Make the following section part of the Standard Specifications:

"**SECTION 627 - ELECTRIC AND COMMUNICATION SYSTEMS**

627.01 Description. This work shall consist of demolishing, adjusting, modifying and/or removing existing systems or portion thereof, furnishing all labor, materials and equipment to install in place and in operating condition underground or overhead structures required for the facilities of Kauai Island Utility Cooperative, herein referred to as KIUC, the facilities of Hawaiian Telcom herein referred to as HTCO, the facilities of Charter Communications, herein referred to as Spectrum and the facilities of Sandwich Isles Communications, herein referred to as SIC. Such works shall be performed and tested at the indicated locations in accordance with the requirements herein specified and the indicated details, or as ordered by the Engineer, and includes but is not limited to the following:

(A) Complete underground duct system including excavating, backfilling, concrete work, conduits, handholes, manholes, and transformer and switching equipment pads, to be used by KIUC for their cables and equipment. Work shall also include securing the approval of the KIUC inspector.

(B) Complete underground duct system including excavation, backfilling, concrete work, conduits, handholes, manholes, and equipment pads to be used by the HTCO for their cables and equipment. Work shall also include securing the approval of the HTCO inspector.

(C) Complete underground duct system including excavation, backfilling, concrete work, conduits and pullboxes to be used by Spectrum for their cables and equipment. Work shall also include securing the approval of the Spectrum inspectors.

(D) Complete underground duct system including excavation, backfilling, concrete work, conduits and pullboxes to be used by the SIC for their cables and equipment. Work shall also include securing the approval of the SIC inspector.

(E) Coordinate work and arrange for periodic inspections by KIUC, HTCO, Spectrum, SIC and Engineer. Any work requiring opening of handholes, boxes, or manholes must be coordinated with the Utility and must be performed only under the Utility's supervision.

(F) Pass test mandrel through all ducts and conduits, and make corrections as directed by the inspectors or Engineer.

(G) Provide pulling wire, No. 12 AWG galvanized steel or polypropelene cord, in all empty ducts and conduits, unless indicated otherwise. Provide duct measuring/cable pulling tape in all HTCO ducts and conduits.

(H) Immediately report and pay for damages to existing equipment.

(I) Obtain and pay for electrical permits, arrange for periodic inspection by local authorities and deliver certificate of final inspection to Engineer.

(J) Contractor shall check and test the installation for completeness and functional operation as described by the drawings and specified herein. Final test shall be in the presence of Engineer and representatives of utility companies. Contractor shall arrange and pay for all testing costs.

(K) Material, construction and workmanship shall conform to the latest requirements of the Utility Company and local ordinances that may apply.

(L) Determine top of cover elevations for manholes, handholes and pullboxes and adjust them to finish grade per the Utilities standards and/or requirements.

Incidental parts which are not shown on the plans or specified herein and which are necessary to complete the underground electric, telephone, and cable television duct systems shall be furnished and installed by the Contractor as though such parts were shown on the plans, or specified herein or in the special provisions.

All electrical equipment shall conform to the NEMA Standards, and all electrical work shall conform to ordinances of the State of Hawaii; latest edition of National Electrical Code; 2002 National Electrical Safety Code; Chapter 6-73, Hawaii Administrative Rules; and Regulations and Standard Practices of KIUC, HTCO, Spectrum and SIC.

Applicable rules, standards and specifications of following associations shall apply to materials and workmanship:

American National Standards Institute (ANSI)
Edison Electric Institute (EEI)
Illumination Engineer Society (IES)
National Board of Fire Underwriters (NBFU)
National Electrical Manufacturer's Association (NEMA)
National Fire Protection Association (NFPA)
Underwriters' Laboratories, Inc. (UL)

The Contractor shall closely work and coordinate ALL work with Hawaiian Telcom Inc. (HTCO), Kauai Island Utility Cooperative (KIUC), Charter Communications (Spectrum) and all other affected utility companies. New ductlines,

manholes, poles, etc., must be constructed, and HTCO, KIUC, Spectrum, and other utilities' work involving relocation of cables, etc., completed, prior to demolition or removal of any existing ductlines, poles and other utility facilities. The Contractor shall incorporate in his schedule that all underground and overhead utilities including utility poles and manholes are to remain in place up to the end of the project, OR until such time that the Utilities can relocate their facilities within the Contract period. The contractor shall schedule/reschedule work to enable the contractor to work around these utilities and work, coordinate and accommodate the Utility companies should they commence with their work at the same time with the contractor's work. Multiple mobilization/demobilization by contractor may be required. Close and continuous coordination with the Utilities, scheduling and re-scheduling of contractor and Utilities' work, accommodating the utility owners should they commence with their relocation work concurrently with the Contractor's work or should the utility owners conduct the Utility work on a discontinuous or piecemeal basis, and multiple mobilization/demobilization shall be done at no additional cost to the County. The Bidder/Contractor shall incorporate the cost in his bid.

627.02 Materials. Materials shall meet the requirements specified in the following subsections of Division 700 - Materials.

Precast Concrete Unit	712.06
Conduits	712.27

(A) Ducts and Conduits shall conform to the requirements of Section 712.27 - Conduits. Ducts and conduits required shall be new and provided by the Contractor in accordance with the construction drawings and specifications.

(1) Polyvinyl Chloride (PVC) Schedule 40 type ducts shall be provided for the KIUC duct system. Polyvinyl Chloride (PVC) Schedule 40 or GT-42 type ducts shall be provided for the HTCO, Spectrum duct system. Polyvinyl Chloride (PVC) Schedule 40 type ducts (concrete encased) shall be provided for the SIC duct system. The fittings shall be of the same material as the conduit and duct.

(2) Conduit Riser Bends shall be polyvinyl chloride (PVC) pipes with 6-foot radius for 69 KV use and 3-foot radius for 12 KV use. The fittings shall be of the same material as the conduit and duct.

(B) Concrete shall conform to the requirements of Section 601 - Structural Concrete, except that for concrete jackets and concrete caps, the maximum size of coarse aggregate shall be 3/4 inch in lieu of the one-inch to No. 4 specified and the slump shall be 6-inch minimum and 7-inch maximum. Concrete for manholes, handholes, and pullboxes shall be Class A.

Concrete for jacketing conduits and ducts shall be Class B except that the cement content shall be 5.6 sacks per cubic yard.

(C) Concrete Bricks shall conform to Subsection 704.02 - Concrete Bricks. The use of broken bricks will not be permitted.

(D) Cement Mortar for Setting Bricks shall conform to the requirements of Section 601 - Structural Concrete. Cement mortar shall be a one-to-three volumetric mix of portland cement and a combined fine aggregate. Combined fine aggregate shall conform to Section 703 - Aggregates.

(E) Concrete Covers, Steel Frames and Miscellaneous Metals and Appurtenances for Handholes and Manholes. Steel shapes shall conform to the applicable provisions of Section 713 - Structural Steel and Related Materials. Fabrication of steel frames shall conform to the applicable provisions of Section 501 - Steel Structures. Steel frames shall be hot-dipped galvanized after fabrication. Concrete for covers shall be Class A and shall conform to Section 601 - Structural Concrete. Cast iron frame and cover shall conform to Subsection 712.07 (A) - Frame and Covers.

(F) Reinforcing Steel. Reinforcing Steel for manholes, handholes and pullboxes, and concrete jackets shall conform to the requirements of Section 602 - Reinforcing Steel.

(G) Materials will be subject to inspection at any time. Failure of the Engineer to note faulty material or workmanship during construction will not relieve the Contractor of his responsibility for removing or replacing such materials and dredging the work at his expense.

627.03 Construction Requirements.

(A) General.

(1) Equipment List and Drawings. Within ten (10) days following the award of the contract, the Contractor shall submit to the Engineer for acceptance six (6) copies of a list of materials and equipment that the Contractor will incorporate in the work. The list shall include the name of the manufacturer, size and catalog number of the unit, detailed scale drawings, and proposed deviations from the contract. If required, the Contractor shall submit for acceptance samples of the material that the Contractor will use at no cost to the State of Hawaii.

(2) The Contractor shall, in performing required excavation and backfill, exercise due care to avoid disturbing existing facilities. He shall remove and dispose of all demolished or excess material from the job site.

(3) Upon completion of the work, the Contractor shall submit an 'As Built' or corrected plan showing in detail thereon all construction changes.

(4) Before bidding, the Contractor shall visit project site, carefully review each section of the Specification and all Drawings of this Contract, and obtain and review the standards, specifications and drawings of the local utility companies.

The Contractor shall report any error, conflicts or omissions to the Engineer at least one week before submission of bids for interpretation or clarification. If errors or omissions are not reported, the Contractor shall provide necessary work at no cost to the State of Hawaii to properly complete intent of Specification and Plans.

(5) The Contractor shall make detailed arrangements for work by utility companies pertaining to this contract. Payment to utility companies for their work shall be by the State.

(6) Electric and telephone utility cables and equipment shall be by respective utility companies. Cable television cables and equipment shall be by the cable television vendor for the area.

(7) **Installation**. Comply with all requirements of the serving utility company, standard drawings and details, and rules and regulations.

For KIUC facilities, follow KIUC Standard Specifications, requirements and procedures. Point of contact: Ferdinand Pascual, phone: (808) 246-4340, extension 2373.

For HTCO facilities, follow Hawaiian Telcom's Standard Specifications for Placing Telephone System, January 2007 or as revised. Point of contact: James Sone, phone: (808) 241-5052.

For Spectrum facilities, follow Charter Communication's Standard Specifications, requirements and procedures. Point of contact: Joshua Martin, phone: (808) 635-6267.

(B) Existing Utilities. Existing utilities are shown on the drawings in approximate locations for the convenience of the Contractor. It is not the intention of plans to imply that all existing utilities are drawn and located, and the fact that any utility is not shown on the drawings shall not relieve the Contractor of his responsibility under this Section. It shall be the Contractor's responsibility to ascertain the locations and depths of all existing utilities which may be subject to damages by construction under this Contract. The

existing utilities are known to be shallow, the Contractor is responsible in working around these utilities. The Contractor shall:

(1) Support and protect all KIUC, HTCO, Spectrum facilities during construction,

(2) Notify KIUC, HTCO and Spectrum immediately of any damage to its system caused by construction under this Contract, and

(3) Reconstruct, at his expense, damaged portions of the utility system in accordance with the requirements and specifications of KIUC, HTCO and Spectrum.

(4) The Contractor shall be responsible for and shall pay for all damages to existing utilities of all types.

(C) KIUC Facilities. The Contractor shall provide KIUC with 24-hour access to all existing KIUC facilities that are to remain, or, for facilities that are to be removed, until they are removed and to all new KIUC facilities after they are installed. The Contractor shall be responsible for any delays in utility company work due to his failure to provide access to utility company facilities. All existing KIUC facilities shall remain in place until proposed permanent facilities are completed and energized. Any cost for temporary relocations arising during construction shall be borne by the Contractor.

Electrical equipment or conductors, whether electrically energized or not, shall remain in place at all time during construction. Handling and moving of electrical equipment or conductors, when required by the Engineer, shall be done by KIUC. Work by the Contractor in areas with energized electrical equipment or conductors shall be performed with extreme caution to prevent accidents and to avoid disturbing or damaging this equipment or conductors or any temporary supports or protective guards that are constructed. Unless otherwise permitted by KIUC, all work by the Contractor in areas with energized equipment of conductors shall be performed in the presence of a KIUC inspector and/or standby man. The Contractor shall have the sole responsibility for maintaining safe and efficient working conditions and procedures in these areas.

Any existing or new KIUC facilities including equipment or conductors damaged by the Contractor during construction shall be replaced by KIUC at the Contractor's expense.

The Contractor shall give KIUC two weeks advance notice for any work to be done by KIUC on its facilities. Unless otherwise indicated on the drawings or otherwise directed by the Engineer, KIUC will:

(1) Remove the concrete envelope from existing underground KIUC ducts containing electrical cables.

(2) Construct temporary supports and protective barriers for bare duct and electrical cables immediately after removal of the concrete envelope is completed. Material for such supports and barriers shall be furnished by the Contractor as an incidental cost.

(3) Remove temporary supports and protective barriers constructed under item (2) above.

(D) Excavation and Backfill. All excavation and backfill for electric, telephone, communications and cable television underground structures and trenches shall conform to the requirements of Section 204 - Excavation and Backfill for Miscellaneous Facilities, modified as follows:

(1) Excavation.

(a) The width of trenches for concrete encased ducts shall be not less than the width of the encasement nor more than that required to properly and safely execute the work.

(b) Ducts encased in concrete jackets which are bedded in disturbed (fill) ground shall be installed in the following manner: Embankments shall be built up and thoroughly compacted to the elevation which is three feet above the top-of-jacket elevation, or to the required elevation shown on the plans, whichever is less than five times the width of the jacket. This work shall conform to the requirements of Section 203 - Excavation and Embankment. The trench to accommodate the jacket shall then be excavated through the constructed embankment.

(c) The Contractor shall not excavate for manholes, handholes and duct lines until he has the locations for these structures staked out and verified to be correct, and approved by the respective utility company inspectors.

(d) Trenches shall be excavated at least 50 feet ahead of duct placement so that any obstruction to the duct line can be avoided through gradual adjustment. The profile grade may be adjusted by the Engineer to increase or decrease the excavation depth (up to 3 feet) as a result of unforeseen obstruction at no additional cost.

(e) Excavation for each handhole and manhole, plus 50 feet of trenching for all ducts connected to those structures shall be completed, and the locations and depths of the handholes and manholes shall be verified and approved by the respective utility company inspectors prior to construction or installation of the structures. All cuts in excess of depths required shall be filled with concrete, or Type A backfill. The lateral limit for handholes and manholes shall be the vertical surfaces two feet outside the neat lines of the structures.

(f) The bottom of the trench excavation shall be flat and smooth. All trenches shall be approved by the Engineer and the utility company inspectors before any ducts or conduits are placed or any structures and foundations are constructed.

(g) The trenches shall be widened at handholes and manholes to permit proper entry of the ducts and conduits.

(h) The Contractor shall provide all shoring, sheathing, bracing and structural supports required to safely support the sides of excavations. Plating and structural supports for the plating are considered incidental. Provision and removal of these items are incidental to the excavation work.

(2) Backfill.

(a) No backfilling shall be done until the duct and conduit installations, and the handhole and manhole placements have been verified to be correct, and approved by the respective utility company inspectors.

(b) Material for use as trench backfill for direct buried cable above select backfill shall be nonexpansive and shall conform to Subsection 627.03 (D) (2) (c) below. Backfilling and compaction shall be as specified in Section 204. Backfill material shall be manufactured sand, beach sand, earth or earth and gravel mixture. If earth and gravel, mixture must pass 1/2 inch mesh screen and contain not more than 20 percent of rock particles by volume.

(c) Material for use as select backfill for direct buried cables shall be nonexpansive and shall conform to the requirements of Subsection 703.04 (B) - Filler.

(d) Backfilling shall be to finished grades indicated on accompanying drawings, and/or matching existing conditions.

Backfill material shall be placed in maximum of 8" layers in loose thickness before compacting. Backfill shall be thoroughly compacted with hand or mechanical tampers to 95% of the ASTM D1557 maximum dry density. In no case shall tamping be accomplished by using the wheels or tracks of a vehicle.

(E) Installation of Conduits and Duct Banks. All joints shall be water tight and all ducts shall be installed to drain towards pull points unless otherwise shown on the plans.

(1) Plastic Duct Joints.

(a) Field cutting of plastic ducts shall be performed by the Contractor and only with the use of a miter box. Burrs shall be removed by filing before the joint is made. All plain ends of the duct shall have the inner radius chamfered so as not to damage cable insulation when pulled through the duct. All foreign matter shall be wiped off the sockets of the fittings and the edges of the duct with a clean cloth.

(b) Cement for plastic duct joints shall be obtained from the duct manufacturer. Thinning of the cement will not be permitted. A liberal and uniform coat of cement shall be applied with a natural bristle brush to the inside of the coupling and to the outside of the duct end. Immediately thereafter, the duct shall be slipped into the socket of the fitting with a half-twist, and the excess cement shall be wiped off.

(c) Allow the joined members to cure for at least five minutes before disturbing or applying stress to the joint. After this initial cure, care must be exercised in handling to prevent twisting or pulling the joint. In damp weather, this interval shall be increased to allow for slower evaporation of the solvent.

(d) Another fitting or section of conduit may be added to the opposite end within 2 or 3 minutes if care is exercised in handling so that strain is not placed on the previous assembly.

(e) Any joint included in a section of conduit to be bent in the trench shall be assembled above ground and allowed to lie undisturbed for at least two hours before installation. In cases where a plastic connection is made with the union under stress due to misalignment or other factors, the union shall be staked out to relieve stress on the joint until the conduit is backfilled or encased.

(2) Plastic Duct Installation.

(a) The Contractor shall provide spacers to maintain proper separation between ducts. The bottom duct spacers shall be placed on the prepared trench bottom, the first tier of ducts placed in the grooves of the spacers, and couplings attached to the duct ends. Spacers shall be 15 inches or more away from any coupling or joint. Successive lengths of ducts shall then be placed and connected to the preceding lengths as specified above. The second tier of duct spacers shall then be placed over the ducts previously placed and followed by installation of couplings. The operation shall be repeated for each successive tier until the top tier is set in place after which the top spacers are placed.

(b) When conduit is assembled above the ground, the spacer shall be supported in a vertical position by use of a No. 4 rebar and smooth black steel wire, No. 14 gage.

(c) Duct alignment shall be as straight as feasible. Such directional changes as are required shall be made by using field made bends or with segments using angle couplings or deflection couplings, except where otherwise indicated. The deflection angle between two adjacent lengths of duct shall not exceed five degrees, unless otherwise indicated.

Horizontal bends for HTCO, Spectrum and SIC conduits/ducts shall be constructed with 25-foot minimum radius curves unless indicated otherwise or approved by the respective utility company inspector. Vertical bends for HTCO, Spectrum and SIC conduits/ducts shall be constructed with 20-foot minimum radius curves unless indicated otherwise or approved by the respective utility company inspector. Horizontal and vertical bends for KIUC. conduits/ducts shall be constructed with 20-foot minimum radius curves unless indicated otherwise or approved by the utility company inspector.

Spacers shall not be located at the centers of a long radius bend. On pre-fabricated bends, the spacer shall be located in the tangent, free of the coupling. On trench formed bend, the spacer shall be located midway between the tangent and center of the bend.

(d) Precaution shall be taken to prevent damage in plastic duct lines from thermal expansion and contraction. All ducts

shall be cool when placed in trenches and when the concrete jacket is being poured.

(e) Ducts ending in handholes and manholes shall be terminated with junior end bells. End bells, terminators or ducts shall be flush to inside wall surfaces; duct extension into boxes is not acceptable.

The terminated ends of the conduit outside an underground structure shall be free of support for a distance of at least 10 feet from the structure. The conduit shall be aligned and supported outside the structure with proper spacing and shall be cut and capped 12 inches past the concrete envelope after the concrete envelope has cured.

(f) The ends of the conduit shall be sealed with a plastic cap, plug, or approved substitute at the end of each day`s work and when terminated inside a structure.

(3) A 4" wide warning tape, orange in color with a black imprinted message "WARNING -- STOP DIGGING -- CALL HTCO, COMMUNICATIONS CABLE BURIED BELOW, FAILURE TO COMPLY COULD RESULT IN LEGAL ACTION", shall be placed as shown on the plans over the duct or concrete jacket for the entire length of duct installations. See HTCO Standard Drawing No. 34028. Recommended tape is manufactured by Thor Enterprises, Inc., Sun Prairie, WI 53590, part numbers DTOGTE-41 (1,000 feet), and DTOGTE-46 (6,000 feet). Equivalent tapes are acceptable. HTCO point of contact: James Sone, phone: (808) 241-5052.

(4) The Contractor shall apply a thin coat of sealing compound on ducts and conduits at couplings and bells.

(5) Conduits stubbed for future connections shall be plugged and marked.

(6) The Contractor shall securely anchor duct banks prior to pouring concrete encasement to prevent ducts from floating.

(F) Installation of Split Ducts Encased in Concrete Jacket. Split ducts with concrete jacket shall be installed around existing cables to remain in service, where shown on the plans.

(1) Field cutting of plastic ducts longitudinally into two equal halves shall be performed by the Contractor with the use of accepted tools and equipment.

(2) The two equal halves of factory manufactured plastic split duct shall be placed carefully around existing cables and sturdily placed carefully around existing cables and sturdily bound together with the wire or tape in order not to dislodge during pouring of concrete. The Contractor shall take necessary precautions not to damage the cables and shall work in an expeditious manner in order to keep uncovered cable exposed for as short a period of time as possible. Split ducts shall be half-lapped with electrical moisture sealant tape (Scotch #06147 or similar) along the entire length of split duct installation and minimum 8-inches past both ends of the split duct.

(3) Subsequent to wrapping of the plastic split ducts with moisture sealant tape, concrete shall be poured to fully encase the ducts. The dimensions of the concrete encasement shall be similar to standard duct formation encasement dimensions.

(G) The Contractor shall test the completed ducts by passing a test mandrel through the length of each duct of each duct run. All mandrel testing shall be pulled by hand, Engineer accepted method or accepted utility company method – no mechanical pulling means shall be used. For KIUC conduits, the mandrel shall be a bullet shaped, blunt tipped type, unless indicated otherwise, about 14 inches long with a diameter 1/2 inch less than the inside diameter of the ducts through the length of each duct run. Mandrel for HTCO, Spectrum and SIC ducts shall be bullet shaped, blunt tipped type about 12 inches long with a diameter 1/4 inch less than the inside diameter of the ducts through the length of each duct run. Scars in the mandrel deeper than 1/32 inch, other than that caused by normal abrasion between the duct line and bottom of mandrel shall be considered an indication of the presence of burrs and/or obstructions in the duct run. The Contractor shall remove such burrs and/or obstructions, after which the test mandrel will be passed through again. All tests shall be conducted in the presence of the Engineer and respective utility company inspectors and shall be repeated until the results obtained are satisfactory to the Engineer and to the utility company inspectors. All required repairs to the ducts shall be done at no additional cost to the State.

(H) Unless indicated otherwise, the Contractor shall furnish and install a 1/8 inch Polyolefin pull line between pull points in all ducts after testing. Provide a minimum of 10-feet of pull line carefully coiled and stored in the duct behind the duct plug with the end of the pull line extended past the duct plug and into the pull point structure.

For HTCO ducts, provide duct measuring/cable pulling tape (NEPTCO WP1800P Muletape or approved equal) in each new duct. Using the duct measuring/cable pulling tape, Contractor shall measure the actual lengths for

duct runs and for at least one duct of each common duct run. The distances shall be marked on the record prints and submitted to the Owner at the final inspection. A copy of the record prints shall also be submitted to the HTCO inspector for record keeping.

(l) Concrete. The Contractor shall notify the utility companies inspector a minimum of 72 hours prior to placement of any concrete.

(1) Securely anchor duct banks prior to pouring concrete encasement to prevent ducts from floating.

(2) When pouring concrete, prevent heavy masses of concrete from falling directly on ducts. If unavoidable, protect ducts with plank.

(3) Direct flow of concrete down sides of duct bank to bottom, allowing concrete to rise between ducts, filling all open spaces uniformly.

(4) To insure against voids in concrete, work a long, flat splicing bar or spatula liberally and carefully up and down the vertical rows of ducts. Pencil vibrators shall be used for stacked duct banks of three ducts or higher.

(5) Cure concrete for a minimum of 72 hours before permitting traffic and/or backfilling.

(6) Convey concrete from mixer to forms rapidly to prevent segregation. Free drop shall be limited to five feet, unless authorized by Engineer.

(7) Placing.

(a) Clean and remove all debris from inside forms and trenches before placing concrete.

(b) Place concrete only on clean damp surfaces, free from water.

(c) Place concrete in forms, in horizontal layers not exceeding 18" thickness.

(d) Place concrete to avoid segregation of materials and displacement of ducts, inserts and reinforcing.

(e) Vibrate structural concrete thoroughly during and immediately after placing to insure dense watertight concrete.

(8) Forming.

(a) Forms shall be of good sound lumber with sufficient strength and conforming to shapes and dimensions indicated on drawings.

(b) Forms shall be treated with non-staining form oil immediately before each use.

(9) Patching: Patch all voids, pour joints and holes before concrete is thoroughly dry. Use mortar of same proportions as original concrete.

(10) Curing: Curing of concrete shall be accomplished by impervious membrane method with liquid membrane compound. Apply two or more coats to obtain a total of one gallon for each 150 square feet of concrete surface.

(J) Reinforcing Steel.

(1) Clean reinforcing of mill, rust scale or other deleterious substances and form to dimensions indicated.

(2) Install reinforcing in proper locations and secure in place to prevent movement during concrete placing or vibrating.

(K) Concrete Brick.

(1) Concrete brick shall be laid in full bed of mortar, both horizontally and vertically.

(2) Mortar shall be one part cement and three parts sand, thoroughly mixed and used when fresh. Retampering will not be allowed.

(3) Setting bed shall be of depth required to bring top of blocks flush with finish line.

(L) Installation, Adjustment and Replacement of Manholes, Handholes and Pullboxes.

(1) Boxes shall be installed approximately where shown. The exact location of each box shall be determined after careful consideration has been given to the location of other utilities, grades, and pavement. Boxes shall be of the type noted on the Drawings and

shall be constructed in accordance with the applicable details and standard drawings as indicated.

(2) Pullboxes shall be installed on a minimum of 3" #3 crushed rock.

(3) Ducts ending in manholes and handholes shall be terminated with junior end bells. End bells, terminators or ducts shall be flush to inside wall surfaces; duct extension into boxes is not acceptable. Verify complement and arrangement of ducts entering each manhole or handhole and location of duct entrance with the respective utility company prior to fabrication of the respective manhole and handhole.

(4) Contractor shall determine the top of cover elevations for new and to be adjusted manholes, handholes and pullboxes by matching the surrounding finished pavements or grades.

(5) Replace outdated, rusted, broken and damaged manhole, handhole and pullbox covers with new.

(6) Provide new manholes, handholes and pullboxes required for installing, adjusting and replacing.

(M) Restoration of Existing Streets and Other Improvements. Street, sidewalks, lawns, curbs, gutters, traffic detection loops, and other improvements, which are damaged by Contractor's operation and/or by rearrangements to the electric, cable television or telephone system, shall be restored by the Contractor to their original condition or better. Existing concrete pavement disturbed by the Contractor shall be removed and reconstructed at the pavement scorelines or joints. Spot repairing of the concrete pavement will not be allowed. Materials and workmanship shall conform to the applicable sections in these specifications.

All disturbed unpaved surfaces shall be backfilled and graded to match the surrounding areas, and sodded areas shall be replanted with the same type of grass. Fences and other improvements shall be restored to their original condition or better.

627.04 Measurement.

(A) The Engineer will measure facilities for HTCO on a lump sum basis per the contract documents.

(B) The Engineer will measure facilities for Spectrum on a lump sum basis per the contract documents.

The Engineer will not measure costs incidental to phasing requirements for construction of electric and communication system or connections to new or existing manholes or adjustment and relocation of existing facilities, including contractor coordination of such phasing with the utility companies, and working with the Utilities in developing post contract documents (PCD's) for payment.

627.05 Payment. The Engineer will pay for the accepted pay items listed below at the contract price per pay unit, as shown in the proposal schedule. Payment will be full compensation for the work prescribed in this section and the contract documents.

The Engineer will pay for each of the following pay items when included in the proposal schedule:

Pay Item	**Pay Unit**
_____Facilities for HTCO _____	Lump Sum
_____Facilities for Spectrum _____	Lump Sum

The Engineer will pay for:

(1) 10 percent of the contract Pay Item upon completion of submitting the equipment list and drawing.

(2) 80 percent of the contract Pay Item upon completion of furnishing and installing the facilities for HTCO and Spectrum.

(3) 10 percent of the contract Pay Item upon completion of restoring the pavement.

The Engineer will not pay for trench and structure excavation and backfill; replacement manholes, handholes, and pullboxes necessary for adjusting and replacing existing manholes, handholes, and pullboxes; saw cutting and repairing of existing pavement, sidewalk, curb or gutter; restoration of lawns, conduit stub-outs; conduit stub-out markers; conduit risers; steel reinforcement for ductlines; and duct sealing of conduits separately. The Engineer will consider the cost as included in the contract prices of the various contract items. The cost is for the work described in this section and in the contract documents.

The Engineer will not pay for costs incidental to phasing requirements for construction of underground or overhead electric and communication system or connections to new or existing manholes, or adjustment and relocation of existing facilities, including contractor coordination of such phasing with the utility companies, separately. The Engineer will consider costs incidental to phasing requirements for construction of underground or overhead electric and

communication system or connections to new or existing manholes, or adjustment and relocation of existing facilities, including contractor coordination of such phasing with the utility companies, and working with the Utilities in developing post contract documents (PCD's), as incidental to the pay items under this section.

The Engineer will not pay for additional materials and labor not specifically shown or called for in the contract documents but are necessary to complete the work."

The Contractor, with the guidance and approval of the Engineer and the respective Utility Company, and at no additional cost to the State, will determine during construction and prior to doing the work, the actual number and locations of utility boxes and manholes that will be adjusted. The Engineer may increase or decrease from what is specified in the Proposal, the actual number of boxes and manholes that will be adjusted. The Contractor shall determine existing and final elevations; tabulations complete with elevations, stations and offsets; and draw plans, details and sections in Autocad format for each box and manhole, to be submitted to the Engineer for review and determination. The Contractor shall provide smooth tie-in connections to boxes and manholes determined not needing adjustment. No additional payment will be made for any delay caused by a utility company. The sole remedy will be an increase in contract time providing the Contractor met the notification requirements and the work was on the critical path.

At no additional cost to the State, the Contractor shall open each utility box and coordinate with the respective Utility representative in determining the adjustment method acceptable to the Utility. If necessary, the Contractor shall submit detailed adjustment drawings to the Utility/Engineer for approval prior to doing the work.

The Engineer will not pay for removing and delivering of existing manholes, handholes, boxes, utility covers, etc. that will not be incorporated in the completed project; salvaging or storage, removing, cleaning, stacking and delivering that are not incorporated in the completed project separately and will consider the cost as included in the prices for the various contract pay items under this sections. The cost is for the work prescribed in this section and the contract documents."

END OF SECTION 627