 Acceptance Criteria for Questionable Water Supply. Use only potable water for job site mixing.

2.02 ADMIXTURES

A. General: Admixtures shall be certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

F. Shrinkage Reducing Admixture which reduces capillary tension of pore water, and not by expansive properties. Products such as Tetraguard AS20 by BASF and Eclipse 4500 by Grace Construction meet this requirement.

2.03 PROPORTIONING

A. Prepare design mixes for each type and strength of concrete determined by either laboratory trial mix or field test data bases in accordance to ACI 211.1 and ACI 301.

B. The concrete mix design for elements of the concrete tank foundation and slab shall have a maximum water-cement ratio of 0.47 based on weight.

C. Compressive Strength (28 days):

1.	Tank Foundation and Slab	4,000 psi (AAA)
2.	Sitework (swales, curb and gutter)	3,000 psi (A)

2.04 ACCESSORIES

A. Curing Materials:

1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./square yard when dry.
2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

PART 3 – EXECUTION

3.01 MIXING CONCRETE

A. General: All concrete shall be batch plant mixed by weight in accordance with Standard Specifications for Public Works. The batch plant shall have sufficient capacity and transportation equipment to deliver concrete at the required rate.

B. Ready Mix Concrete: Mixed-in-transit concrete shall conform to the requirements of ASTM C 94.

C. Job Site Mixing shall conform to the requirements of Standard Specifications for Public Works, Section 39.3.B and only can be utilized after approved by Project Manager.

D. Retempering concrete is not permitted.

3.02 CONVEYING, PLACING AND HANDLING

A. The conveying, placing and handling of concrete shall be in accordance with ACI 301, Standard Specifications for Public Works, Section 39.5 and the following.

B. Concrete shall not be placed until all reinforcing steel and all embedded items have been secured in place and inspected and approved by the Engineer.

C. Concrete shall be conveyed in a manner that does not promote segregation or loss of the concrete materials. Any means deemed by the sole judgment of the Project Manager to not meet the above requirement shall be discontinued.

D. Concrete shall be deposited as close to its final position as practical. Concrete shall not be moved by use of the vibrators.

E. All chutes, troughs, pipes or other means used to convey concrete shall not be aluminum and be kept clean and free of coats of hardened concrete by thoroughly cleaning after each pour. Water used for cleaning shall be directed away from placed concrete or formwork.

F. Concrete shall not be placed during rain unless adequate protection of the concrete is provided. Rainwater shall not be allowed to increase the mix water nor mar the finished surface of the concrete. Fresh concrete that has been deposited but has not set shall be protected in the event of rain.

G. In order to avoid the segregation, do not drop concrete a vertical distance greater than five (5) feet and avoid depositing concrete over reinforcing steel, especially at locations where multiple layers of reinforcing occur.

H. Concrete placed for slabs shall be deposited in a continuous progression across the slab segment being placed. Do not deposit concrete in separate piles that are leveled and worked together.

1. Consolidate concrete during placement operations working concrete thoroughly around reinforcement and other embedded items and into corners.

2. Maintain reinforcement and embedded items in position during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains or swale where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

I. Concrete that has partial hardened or been contaminated by foreign materials prior to placement, shall not be placed.

J. The concrete placement shall be a continuous operation until the full section, as defined by predetermined boundaries is completed.

K. The top surface of vertically formed lifts shall be generally level.

3.03 CONSOLIDATION

A. The consolidation of concrete shall be in accordance with Standard Specifications for Public Works, Section 39.5.B and the following.

B. All concrete shall be consolidated by the use of mechanical internal vibrators. Special attention shall be provided in corners of forms, around embedded items and heavily reinforced sections.

C. Contractor shall provide a sufficient number of vibrators and workers to consolidate the concrete at the same rate it is being placed to prevent the concrete from setting prior to consolidation.

D. Consolidation shall not be achieved by vibrating the formwork.

3.04 JOINTS

A. General

1. Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as foundation walls, stair landings and locations indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 3/4 inch below finished concrete surface where joint sealants are specified or shown.

3. Install joint-filler strips in lengths as long as practicable. Where a splice is required, lace or clip sections together.

3.05 SURFACE FINISHES

A. General: Comply with ACI 301 that apply and the following:

1. Apply to edge of concrete footing surfaces exposed to view.

2. Do not apply rubbed finish to smooth-formed finish.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.

C. Rubbed Finish: After forms are removed, rub surface with burlap sack cloth to produce a uniform surface texture leaving no fins or projections.

3.06 FINISHING OF SLAB

A. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.

1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar topping, other bonded cementitious finishes or exposed exterior surface.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated to receive trowel finish, and to slab surface to be covered with fluid-applied waterproofing.

D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and

appearance. Grind smooth any surface defects that would telegraph through applied coatings.

1. Apply a trowel finish to surfaces of tank floor slab or surfaces exposed to view or to be painted, or covered with a thin film-finish coating system.

3.07 HOT WEATHER CONCRETING PROCEDURE

A. Description: Hot weather is defined as any combination of high air temperature, low relative humidity and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise resulting in abnormal concrete properties. During hot weather, any or all of the methods specified herein for temperature control of concrete shall be used as required to maintain the concrete temperature below the limits specified.

B. Shop Drawings: Not less than 30 days prior to expected placement of concrete under hot weather conditions, a complete procedure shall be submitted for review covering the aspects of protection of concrete and its ingredients from the detrimental effects of hot weather. Concrete placement during hot weather shall not commence prior to the return of the procedure marked "Reviewed".

C. Product Delivery, Handling and Storage

1. Aggregate piles, cement bins and batch plant bins shall be shaded from the direct rays of the sun.
2. Aggregate piles shall be cooled by wetting and evaporation. Aggregate wetting shall be performed in such a manner that it will not cause wide variations in moisture content impairing slump uniformity.

D. General Practices and Measures: The following list of practices and measures, as described in ACI 305, may be used to reduce or avoid the potential problems of hot weather concreting:

1. Use concrete materials and proportions with satisfactory records in field use under hot weather conditions.

2. Use cooled concrete.

3. Use a concrete consistency that permits rapid placement and effective consolidation.

4. Transport, place, consolidate, and finish the concrete with least delay.

5. Plan the job to avoid adverse exposure of the concrete to the environment; schedule placing operations during times of the day or night when weather conditions are favorable.

6. Protect the concrete against moisture loss at all times during placing and during its curing period.

D. Batching and Mixing

1. Concrete mix water shall be refrigerated or ice shall be added to the mix up to 100 percent of the water requirement.

2. Ice, when introduced into the mixer, shall be in such form that it will be completely melted and dispersed throughout the mix at the completion of the mixing time.

3. Using liquid nitrogen to cool concrete is at Contractor's option.

4. The mixing time shall be held to the minimum practicable consistent with producing concrete meeting the specified requirements.

5. All methods and equipment for cooling of water and aggregate shall be subject to the approval of the Manager and shall conform to ACI 305.

E. Concrete Temperature

1. The temperature of concrete, as delivered at the time and location of placement, shall not exceed 90° F under any conditions.

2. The temperature of concrete as delivered at the time of placement under the following combined ambient conditions, except concrete that will be deposited within wall or column forms, shall not exceed the following temperatures:

Relative humidity < %	Ambient temperature > F	Maximum concrete temperature F
80	90	100
70	90	95
60	90	90
50	90	85
40	90	80
30	80	75
20	75	70

F. Delivery: Concrete shall be placed within 90 minutes after the introduction of water to the mix.

G. Preparation for Placing: Elevated forms and reinforcing steel shall be cooled by fog spraying and evaporation immediately prior to placing concrete. Forms shall be free of standing water when concrete is placed herein.

H. Placing: Concrete shall be placed in shallower layers than under normal weather conditions if necessary to assure coverage of the previous layer while it will respond readily to vibration.

I. Finishing: Fog spray shall be used during finishing operations whenever necessary to avoid surface plastic-shrinkage cracking. Fog spray shall also be

used after finishing and before the specified curing process is commenced to avoid surface plastic-shrinkage cracking.

J. Protection and Curing: Forms shall be kept covered and continuously moist. Once forms are loosened and during form removal, concrete surfaces shall be protected from drying and shall be kept continuously wet by fog spraying or other approved means.

3.08 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in non-water retaining concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.09 PROTECTION AND CURING

A. General: Provisions shall comply with Standard Specifications for Public Works, Section 39.5.C. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Wet cure concrete surfaces unformed surfaces or surfaces exposed when forms are removed before the specified curing period has passed since the section was cast. Use of only curing compounds is not acceptable.

C. For unformed surfaces, begin curing immediately after finishing concrete.

D. Concrete shall be cured for a minimum of seven (7) days after the concrete has been placed in the forms while maintained at a temperature above 50 degrees F.

3.10 CONCRETE REPAIR

A. Defective Concrete: Immediately after forms are removed, the Contractor shall examine all surfaces for areas requiring repair. Contractor shall precede under the requirements stated in DWS Standards, Section 303.03N for areas to be repaired.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Formed Surfaces: Surface defects include texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

D. Cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean exposed surface, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

E. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

F. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Engineer.

G. Unformed Surfaces: Check slab surface for high and low spots, and surface defects. Test surfaces for proper drainage, where slopes occur.

H. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.05 inch wide or that penetrate to reinforcement and other objectionable conditions.

I. After concrete has cured at least 14 days, correct high areas by grinding.

J. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

K. Correct low areas scheduled to remain exposed with a mortar repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a strong bond with a smooth, uniform, plane, and level surface.

L. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish surface to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

M. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours after repair is complete.

N. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Contractor shall engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement according to requirements specified in this Article.

B. Testing Services: Testing of fresh concrete samples obtained according to ASTM C 31 shall be performed to meet the following requirements:

1. Compressive-Strength Tests: A set of samples shall be taken for every 100 cubic yards place for each type of concrete each day. ASTM C 39; test two laboratory-cured specimens at 7 days and two at 28 days with a fifth sample held in reserve as an additional test specimen if required.

2. Slump: ASTM C 143; one test at point of placement for each set of test samples, but not less than one test for each day's pour of each concrete classification. Perform additional tests when concrete consistency appears to change or when ordered by Engineer.

3. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 80 degrees F and above, and one test for each set of samples.

C. Testing Results Criteria: The samples tested shall meet the requirements stated below.

1. Compression-Strength Test results shall meet the criteria specified in Standard Specifications for Public Works, Section 39.5.A.

2. Test results shall be reported in writing to Project Manager, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

D. Additional Tests: Testing and inspecting agency shall make additional tests of concrete at the rate of one set for every 50 cubic yards of concrete placed when test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by Project Manager.

END OF SECTION

DIVISION 5 - METALS

SECTION 05600 – PREFABRICATED STEEL WATER TANK

PART 1 – GENERAL

1.01 GENERAL CONDITIONS: The General Conditions and Special Provisions preceding these specifications shall govern this section of the work.

1.02 WORK INCLUDED: The Department will provide a previously used galvanized steel water tank for use on this project. The tank was previously used as a temporary tank with a 12-inch influent and effluent line and a 12-inch overflow line. The Contractor shall furnish all labor, materials, services, equipment and related items necessary to transport, retrofit and install the prefabricated steel water tank in accordance with these specifications, dimensions, sections and details shown on the plans, and the approval of the Department.

1.03 SUBMITTALS

A. Prior to commencing work, the Contractor shall submit to the Project Manger a general work plan outlining the complete details of the equipment, materials and methods to be used to retrofit the tank for the project.

B. Product Data: Submit data in the form of manufacturer's technical data, specifications and installation.

1.04 EXISTING TANK

The Department will supply a 104,600 gallon tank manufactured by Scafco Corporation, model 3604LSTP-40. The Contractor will be responsible for transporting the tank from the Department's Office in Waimea to the project site. In addition to retrofitting the tank for the required pipe sizes, at a minimum, the Contractor shall replace the tank liner, rib clips, nuts, bolts and washers. An inventory of the tank parts is appended at the end of this section.

1.05 QUALIFICATIONS OF TANK ERECTOR

Tank Erector shall be licensed to perform General Engineering "A" construction work in the State of Hawaii and shall have erected, at least, 5 storage tanks of similar design and size in the State of Hawaii. A copy of the manufacturer's installation instructions is appended at the end of this section.

PART 2 – PRODUCTS

2.01 TANK MATERIALS

A. Wall Staves - All wall sheets to 17 Ga. conform to ASTM A-446, C, Fy = 50,000 P.S.I G-115 galvanized or better. All wall sheets 16 Ga. or thicker conform to ASTM A653 SQ,

Grade 57 commercial quality. Sheets standard corrugation 2-2/3" x ½". Sheets have 42-2/3"@ x 112-1/2" typical coverage.

B. Bolting Hardware - All bolts are grade 8.2 meeting or exceeding Leland JS1000. Bolts have mechanical zinc plating .0006" thick. Vertical seams are bolted at 1-1/3" on center. Horizontal seams are bolted at 9-3/8" on center.

C. Vinyl Liner - Tank liner construction of 40 mil white NSF 61 PVC liner side and bottom. Tank liner shall be protected from tank steel body and tank floor with geotextile material.

D. Tank Roof - Tank roof sheets shall be triangular sections of galvanized steel with raised ribs along each side, flat area between ribs, and a 90 degree formed deep edge at the eave. Panels are manufactured from G-90 galvanized steel conforming to ASTM A 446, Grade C, or better. Tank roof shall be self supporting and shall have a 15 degree pitch. Tank roof shall include an entry hatch, an apex vent/access manway, gooseneck vent and safety steps of cold formed steel angle.

E. Tank Coatings - Tank interior shall be coated with suitable heavy solids zinc or aluminum urethane primer following a wash system suitable for coating system. Tank exterior shall be coated with a primer and top coat system for galvanized steel following as wash system suitable for the coatings. Color shall be per Project Manager.

PART 3 - EXECUTION

3.01 TANK ERECTION

A. Tank shall be erected on a foundation and pad per the manufacturer's recommended foundation design for soil with a bearing capacity of 2,000 psf.

B. Tank shall be erected by an experienced tank erector using a tank jacking system to prevent damage to the liner.

C. Tank penetrations shall be through the tank floor using fittings per the manufacturer's recommended design.

3.02 TESTING AND DISINFECTION

A. Finished structure shall be filled and checked for leaks. Water shall be supplied by the Contractor.

B. Tank shall be disinfected in accordance with AWWA standard D-105. Tank shall be sampled and pass microbiological testing before facility is placed in operation.

END OF SECTION

DIVISION 15 - MECHANICAL

SECTION 15050 - MECHANICAL MATERIALS

PART 1 - GENERAL

1.01 GENERAL CONDITIONS

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

1.02 REFERENCES

Work shall be governed by “The Water System Standards”, dated 2002, “The Approved Material List and Standard Details for Water System Construction”, dated 2002 and “Water System Exterior Corrosion Control Standard”, dated 1991, for the Department of Water Supply (DWS), County of Hawaii and all subsequent amendments, hereinafter referred to as the DWS Standards, and the Uniform Plumbing Code.

1.03 SUBMITTALS

Material list naming each product to be used identified by manufacturer and type number, in accordance with Section 01340 DRAWINGS TO BE FURNISHED BY THE CONTRACTOR.

PART 2 - PRODUCTS

2.01 PIPING AND VALVES

Piping and valves, including pressure reducing valves, air release valves, ball valves, flow switches, tank level transmitters, pressure gages, and all necessary appurtenances and piping shall be furnished as shown on the plans.

2.02 PRESSURE REDUCING VALVE

A. Valves shall maintain a constant downstream pressure regardless of changing flow rate and/or inlet pressure.

B. Pressure reducing valves and appurtenances shall be in accordance with the Water System Standards and Uniform Plumbing Code.

C. Valves shall be brass with a maximum working pressure of 400 psig.

2.03 AIR RELEASE VALVE

A. Air release valves shall be automatic float operated valves designed to release accumulated air from a piping system while the system is in operation and under pressure.

B. The valve body shall be threaded with NTP inlets and outlets.

C. Orifice shall be sized for a ½-inch inlet.

D. Bodies and Cover shall be cast iron ASTM A48 Class 30 for working pressures up to 175 psig.

E. The seat shall be brass with Type 904 stainless steel float and linkage mechanisms. Non-metallic floats or linkage mechanisms are not acceptable.

F. Valves shall be manufactured and tested in accordance with AWWA C512.

2.04 BALL VALVES

A. Ball valves shall be full port stainless steel ball valves and include handwheels similar to Apollo 76-100 series, Saturn 96-100 series or approved equal.

B. Body may be brass or stainless steel.

C. Lever handles may be substituted for handwheels. Lever handles shall be made of stainless steel.

D. For ball valves 1-1/2 inch and smaller, handwheels shall have a maximum radius of 1-1/2 inch from the vertical center of the valve. Lever handles shall have a maximum width of 1 inch and a radial length between 2-1/2 inches to 3 inches from the vertical center of the valve to the end of the handle.

E. Lockable levers shall be lockable in the closed position using a padlock.

F. Padlocks are to be of good quality, heavy duty and weather resistant and provided by the Contractor for all gates. All padlocks shall be keyed alike and a minimum of twelve (12) keys shall be provided. The Contractor shall provide a submittal of the padlocks for acceptance by the Project Manager.

2.05 WATER METERS

A. Water meters shall be installed as indicated in the contract documents.

B. Meters shall be brass or bronze and manufactured in accordance with AWWA C700.

C. Meters shall consists of a register, a lead free high-copper alloy main case and a positive displacement nutating disc measuring chamber.

D. Meter maincase and cover shall be cast from NSF/ANSI 61, Annex G and Annex F certified lead free alloy containing a minimum of 85 percent copper.

E. Register must contain a low flow indicator with a 1:1 ratio to disc nutations for leak detection.

F. The measuring chamber shall be manufactured from a single piece of non-hydrolyzing synthetic polymer with a Type 316 stainless steel spindle.

G. Meter boxes for meters shall be Ford Meter Box Company, Inc. Model LYLBB344-244-NL with locking iron lid or approved equal.

2.06 TANK LEVEL INDICATOR

A. Float based level indicator shall be furnished for each tank. Wind guards shall be provided to prevent indicator from swaying.

B. All gages and pressure instruments and shall be stainless steel.

C. Indicator shall be manufactured by Tank Products Inc. or approved equal.

2.07 PRESSURE GAGE

The diameter of the dial shall be 3-1/2 inches with a standard pressure range specified on the plans, liquid filled, 1 percent full scale accuracy, and a minimum ASME Grade 1A rating. The gage shall be all welded stainless steel construction. Process connection shall be 1/4-inch NPT with a brass snubber, petcock, and union between gage and pipe. Pressure gage shall be Ashcroft Model 1009 or approved equal. Pressure snubbers shall be furnished with all gages and pressure instruments and shall be RAY or approved equal. Gage, snubber and petcock union shall be supplied as a unit and shall be located as shown on the plans.

2.08 HYDROMETER

A. The hydrometer shall consist of a water meter and hydraulic control valve to regulate flow. Hydrometer shall be threaded, globe pattern Bermad Model IR-900-M or approved equal.

Material Specification:

Valve Size:	1-1/2 inch
Main Valve Body and Cover:	Ductile Iron
End Detail:	Threaded
Pressure Rating:	150 PSI
Temperature Range:	122 degrees F
Rubber Material:	Buna N
Coating:	Polyester

B. The hydrometer shall be used in conjunction with a DC Volumetric Single Station Controller Bermad Model BEC PM1 or approved equal. The controller receives digital inputs from the hydrometer and closes the control valve after is a preset quantity of water.

Specifications:	
Hardware:	9V Alkaline battery
Standard Input:	Two dedicated contact – water meter or override switch
Standard Output:	12 VDC Latch (Bermad S-392)
Housing:	UV Resistant ABS
Display:	LCD Screen

PART 3 - EXECUTION

3.01. INSTALLATION

A. Pump piping and valves shall be installed in conformance with manufacture's recommendations.

B. Pressure testing and flushing of valves shall be carried out in accordance with the Water System Standards by the Contractor. The results of such tests shall be submitted to the Project Manager for approval at the Contractor's expense. All charges for services required by the Department of Water Supply shall be paid for by the Contractor.

END OF SECTION