SECTION 02300

EARTHWORK

PART 1 – GENERAL

1.01 GENERAL CONDITIONS

A. As specified in Division 1 – General Requirements.

1.02 GENERAL REQUIREMENTS

A. Furnish materials, labor and equipment required to accomplish all excavation, ripping and proofrolling, probing and grouting, filling and backfilling, grading and compacting as indicated on the drawings.

B. The Geotechnical engineer shall be present to observe site grading, proofrolling, fill and backfill placements and compaction and probing and grouting procedures on a full-time basis. All cost for their services shall be borne by the Contractor.

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

D. 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 drawings and/or described herein or may vary there from.

E. The requirements in this section are applicable to all new construction areas and to future construction areas under this contract.

F. In addition, the following construction standards, with certain modifications as hereinafter specified, are hereby incorporated into and made a part of these specifications by reference and shall be applicable to all work performed by the Contractor under this section.

1.03 STANDARD SPECIFICATIONS

A. Work shall be in accordance with the following sections of the County's "Standard Specifications for Public Works Construction" (SSPWC), dated September 1986 as revised, except as amended in the plans and specifications herewith. (Paragraphs concerning Measurement and Payment in the Sections are not applicable to this project.)

1. Clearing and Grubbing Section 10

2. Trench Excavation and Backfill Section 11

3. Rock for Fill Section 14

4. Crushed Rock Section 15

5. Borrow Section 16

6. Embankment Section 17

1.04 CRITERIA FOR BIDDING

A. Base bids on the following criteria:

1. Surface elevations are as indicated.

2. Blasting is not permitted.

3. Crushing and screeninig of onsite rock material for general fill is permitted.

4. Removal of all unsuitable materials as well as additional embankment materials required for lava tubes, and subterranean voids shall be incidental items to excavation and embankment, The Contractor shall adjust his unit price accordingly.

1.05 PERMITS

A. The contractor shall obtain and pay for necessary permits prior to the commencement of work.

1.06 CONSTRUCTION LINES, LEVELS, AND GRADES

A. The Contractor shall verify all lines, levels, elevations and improvements indicated on the drawings before any clearing, excavation or construction begins. Any discrepancy shall be immediately brought to the attention of the Engineer and any change shall be made in accordance with his instruction. Starting of clearing and grubbing operations shall be construed to mean that the Contractor agrees that the existing grades and improvements are essentially correct as shown. The Contractor shall not be entitled to extra payment if existing grades and improvements are in error after his verification thereof, or 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 verified and established by a Surveyor or Civil Engineer licensed in the State of Hawaii.

C. The laying out of base lines, establishment of grades and staking out the entire work shall be done by a licensed Surveyor or licensed Civil Engineer.

PART 2 – PRODUCTS

2.01 MATERIALS

A. No asbestos containing materials shall be under this section. The Contractor shall insure that all materials incorporated in the project are asbestos-free.

B. Fill areas of the project site shall be capped with a minimum 2-foot thick layer of structural fill material. Structural fill shall be well graded granular material, with particles less than 6 inches in maximum size and contain less than 30 percent particles passing the No. 200 sieve by weight. When placed in confined areas, such as utility trenches and footing excavations the maximum particle size shall be limited to 2 inches.

C. Fill and backfill materials below the minimum 2-foot thick structural fill layer may consist of general fill material. General fill material shall be well-graded granular material, free from organic material and backfill, debris, other deleterious substances and majority of which are less than 12 inches in size with an absolute maximum dimension of 18 inches. Materials between 12 and 18 inches in particle size should be limited to about 15 percent or less of the total volume Cushion fill: Under exterior and interior concrete slabs-on-grade shall be ASTM C33 Standard Size Aggregate No. 67 (No. 3B fine gravel).

D. Drain rock shall meet the gradation requirements for ASTM C33 Standard Size No. 67 (No. 3B fine gravel).

E. Base Course and Subbase Course for roadways shall meet the requirements of the Standard Specifications for Public Works Construction, Section 30-Select borrow for Subbase Course and Section 31-Aggregate Base Course.

F. The Contractor shall import all necessary material to complete the grading work at no additional cost to the Owner. Imported material shall be well-graded from coarse to fine with no particles greater than 6 inches in largest dimension. The material shall have a laboratory California Bearing Ratio (CBR) value of 20 or higher, and a swell potential of 1 percent or less when tested in accordance with ASTM Test Designation D 1883. The imported material shall be tested prior to being transported to the site and subject to the approval of the Geotechnical engineer and shall meet the requirements as specified for each category of the materials.

G. Excavated onsite basalt materials may be used as fill and backfill, provided that the materials are well graded and maximum size of the individual fragments are

limited to the applicable sizes for general fill and backfill and structural fill and backfill.

PART 3 – EXECUTION

3.01 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 handhole boxes, earth banks, etc. free from damages resulting from the work, shall be designed, 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 conduct operations with minimum interference to streets, driveways, sidewalks, passageways, traffic, etc. 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. When necessary and when directed, the Contractor shall provide and erect barriers, etc. with special attention to the protection of personnel.

3.02 LAYING OUT

A. The laying out of baselines, establishment of grades and staking out the entire work shall be done by a Land Surveyor, licensed in the State of Hawaii, at the expense of the Contractor and he shall be solely responsible for their accuracy. The Contractor shall erect and maintain substantial batter boards showing construction lines and levels.

B. Should any discrepancies be discovered in the dimensions given in the plans, the Contractor shall immediately notify the Engineer before proceeding any further with the work; otherwise, he will be held responsible for any costs involved in corrections of construction placed due to such discrepancies.

3.03 SITE GRADING

A. All grading work shall be performed in conformance with County of Hawaii Ordinance 168, the applicable provisions of Chapter 54, Water Quality Control

Standards, and Chapter 55, Water Pollution Control, of Title 11, Administrative Rules of the State Department of Health. In addition, the work shall be in conformance with the Air Pollution Control Standards and Regulations of the State Department of Health.

B. The area to be graded shall be cleared of vegetation, debris, rubbish, old pavements, abandoned pipelines and other deleterious materials. Trees and large masses of roots shall be grubbed. All of these materials shall be removed and disposed of properly off-site at no cost to DLNR.

C. No blasting will be permitted.

D. The areas not covered by concrete slab or pavement up to the Contract Zone Limits shall be graded to conform to finish contours with allowance for depth of top soil. Rough grading shall prevent the drainage of water into construction areas.

E. Site grading observations shall be performed under the observation of the Geotechnical Engineer.

3.04 SITE PREPARATION

A. Prior to commencement of earthwork operations, all vegetation debris and other deleterious materials shall be removed from the site. Surface soils shall be stripped until basalt rock is encountered. Strippings shall not be used and shall be removed from the site.

B. Basalt rock under slab-on-grade pavements, excavated subgrades and areas to receive fill shall be ripped and proofrolled as specified herein.

C. All subgrades of fill areas shall be ripped to a depth of ~~about 3 feet~~ 12 inches below ~~the existing ground surface~~ subgrade elevations shown on the plans to detect and collapse near-surface cavities and/or voids. As a minimum, ripping of the subgrades should extend at least 3 feet laterally beyond the limits of the fill areas.

D. After the fill surfaces have been ripped to a depth of ~~about 3 feet~~ 12 inches ~~below the ground surface~~ subgrade elevations shown on the plans, the ground should be proof-rolled with a Caterpillar D-10 bulldozer or similar size bulldozer a minimum of four passes to provide a relatively level surface. After leveing with the bulldozer, the fill subgrades should be Proof-rolled with a large vibratory drum roller (minimum 20 tons static weight) for a minimum of eight passes travelling no faster than 100 feet per minute. Yielding areas, loose areas, or cavities disclosed during clearing and proof-rolling operations should be over-excavated and backfilled with compacted fill materials.

E. The Geotechnical engineer shall be present from the beginning of grading to observe earthwork operations. In addition, prior to placing fill, the ground surface shall be checked by the Geotechnical engineer.

F. Any underground structures such as cesspools, cisterns, septic tanks, well, pipelines, fuel tanks, etc. discovered in the site preparation work shall be removed and backfilled in accordance with these specifications and any applicable regulations.

G. Cut slopes in hard basalt rock may be inclined at 0.50 horizontal to 1.0 vertical or flatter. Benching may be omitted for cut slopes less than 25 feet in height in hard basalt formation. The upper 5 feet of the cut slopes shall be inclined at 1.0 horizontal to 1.0 vertical or flatter.

H. Any loose soft spots encountered at the excavated subgrade levels shall be removed and replaced with compacted structural fill.

3.05 GENERAL FILL AND BACKFILL

A. Generalfill and backfill shall be compacted to a firm, unyielding surface. Conventional compaction testing is generally not practicable in fills which composed of rocks, boulders and/or cobbles. A testing program to evaluate the number of passes of a compactor needed to achieve the desired level of compaction shall be conducted at the start of the grading phase of the project. Compaction shall be observed by the Geotechnical engineer.

B. General Fill slopes shall not be steeper than 1.5 horizontal to 1 vertical. Fills placed on slopes steeper than 5H:1V should be keyed and benched into the existing slope to provide stability of the new fill against sliding.

C. The filling operations shall start at the lowest point and continue up in level horizontal compacted layers in accordance with the fill placement recommendations noted herein before. Fill slopes should be constructed by overfilling and cutting back to the design slope ratio to obtain a well-compacted slope face. In the event that over-cutting of a slope occurs, keying and benching requirements should be implemented instead of backfilling the slope to the design grade with sliver fills.

3.06 UTILITY TRENCH EXCAVATION AND BACKFILL FOR EXTERIOR UTILITIES

A. Trench excavation for exterior utility lines (water, sewer, drain, electrical), shall be dug to depths shown on the drawings. If depths are not indicated, the trench shall be cut down to proper levels that will provide the minimum coverage required.

B. Trenching work shall be open cut excavation with banks as nearly vertical as practical, with sufficient width to provide proper working space and bottom of trench accurately graded to provide uniform slope and support.

C. Backfill for the utilities shall be as indicated on the plans and as specified herein. Trench backfill shall be General Fill and Backfill. The upper portion of the trench backfill shall consist of granular material generally less than 6 inches in maximum size compacted to at least 90 percent relative compaction as determined by ASTM D1557-91. For trenches located in paved areas, the upper 2 feet of the trench backfill below the road subgrade shall be compacted to not less than 95 percent relative compaction. Where the utility line crosses beneath the footings, the utility pipes should be concrete jacketed."

3.07 FILL TESTING

A. All fill shall be tested by Geotechnical engineer or a designated testing agency for approval. All cost of testing shall be borne by the Contractor. Testing shall be made throughout the area for each compacted lift. All test results must be approved before the Contractor can proceed with placing of topsoil, cushion fill or base course.

3.08 FINISH GRADING

A. Where finish grades and contours are not given, Contractor shall grade to provide drainage away from new and existing structures and shall provide good transitions into existing grades outside the grading limits

END OF SECTION