

SECTION 01020
INTENT OF DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Explanation of intent and terminology of the Construction Documents.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions.

1.03 SPECIFICATION FORMAT AND COMPOSITION

- A. Specifications are divided into Divisions and Sections for the convenience of writing and using. Titles are not intended to imply a particular trade jurisdiction. AUTHORITY is not bound to define the limits of any subcontract, and will not enter into disputes between the CONTRACTOR and his employees, including Subcontractors.
- B. Pages are numbered independently for each Section, and recorded in the Table of Contents. Section number is shown with the page number at the bottom of each page. The end of each Section of the Specifications is ended by “End of Section”. It is CONTRACTOR’S responsibility to verify that Contract Documents received for bidding and/or construction are complete in accordance with Table of Contents.
- C. The language employed in the Contract Documents is addressed directly to the CONTRACTOR. Imperative or indicative language is generally employed throughout and requirements expressed are the mandatory responsibility of the CONTRACTOR, even though the Work specified may be accomplished by specialty subcontractors engaged by the CONTRACTOR. References to third parties in this regard shall not be interpreted in any way as to relieve the CONTRACTOR of his or her responsibility under this Contract.
- D. These Specifications are of the abbreviated or “streamlined” type, and may include incomplete sentences.
- E. Omissions of words or phrases such as “the CONTRACTOR shall”, “in conformity therewith”, “shall be”, “as noted on the Drawings”, “according to the Drawings”, “a”, “an”, “the” and “all” are intentional.

- F. Omitted words or phrases shall be supplied by inference in the same manner as they are when a “note” occurs on the Drawings.

1.04 DRAWINGS: CONTENT EXPLANATION

- A. Drawings, Dimensions and Measurements.
 - 1. Contract Documents do not purport to describe in detail, absolute and complete construction information. Drawings are diagrammatic. CONTRACTOR shall provide verification of actual site conditions and shall provide complete and operational systems as specified when Drawings do not provide full detail.

1.05 COMMON TERMINOLOGY

- A. Certain items used generally throughout the Specifications and Drawings are used as follows:
 - 1. Indicated: The term “indicated” is a cross reference to details, notes or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar means of recording requirements in the Contract Documents. Where terms such as “shown”, “noted”, “schedules”, and “specified” are used in lieu of “indicate”, it is for the purpose of helping the reader accomplish the cross reference, and no limitation of location is intended except as specifically noted.
 - 2. Installer: The person or entity engaged by CONTRACTOR, his Subcontractor or sub-subcontractor for the performance of a particular unit of Work at the Project site, including installation, erection, application and similar required operations. It is a general requirement that installers be recognized experts in the work they are engaged to perform.
 - 3. Furnish: Except as otherwise defined in greater detail, the term “furnish” is used to mean “...supply and deliver to the Project site, ready for unpacking, assembly and installation...”
 - 4. Guarantee and Warranty: “Warranty” is generally used in conjunction with products manufactured or fabricated away from the Project site, and “guarantee” is generally used in conjunction with units of work which require both products and substantial amounts of labor at the Project site. The resulting difference is that warranties are frequently issued by manufacturers, and guarantees are generally issued by CONTRACTOR and frequently supported (partially) by product warranties from manufacturers.

1.06 CONFLICTS

- A. Report any conflicts to AUTHORITY for clarification.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01020

SECTION 01027
APPLICATIONS FOR PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for preparation and submittal of Applications for Payment.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions: Article 13, Progress Payments, and Final Payment.
- B. Document 00800 – Supplementary Conditions.
- C. Section 01300 – Submittals.
- D. Section 01370 – Schedule of Values.
- E. Section 01700 – Project Closeout.
- F. Section 01720 – Project Record Documents
- G. Section 01770 – Contract Closeout.

1.03 FORMAT

- A. Application for Payment form as provided by the AUTHORITY or Contractor's Form containing same information.

1.04 PREPARATION OF APPLICATIONS

- A. Type required information on Application for Payment form approved by AUTHORITY.
- B. Execute certification by original signature of authorized officer upon each copy of the Application for Payment.
- C. Submit names of individuals authorized to be responsible for information submitted on Application for Payment.

- D. Indicate breakdown of costs for each item of the Work on accepted Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed and for stored products. Indicate percent complete for each item, value for invoice submitted, total value billed, and totals for each column.
- E. List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of Work.
- F. Prepare for application of Final Payment as specified in Section 01770 – Contract Closeout.

1.05 SUBMITTAL PROCEDURES

- A. Submit original plus three (3) copies and one (1) copy electronically of each Application for Payment at times stipulated in Contract.
- B. Submit under AUTHORITY accepted transmittal letter. Identify Contract by AUTHORITY Contract number.

1.06 SUBSTANTIATING DATA

- A. When AUTHORITY requires substantiating information, submit data justifying line item amounts in question.
- B. Provide two (2) copies of data with cover letter for each copy of Application. Show Application number and date, and line item by number and description.

1.07 SUBMITTALS WITH APPLICATION FOR PAYMENT

- A. Submit the following with each Application for Payment:
 - 1. Updated construction schedule as required by Section 01300 – Submittals.
 - 2. Updated Schedule of Values as required by Section 01370 – Schedule of Values.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01027

SECTION 01028
CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures for processing Change Orders.

1.02 RELATED SECTIONS

- A. Document 00700 - General Conditions: Articles 9, 10, and 11 – Governing requirements for changes in the Work, in Contract Price, and Contract Time.
- B. Document 00800 – Supplementary Conditions: Modifications to Document 00700 – General Conditions.
- C. Section 01027 – Applications for Payment.
- D. Section 01300 - Submittals.
- E. Section 01770 – Contract Closeout.

1.03 SUBMITTALS

- A. Submit name of the individual authorized to accept changes, and to be responsible for informing others in CONTRACTOR's employ of changes in the Work.
- B. Change Order Forms will be prepared by the AUTHORITY.

1.04 DOCUMENTATION OF CHANGE IN CONTRACT PRICE AND CONTRACT TIME

- A. Maintain detailed records of work done on a Cost of the Work plus a Fee basis. Provide full information required for evaluation of proposed changes, and to substantiate costs of changes in the Work. Incomplete or unsubstantiated costs will be disallowed.
- B. CONTRACTOR shall submit a complete, detailed, itemized cost breakdown addressing impact on Contract Time and Contract Price with each proposal.
- C. On request, provide additional data to support computations:
 - 1. Quantities of products, labor, and equipment.
 - 2. Taxes, insurance and bonds.

3. Overhead and profit.
 4. Justification for any change in Contract Time.
 5. Credit for deletions from Contract, similarly documented.
- D. Support each claim for additional costs, and for work done on a cost of the Work plus a Fee basis, with additional information:
1. Origin and date of claim.
 2. Dates and times Work was performed, and by whom.
 3. Time records and wage rates paid.
 4. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

1.05 PRELIMINARY PROCEDURES

- A. AUTHORITY may submit a Proposal Request which includes: Detailed description of change with supplementary or revised Drawings and Specifications, the projected time for executing the change, with a stipulation of any overtime work required, and the period of time during which the requested price will be considered valid.
- B. CONTRACTOR may initiate a change by submittal of a request to AUTHORITY describing the proposed change with a statement of the reason for the change, and the effect on Contract Price and Contract Time with full documentation.

1.06 CONSTRUCTION CHANGE AUTHORIZATION

- A. Shall be in accordance with Article 9 – Changes: in Document 00700 – General Conditions.

1.07 LUMP SUM CHANGE ORDER

- A. CONTRACTOR shall submit an itemized price proposal in sufficient detail to fully explain the basis for the proposal. CONTRACTOR and AUTHORITY shall then negotiate an equitable price (and time adjustment if appropriate) in good faith. The Change Order will reflect the results of those negotiations. If negotiations break down, CONTRACTOR may be directed to perform the subject Work under a COST OF THE WORK CHANGE ORDER.
- B. The maximum rates of cost markup (to cover both overhead and profit of the CONTRACTOR) shall be per Section 00700 – General Conditions, Article 10, Paragraph 10.3 “Change Order Price Determination”.
- C. These terms shall also apply to the proposals of subcontracts and allowances.

1.08 UNIT PRICE CHANGE ORDER

- A. For pre-determined Unit Prices and quantities, Change Order will be executed on a lump sum basis.
- B. For pre-determined Unit Prices and undetermined quantities, Change Order will be executed on an estimated quantity basis; payment will be based on actual quantities measured as specified.

1.09 COST OF THE WORK CHANGE ORDER

- A. CONTRACTOR shall submit documentation required in Paragraph 1.04 of this Section on a daily basis for certification by the AUTHORITY. The AUTHORITY will indicate by signature that the submitted documentation is acceptable. If it is not acceptable, CONTRACTOR and AUTHORITY shall immediately meet to discuss resolution.
- B. After completion of the change and within fourteen (14) Calendar Days, unless extended by the AUTHORITY, the CONTRACTOR shall submit in final form an itemized account with support data of all costs. Support data shall have been certified by the AUTHORITY, as required above in paragraph A.
- C. AUTHORITY will determine the change allowable in Contract Price and Contract Time as provided in provisions of the Contract Documents.

1.10 EXECUTION OF CHANGE ORDERS

- A. AUTHORITY will issue Change Orders for signatures of parties as provided in Conditions of the Contract.

1.11 CORRELATION OF CONTRACTOR SUBMITTALS

- A. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Price as shown on Change Order.
- B. Promptly revise progress schedules to reflect any change in Contract Time, revise subschedules to adjust times for other items of Work affected by the change, and resubmit.
- C. Promptly enter changes in project record documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01028

SECTION 01041
PROJECT COORDINATION

PART 1. PART GENERAL

1.01 CONTRACTOR

- A. Expedite his work to assure compliance with schedules.
- B. Comply with orders and instructions of the Project Manager.
- C. Monitor and control the use of site:
 - 1. Supervise site layout.
 - 2. Allocate space for each subcontractor's use for field offices, sheds, work and storage areas.
 - 3. Establish access, traffic, parking allocations, and regulations.

1.02 CONTRACTOR AND SUBCONTRACTORS SHALL DILIGENTLY COMPLY WITH THE FOLLOWING:

- A. Cooperate in planning and layout of the work well in advance of operations. Inform other contractors of requirements at proper time to prevent delay or revisions.
- B. Be informed of the requirements of other contractors and check own work for conflicts with the work of others.
- C. Ensure delivery of materials and performance of work on coordinated schedule with other contractors.
- D. Be responsible for proper layout of the work, and for all lines and measurements for all of the work executed under the contract documents. Verify the field dimensions with those shown on the drawings before laying out the work and report any inaccuracies in writing to the Project Manager before commencing work. The Authority, Engineer or their representative will in no case assume the responsibility for layout of the work.

1.03 AUTHORITY NOTIFICATION/REIMBURSEMENT

- A. The contractor shall reimburse the additional cost to the Authority and Engineer for inspection work beyond a first substantial completion inspections. The contractor is expected to be virtually complete at time of substantial completion inspection with only minor punchlist items remaining. Should punchlist items

remain at time of final inspection and should subsequent inspections be required, the contractor shall pay all costs incurred for reinspection.

PART 2. PRODUCTS (NOT APPLICABLE)

PART 3. EXECUTION

3.01 COORDINATION WITH GENERAL CONTRACTOR

- A. If SWPPP is required, the Contractor shall be responsible for all SWPPP coordination as required to construct the proposed facilities. The Contractor's foreman for this contract shall be AK-CESCL certified, and adhere to the construction requirements of any required SWPPP.
- B. Where Contractor disturbs existing vegetation, the Contractor shall return the area to the same condition as prior to disturbance, or if restoration is not possible, re-seed the disturbed area to prevent erosion.

END OF SECTION 01041

SECTION 01100
SUMMARY OF WORK

PART 1. GENERAL

1.01 SECTION INCLUDES

- A. This section describes the work to be performed under this Contract. Detailed requirements and extent of work are stated in applicable Specification sections and shown on the Drawings and in the Staking Sheets.

1.02 ORGANIZATION AND INTERPRETATION OF CONTRACT DOCUMENTS

- A. Specifications and Drawings included in these Contract Documents establish the performance, quality requirements, location and general arrangement of materials and equipment, and establish the minimum standards for quality of workmanship and appearance.
- B. Specification sections have not been divided into groups for work of subcontractors or various trades. Should there be questions concerning the applicability or interpretation of a particular section or part of a section or Drawing, direct questions to the Engineer.
- C. A part of the work that is necessary or required to make each installation satisfactory and operable for its intended purpose, even though it is not specifically included in the Specifications or on the Drawings, shall be performed as incidental work as if it were described in the Specifications and shown on the Drawings.

1.03 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of this Contract comprises demolition and construction of electrical distribution facilities as shown on the contract drawings and described herein.
- B. Definition of Site: Wherein the term Site is used in the contract documents, it shall mean the areas where work is to be performed; located as identified in the Invitation to Bid and on the Contract Drawings.
- C. Acceptance of Site: The Contractor shall fully inform himself of the areas in which work is to be prosecuted, material delivered, limitations in working conditions, and access to work areas.
- D. Existing Conditions: The drawings may not show all arrangements and condition of the site as they now exist. The Contractor shall be responsible for a complete

visual inspection.

1.04 GENERAL PROJECT DESCRIPTION

- A. General Description: The majority of the existing primary distribution system is 2400V Delta primary, as shown on the drawings. This project will retire and/or re-use existing overhead distribution facilities and install new poles as required, to provide a new primary WYE distribution system, new and re-worked secondary services, and ancillary facilities, as indicated in the drawings.
- B. Sequence the start, construction, and completion of Work as required.

1.05 CONTRACTOR'S USE OF PREMISES

- A. Contractor's use of premises for work and for storage:
 - 1. Shall allow for occupancy of energized structures: residential, commercial, and institutional.
 - 2. Contractor shall take full responsibility for protection and safekeeping of products under this Contract stored at Site.
 - 3. Contractor shall move any stored products or equipment, under Contractor's control, which interfere with public use of right-of-way.

1.06 COORDINATION OF NOISE, DUST, FUMES, AND OUTAGES

- A. Contain noise, dust and fumes within work area. Notify Project Manager at least 24 hours prior to any necessary excessive noise, dust or fumes. Comply with the Project Manager's instructions.
- B. Notify consumers at least 24 hours prior to required outages. Schedule work to minimize required outages.

1.07 SALVAGE RIGHTS

- A. Except where noted otherwise on contract documents, existing equipment which is removed as a part of the work shall become the property of the Contractor to dispose of, in a responsible manner, as he sees fit.

PART 2. PRODUCTS (NOT APPLICABLE)

PART 3. EXECUTION

3.01 Use of Premises

- A. Contractor shall maintain a clean worksite.
- B. Contractor has a use of laydown space for their materials, to be coordinated with the Project Manager.
- C. Contractor shall insure no public safety hazards are created in the course of the work.

END OF SECTION 01100

SECTION 01110
REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 APPLICABLE CODES, STANDARDS, AND REGULATORY REQUIREMENTS

All work shall be in accordance with the latest edition of governing Codes Regulations including but are not limited to:

1. Alaska Department of Environmental Conservation (ADEC) Regulations including 18AAC75
2. American National Standards Institute (ANSI)
3. American Society of Mechanical Engineers (ASME)
4. Environmental Protection Agency (EPA) Regulations
5. American Society of Testing and Materials (ASTM)
6. American Society of Mechanical Engineers (ASME)
7. Institute of Electrical and Electronic Engineers (IEEE)
8. International Fire Code (IFC)
9. International Building Code (IBC)
10. National Fire Protection Association (NFPA) NFPA 30
11. National Electrical Safety Code (NESC), ANSI C2-2007
12. Occupational Safety and Health Administration (OSHA)
13. Underwriters Laboratories (U.L.)
14. Rural Utility Service (RUS)

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01110

SECTION 01300
SUBMITTALS

PART 1. GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Procedures
- B. Construction Progress Schedules
- C. Certifications
- D. Schedule of Values
- E. Shop Drawings and Product Data
- F. Construction Photos
- G. Operating and Maintenance Data
- H. As Built Drawings

1.02 RELATED REQUIREMENTS

- A. Individual Specification sections in these Contract Documents contain additional and special submittal requirements. Individual sections shall take precedence in the event of a conflict with this section.
- B. Document 00700 – General Conditions, Paragraphs 6.9, 6.10 and 6.11 for substitutes, and Paragraphs 6.20 and 6.21 for shop drawings.
- C. Document 00700 – General Conditions, Paragraphs 6.6, 6.7 and 6.8 for Progress Schedules.
- D. Document 00700 – General Conditions, Paragraph 6.16 for Record Documents.
- E. Section 01100 - Summary of Work
- F. Section 01400 - Quality Control
- G. Section 01600 - Materials and Equipment
- H. Section 01700 - Project Close Out

I. Section 01720 – Project Record Documents

J. Section 01770 – Contract Closeout

1.03 SUBMITTAL SCHEDULE

Submittal items shall be submitted to the following locations as indicated:

<u>ITEM</u>	<u>ORIGINAL</u>	<u>COPY</u>
Schedule of Values	AUTHORITY	Engineer
* Construction Schedule	AUTHORITY	Engineer
* Subcontractor List	AUTHORITY	Engineer
* Contractor Questionnaire	AUTHORITY	Engineer
Work Plan	Engineer	AUTHORITY
Erosion and Pollution Control Plans	Engineer	AUTHORITY
Options or Substitutions	Engineer	
Pay Requests	AUTHORITY	Engineer
Change Order Requests or Proposals	AUTHORITY	Engineer
Design Clarification and Verification Requests	Engineer	AUTHORITY
Project Closeout Documents	AUTHORITY	Engineer
Request for Substantial Completion Inspection	AUTHORITY	Engineer
Contract Closeout Documents	AUTHORITY	
Request for Final Completion Inspection	AUTHORITY	Engineer
Project Record Documents	AUTHORITY	Engineer

* These items are required by Document 00120. All items required by Document 00120 but not listed here shall be submitted to the AUTHORITY.

1.04 PROCEDURES

- A. AUTHORITY reserves the right to modify the procedures and requirements for submittals, as necessary, to accomplish the specific purpose of each submittal. Direct inquiries to Engineer regarding the procedure, purpose, or extent of any submittal.
- B. Review, acceptance, or approval of substitutions, schedules, shop drawings, list of materials, and procedures submitted or requested by Contractor shall not add to the Contract amount, and additional costs which may result therefrom shall be solely the obligation of Contractor.
- C. Contractor shall be responsible for performing necessary analysis research, data gathering, code analysis, and cost estimating for review and acceptance by the Engineer when the Contractor submits a substitution as an equal product.

- D. AUTHORITY is not precluded, by virtue of review, acceptance, or approval, from obtaining a credit for construction savings resulting from allowed concessions in the work or materials therefore.
- E. AUTHORITY is not responsible to provide engineering or other services to protect Contractor from additional costs accruing from submittals.
- F. Submittals processed by Engineer do not become Contract Documents and are not Change Orders; the purpose of submittal review is to establish a reporting procedure and is intended for Contractor's convenience in organizing the work, and to permit Engineer to monitor Contractor's progress and understanding of the design.
- G. Delays caused by the need for resubmittal shall not constitute basis for claim.
- H. After checking and verifying all field measurements, make submittal to Engineer in accordance with the schedule of submittals for review.
 - 1. Submittals shall bear a stamp or specific written indication that Contractor has satisfied its responsibilities under the Contract Documents with respect to the review of the submittal.
 - 2. Data shown shall be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable Engineer to review the information.
- I. Check samples, and accompany with specific written indication that Contractor has satisfied requirements under the Contract Documents with respect to review of submittals, and identify clearly as to material, supplier, pertinent data such as catalog numbers and the intended use.
- J. At the time of each submission, give Engineer specific written notice of each variation that the submittal may have from the requirements of the Contract Documents. In addition, make specific notation on each shop drawing submitted to Engineer for review and approval of each such variation.
- K. Engineer's review will be only for conformance with the design concept of the project and for compliance with the information given in the Contract Documents, not extending to means, methods, techniques, sequences, or procedures of construction (except where a specific means, method, technique, sequence, or procedure of construction is indicated in or required by the Contract Documents), nor to safety precautions or programs incident thereto. The review of a separate item as such will not indicate review of the assembly in which the item functions.
- L. Engineer's review of submittals shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless

Contractor has in writing, called Engineer's attention to each such variation at the time of submission, and Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the shop drawing or sample approval; nor will any approval by Engineer relieve Contractor from responsibility for errors or omissions in the shop drawings, or from responsibility for having complied with the provisions herein.

- M. Where a shop drawing or sample is required by the Specifications, related work performed prior to Engineer's review and approval of the pertinent submission shall be the sole expense and responsibility of Contractor.
- N. For all items to be provided by Contractor, deliver submittals to the Project Manager. Number each submittal with the section number, dash, numerical order of the submittal, example 03300-1. Add an alpha to each resubmittal, example, 03300-1A.
- O. Provide each submittal with a transmittal cover letter. Identify Project, Contractor, subcontractor, major supplier; identify pertinent Drawing sheet and detail number and specification section number, as appropriate. Identify deviations from Contract Documents. Provide space for Contractor and Engineer review stamps. After review by the Engineer, revise and resubmit as required. Submit revised schedule of values with each application for payment, reflecting changes since previous submittal.
- P. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for review, for securing necessary approvals, for possible revision and resubmittals and for placing orders and securing delivery..
- Q. Contractor shall review submittals prior to submission. Verify: field measurements, field construction criteria, and conformance with specifications. Coordinate each submittal with requirements of work and Contract Documents. Contractor's responsibility for errors and omissions in submittals is not relieved by Engineer's review and approval. Contractor's deviations in submittal requirements shall not relieve Contractor from completing Contract requirements.
- R. The contractor shall allow at least five (5) days for review of original submittals or resubmittals.
- S. Submit one (1) copy of each submittal. Submit two (2) copies of O&M manuals.
- T. Distribute copies of reviewed submittals to concerned persons. Revise initial submittals as required and resubmit as specified. Instruct recipients to promptly report any inability to comply with provisions. Review with sub-consultants/suppliers any inability to meet requirements of project. Find solutions with sub-consultants/suppliers making conformance with documents possible. Review solutions with Authority and engineer for acceptance prior to proceeding

with work.

1.05 CONSTRUCTION PROGRESS SCHEDULES

See Requirements in Section 01310 Progress Schedule.

1.06 CERTIFICATIONS

- A. Within fourteen (14) calendar days following the Notice to Proceed, the Contractor shall submit for the Project Manager's review, comment and acceptance, the required certifications for the crew assigned to the construction of this project.

1.07 SCHEDULE OF VALUES

See Requirements in Section 01370 Schedule of Values.

1.08 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit Shop Drawings and Product Data as may be required.
- B. Individual submittals shall not include material covering more than one section of the Specifications.
- C. Products fabricated and/or installed prior to approval of submittals are subject to removal and replacement with approved products by the Contractor at no additional cost to the Authority.
- D. Prepare shop drawings for this particular project. Drawings prepared for other projects and revised for this project will be rejected. When using manufacturer's standard schematic drawings, modify drawings to delete information which is not applicable to project; and supplement standard information to provide additional information applicable to project.
- E. Manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.
 - 1. Clearly mark each copy and identify pertinent materials, products or models.
 - 2. Show dimensions and clearances required.
 - 3. Show performance characteristics and capacities.
 - 4. Show wiring diagrams and controls.

1.09 MANUFACTURERS' INSTRUCTIONS

- A. When required in individual specification section, submit manufacturers printed instructions for delivery, storage, assembly, installation adjusting and finishing, in

quantities specified for product data.

1.010 CONSTRUCTION PHOTOS

- A. Submit photos as may be required elsewhere in the contract documents.
- B. In addition, provide weekly photos of construction throughout progress of work.
- C. Provide photos indicating critical construction elements, such as depth of embedment or trench. Provide additional photos as requested by Project Manager or Engineer.
- D. Provide photos of completed construction.
- E. Photo library shall be maintained digitally. Progress photos shall be delivered to the Project Manager as required during construction. Provide complete CD of construction photos prior to contract close out.
- F. All photos file names shall identify date of image.

1.10 OPERATING AND MAINTENANCE DATA

- A. Prepare manufacturer's operation and maintenance data in the form of an instructional manual, in D-ring binder, with typed title of project, and provide table of contents. Include shop drawings, product data, and 11x17 copy of as-built drawings.

1.11 AS-BUILT DRAWINGS

- A. Provide as-built drawings as required in Divisions 1 and 16.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION (Not Applicable)

END OF SECTION 01300

SECTION 01310
PROGRESS SCHEDULES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Detailed scheduling requirements and procedures including preparation, interim schedule, and overall schedule.
- B. Preconstruction conference requirements.
- C. Monthly progress report requirements.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions, Paragraphs 6.6, 6.7 and 6.8 for Anticipated Schedules, Finalizing Schedules, and Adjusting Schedules.
- B. Section 01300 – Submittals.

1.03 SUBMITTALS

- A. Submit the following items as specified in this section:
 - 1. Gantt Chart, not CPM (Critical Path Method) nodal analysis.

1.04 CONSTRUCTION SCHEDULE RESPONSIBILITIES

- A. Contractor shall accept the risk for delays caused by the rate of progress of work to be executed under Contract. Contractor shall be responsible for scheduling work.

1.05 PROGRESS OF THE WORK

- A. General:
 - 1. Execute work with such progress as necessary to prevent delay to the overall completion of the project.
 - 2. Execute the work at such times and on such parts of the project, and with such forces, materials and equipment to assure completion in the time established by the Contract.

1.06 PRECONSTRUCTION CONFERENCE

- A. Within twenty (20) days following execution of Contract but before start of work at the site, Contractor shall meet with AUTHORITY and Engineer for discussion of scheduling requirements per Section 01320 – Project Meetings.
- B. Prior to start of work at the site, Contractor shall meet with AUTHORITY and Engineer for an update of scheduling requirements per Section 01320 – Project Meetings.

1.07 SCHEDULE

- A. General:
 - 1. Contractor shall prepare and submit within fourteen (14) days after the award of Contract, a schedule comprised of all construction operations in connection with the Contract.
- B. Schedule Requirements:
 - 1. Schedule type shall be a Gantt chart. Draw or print the schedule on reproducible paper, not larger than 30 inches by 42 inches, and show the sequence and interdependence of activities required for complete performance of all items of work.
- C. Acceleration:
 - 1. If at any time during the project Contractor fails to complete an activity by its latest scheduled completion date, which late completion will impact the end date of the work past the Contract completion date, submit within seven (7) calendar days plans to reorganize the work force to return to the current schedule.
 - 2. The AUTHORITY may require Contractor to add equipment or construction forces, as well as increase working hours, if operations fall behind schedule at any time.
 - 3. Addition of equipment or construction forces, increasing working hours, or other method, manner, or procedure to return to the contractually required completion date will not be justification for Contract modification or treated as an acceleration.
 - 4. Contractor shall plan, schedule, and coordinate construction operations and activities in a manner that will facilitate progress of work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01310

SECTION 01320
PROJECT MEETINGS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Pre-construction Conference: Contractor shall attend a mandatory pre-construction conference at Alaska Energy Authority, 813 West Northern Lights Blvd, Anchorage, Alaska 99503, (907) 771-3000.
1. As a minimum, the following project representatives will attend:
 - a. AUTHORITY's project manager
 - b. Engineer's project manager
 - c. Contractor's project manager
 - d. Contractor's superintendent
 - e. Subcontractors whom the Contractor or Engineer has requested may attend.
 2. The Engineer shall develop an agenda for the preconstruction meeting approximately one (1) week prior to the meeting. Minimum agenda is a follows:
 - a. Identification of Responsible Parties
 - b. Contract Information
 - c. DCVRs, Procedures, Contractor Questions and AUTHORITY Directions
 - d. Change Order Procedures
 - e. Project Schedule (provided by the Contractor)
 - f. Schedule of Values
 - g. Pay Requests
 - h. List of Subcontractors
- B. Job Site Pre-construction Meeting: Contractor shall hold a mandatory pre-construction meeting at the job site within 7-days of start of construction. Contractor shall provide minimum 7-days notice to the AUTHORITY of the meeting date and location. The Contractor is responsible to provide the meeting facilities
- C. The Project Manager will conduct progress or special meetings as required, either via teleconference, at the Project Site, or at the office of the Project Manager, to coordinate the work, answer questions, and resolve problems.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01320

SECTION 01370
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide a detailed breakdown of the agreed Contract Sum showing amounts allocated to each of the various parts of the work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work:
 - 1. Documents affecting work of this section include, but are not necessarily limited to, General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. Preparation and submittal of a schedule of values is required by the General Conditions.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions, Paragraph 13.1, Schedule of Values.

1.03 SUBMITTALS

- A. Within seven (7) days after the pre-construction Conference and prior to first application for payment, submit a proposed schedule of values to the Engineer based on the schedule breakdown in Part 2.01 of this section.
 - 1. Prepare schedule of values for the project with tasks identified outlined by this section.
 - 2. Meet with the Engineer and AUTHORITY to determine additional data, if any, required to be submitted.
 - 3. Secure the Engineer and AUTHORITY's acceptance of the schedule of values prior to submitting first application for payment.

1.04 QUALITY ASSURANCE

- A. Assure arithmetical accuracy of the sums described.
- B. When so required by the Engineer, provide copies of documentation or other data acceptable to the Engineer, substantiating the sums described.
 - 1. Support documentation might include, but not be limited to the following:
 - a. Insurance and bond invoices
 - b. Copies of subcontracts
 - c. Bills of lading
 - d. Material invoices
 - e. Freight invoices

PART 2 PRODUCTS

2.01 SCHEDULE BREAKDOWN

- A. The following is the minimum acceptable breakdown:
 - 1. Bond and insurance
 - 2. General Conditions (categorize as required)
 - 3. Freight (categorize as required)
 - 4. Mobilization
 - 5. Demobilization
 - 6. Items specified in the Bid Schedule (include materials, equipment and labor breakdown)
 - 7. As-built
 - 8. O&M Manuals
 - 9. Final Clean-up and Punch List
 - 10. Project close-out

- B. The sum of the schedule of values breakdown shall equal to the total Contract Price.

- C. The Schedule of Values shall serve as a basis for calculating progress payments during construction and shall be presented in such detail to allow the AUTHORITY to accurately verify the amount and value of work completed as defined in the Contractor's invoice.

- D. The Schedule of Values should correspond to the activities on the Construction Schedule.

- E. All components or items not listed in the Schedule of Values shall be incidental to one of the Units listed.

PART 3 EXECUTION (NOT USED)

END OF SECTION 01370

SECTION 01400
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Engineer, or Authority are not limited by provisions of this Section.
- C. See Divisions 2 through 16 Sections for specific test and inspection requirements.

1.02 GENERAL

- A. This section identifies Contractor Quality Control (QC) requirements and to assist:
 - 1. Planning of Quality Control Work
 - 2. Providing of the appropriate Quality Control Personnel
 - 3. Assurance of Quality Work
- B. The Engineer's function is to plan, design, and review the construction of the powerline. Their responsibility to the AUTHORITY is to ensure the completion of the project within the parameters established by cost and schedule, while meeting all the design requirements. Not including any supervision of Contractor's employees.
- C. Documentation is an extremely important component of the QC effort. Documentation is required by law and is the basis of evidence that the facility was constructed as designed and approved. By his signature, the quality assurance reviewer, whether he is in the Contractor's or Engineer's employment, attest to and certifies that the report is a factual summation of what he has reviewed during the period covered by this report.

1.03 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Engineer.
- C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.04 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Engineer for a decision before proceeding.

1.05 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and re-inspecting.
- C. Permits, Licenses, and Certificates: For Authority's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.06 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.07 QUALITY CONTROL

- A. Authority Responsibilities: Where quality-control services are indicated as Authority's responsibility, Authority will engage a qualified testing agency to perform these services.

1. Authority will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Authority are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Authority, unless agreed to in writing by Authority.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01300 Submittals.
- D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Engineer and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.08 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Authority will engage a qualified testing agency and/or special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Authority, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified testing agency and/or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
 2. Notifying Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.

3. Submitting a certified written report of each test, inspection, and similar quality-control service to Engineer with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, that includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.01. REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This Section includes requirements for temporary facilities and controls, including utilities, support facilities, and security and protection facilities.
- B. Temporary utilities include, but are not limited to, the following:
 - 1. Water service
 - 2. Sanitary facilities, including toilets, wash facilities, and drinking-water facilities
 - 3. Heating and cooling facilities
 - 4. Ventilation
 - 5. Electric power service
 - 6. Lighting
 - 7. Telephone/facsimile
- C. Support facilities include, but are not limited to, the following:
 - 1. Project identification and temporary signs
 - 2. Water storage facilities
 - 3. Waste disposal facilities
 - 4. Office or common use facility
 - 5. Storage
 - 6. Lifts and hoists
 - 7. Temporary ladders and scaffolding
 - 8. Construction aides and miscellaneous services and facilities
- D. Security and protection facilities include but are not limited to, the following:
 - 1. Environmental protection
 - 2. Temporary secure enclosures

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions, Paragraph 6.14, Use of Premises, and Paragraph 7.6, Sanitary Provisions.

1.03 SUBMITTALS

- A. Submit temporary facility proposed locations, and construction.

1.04 USE CHARGES

- A. Cost or use charges for temporary facilities are not chargeable to the AUTHORITY or Engineer, and shall be included in the Contract Price. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the following:
 - 1. Engineer
 - 2. AUTHORITY
 - 3. Personnel of authorities having jurisdiction.
- B. Water Service: Pay water service use charges, whether metered or otherwise, for water used by all entities engaged in construction activities.
- C. Electric Power Service: Pay electric power service use charges, whether metered or otherwise, for electricity used by all entities engaged in construction activities.

1.05 PROJECT CONDITIONS

- A. Conditions of Use: The following conditions apply to use of temporary services and facilities by all parties engaged in the Work:
 - 1. Keep temporary services and facilities clean and neat.
 - 2. Relocate temporary services and facilities as required by progress of the Work.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide new materials or undamaged previously used materials in serviceable condition. Provide materials suitable for use intended.

2.02 EQUIPMENT

- A. Provide equipment suitable for use intended.
- B. Field Office: Local office with lockable entrances, operable windows, and serviceable finishes; heated; on foundations adequate for normal loading.
- C. Fire extinguishers: Hand carried, portable, UL rated.

- D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110V to 120V plus into higher voltage outlets; equipped with ground fault circuit interrupters, reset button and pilot light.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
- B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed.

3.02 TEMPORARY UTILITY INSTALLATION

- A. General: Engage appropriate local utility company to install temporary service or connect to existing service. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.
 - 1. Arrange with utility company, AUTHORITY, and existing users for time when distribution system can be interrupted, if necessary, to make connections for temporary services.
 - 2. Provide adequate capacity for each stage of construction.
- B. Provide job site first aid kit, eyewash fountains, and similar facilities for convenience, safety, and sanitation of personnel.
- C. Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include overload-protected disconnecting means, automatic ground-fault interrupters, and distribution panel. Provide meter if not provided by utility company.
- D. Telephone Service: Provide temporary telephone service throughout construction period for a common-use facility or office used by all personnel engaged in construction activities.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a telephone line for facsimile machine in each common use facility or office.
 - b. At each telephone, post a list of important telephone numbers.
 - 1. Police and fire departments

2. Medical Emergency
 3. Contractor's home office
 4. Engineers' offices
 5. AUTHORITY's office
 6. Principal subcontractors' field and home offices.
- c. Provide messaging service on superintendent's telephone.
 - d. Furnish superintendent with portable communications device for use when away from field office, i.e. Cellular phone, two-way radio, etc.

3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access in approved locations.
 2. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Containerize and clearly label hazardous, dangerous, or unsanitary waste materials separately from other waste.
 3. All facilities shall comply with OSHA regulations.

3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects. Avoid using tools and equipment that produce harmful noise. Restrict use of noisemaking tools and equipment to hours that will minimize complaints from persons in the vicinity of the Project site.

3.05 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage caused by freezing temperatures and similar elements.
- C. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

- D. Prevent water-filled piping from freezing.

- E. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are the property of Contractor.
 - 2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with cleaning requirements in Section 01710 – Cleaning.

END OF SECTION 01500

SECTION 01600
MATERIALS AND EQUIPMENT

PART 1. GENERAL

1.01 DESCRIPTION

- A. Materials and Equipment incorporated into Work shall:
 - 1. Be on the RUS approved materials list.
 - 2. Conform to applicable specifications and standards.
 - 3. Comply with size, make, type, and quantity specified, unless otherwise approved in writing.

- B. Manufactured and Fabricated Products:
 - 1. Manufacture like parts of duplicate units to standard size and gauges, and to be interchangeable.
 - 2. Two or more items of same kind shall be identical, and by same Manufacturer.
 - 3. Products shall be suitable for service conditions.
 - 4. Equipment shall comply with capacity, sizes, and dimensions shown or specified, unless otherwise approved in writing.

- C. Do not use materials or equipment for any purpose other than that for which designed or specified.

1.02 RELATED REQUIREMENTS

- A. Section 01010: Summary of Work.
- B. Section 01300: Submittals.
- C. Section 01610: Delivery, Storage, and Handling.
- D. Section 01640: AUTHORITY Furnished Products

1.03 PRODUCT OPTIONS

- A. Products Specified by Naming One or More Manufacturers followed by the term “No Substitutions”: Use only specified manufacturers, no substitutions allowed.
- B. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards.
- C. Products specified by naming one or more products and “or approved”, select any one specified product.

- D. Whenever a material, article or piece of equipment is identified in the Contract Documents by reference to manufacturer's or vendor's names, trade names, catalog numbers, etc., it is intended to establish a minimum standard. Unless otherwise noted, any substitute material, article or equipment of other manufacturers or vendors which will perform adequately the duties imposed by the general design of the project will be considered equally acceptable; provided, the substitute material, article or equipment so proposed is, in the opinion of the Engineer, of equal substance, function, dimension, appearance and quality.
- E. Prior to the bid opening, the Bidder shall make his own determination in selecting which specified or substitute equipment to base his proposal upon. Substituted items shall be equal to or better than that specified or indicated in regards to quality, workmanship, finish, space requirements, electrical requirements, performance and warranties.
- F. After the bid opening, the Contractor shall submit sufficient data in accordance with this Section to establish equality. The Engineer shall be the sole judge of equality and acceptability.
- G. Acceptance of substitute materials will not relieve the Contractor of the responsibility for any changes in his own Work or in the Work of other crafts caused by the substitution. Any additional costs resulting from substitutions are the responsibility of the Contractor.
- H. Any proposed substitution whose characteristics differ from the specified item to such an extent as to necessitate changes in the mechanical, electrical or other basic design of the Project, shall include the cost of any such changes, the design and the cost of design, which costs shall be borne by the Contractor. Determination of a substitution request will be based on the Engineer's comparisons as to quality, adaptability, aesthetics, Contract amount change, if applicable, etc., between the proposed substitution and specified item.
- I. Only one request for substitution will be considered for each product. When substitution is not accepted, provide specified product.
- J. Substitute products shall not be ordered or installed without written acceptance.

1.04 CONTRACTOR REPRESENTATION

- A. Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product.
- B. Contractor will provide same warranty for substitution as for specified product.

- C. Contractor will coordinate installation of accepted substitute, making such changes as may be required for Work to be complete in all respects.
- D. Contractor certifies that cost data presented is complete and includes all related costs under this Contract.
- E. Contractor waives claims for additional costs related to substitution that may later become apparent.

1.05 INAPPROPRIATE PRODUCTS AND METHODS

- A. If Contractor believes that any specified product, method, or system is inappropriate for use, he shall, if possible, so notify the Project Manager at least three (3) working days prior to bid opening, and if not possible, such notice shall be given before performing work in question. If notice of objection is not received within the specified time limits, it will be assumed that Contractor agrees that specified products, methods, and systems are not inappropriate for use.

1.06 NUMBER OF PRODUCTS REQUIRED

- A. Whenever in specifications a product is referred to in singular number, such reference shall include as many such products as are shown on Drawings or are required to complete the Work.

1.07 PRODUCTS LIST

- A. Coordinate Products List with materials to provide a complete installation for the Work, submit to the Project Manager a complete list of major products required to be submitted under Section 01300.

1.08 MANUFACTURER'S INSTRUCTIONS

- A. Perform work in accordance with Manufacturer's instructions.
- B. Do not omit preparatory or installation procedures required by Manufacturer, unless specifically modified by Contractor Documents.
- C. When Contract Documents require Work to comply with Manufacturer's instruction, obtain and distribute such instructions to parties performing work, including copies to Engineer and Project Manager. Maintain one set at job site during installation and until acceptance.
- D. Handle, install, connect, clean, condition, and adjust products in strict accord with

- such instructions and in conformance with specified requirements.
- E. Should job conditions or specified requirements conflict with Manufacturer's instructions, consult Project Manager for further instructions.
 - F. Do not proceed with work without clear instructions.

1.09 SYSTEMS DEMONSTRATION

- A. Prior to final inspection, Contractor will demonstrate operation of each system to Engineer.
- B. Contractor will instruct OWNER'S personnel in operation, adjustment and maintenance of equipment and systems, using the operation and maintenance data as the basis of instruction.

PART 2. PRODUCTS

2.01 AUTHORITY FURNISHED MATERIALS

- A. See Section 01640 Authority Furnished Products.

PART 3. EXECUTION (Not Applicable)

END OF SECTION 01600

SECTION 01610
DELIVERY, STORAGE, AND HANDLING

PART 1. GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide for expeditious transportation and delivery of products to project site undamaged, on schedule to avoid delay of the Work.
- B. Provide equipment and personnel at site to unload and handle products in manner to avoid damage to products.
- C. Coordinate material provided by Authority for receipt of delivery, secure storage, and inventory of items received.
- D. Provide secure storage and protection for products to be incorporated into the Work, and maintenance and protection for products after installation and until completion of the Work.

1.02 DELIVERY

- A. Arrange deliveries of products in accord with construction schedules and in ample time to facilitate inspection prior to installation.
- B. Coordinate deliveries to avoid conflict with work and conditions at site. Contractor deliveries must not conflict with:
 - 1. Work of other Contractors, the Authority or Owner.
 - 2. Limitations of storage space.
 - 3. Availability of equipment and personnel for handling products.
- C. Deliver products in undamaged condition in original containers or packaging, with identifying labels intact and legible.
- D. Partial deliveries of component parts of equipment shall be clearly marked to identify equipment, to permit easy accumulation of parts and to facilitate assembly.
- E. Immediately upon delivery, inspect shipment to assure:
 - 1. Product complies with requirements of contract documents and reviewed submittals.
 - 2. Quantities are correct.
 - 3. Containers and packages are intact, labels are legible.
 - 4. Products are protected and undamaged. Minor damages may be repaired, provided repaired items are equivalent in all respects to new work.

1.03 PRODUCT HANDLING

- A. Provide equipment and personnel necessary to handle products, by methods to prevent soiling or damage to products or packaging.
- B. Provide additional protection during handling as necessary to prevent scraping, marring, or otherwise damaging products or surrounding surfaces.
- C. Handle products by methods to prevent bending or over-stressing.
- D. Lift heavy components only at designated lifting points.
- E. Handling of wood poles shall be in accordance with RUS recommendations and pointed tools capable of producing indentations more than an inch in depth shall not be used.

1.04 STORAGE

- A. Store products immediately on delivery, and protect until installed in the Work. Store in accord with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.
- B. Exterior Storage
 - 1. Provide substantial platforms, blocking, or skids to support fabricated products 4" above ground, prevent soiling or staining.
 - 2. Cover products, subject to discoloration or deterioration from exposure to elements, with impervious sheet coverings. Avoid use of non-vented plastic or canvas shelters which could create humidity chambers. Provide adequate ventilation to avoid condensation.
 - 3. Store loose granular materials in solid surfaces such as paved areas, or provide plywood or sheet materials to prevent mixing with foreign matter.
 - a. Provide surface drainage to prevent flow or ponding of rainwater.
 - b. Prevent mixing of refuse or chemically injurious materials or liquids.
 - 4. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements.
 - 5. Wood poles held in storage for more than 2 weeks shall be stored covered and supported on dunnage providing not less than 3" of clearance above ground.
 - 6. Provide exterior storage area within Contractor secure area.
- C. Arrange storage in manner to provide easy access for inspection. Periodically inspect to assure products are undamaged and maintained under required conditions until incorporated in the work.

1.05 MAINTENANCE OF STORAGE

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
 - 1. State of storage facilities is adequate to provide required conditions.
 - 2. Surfaces of products exposed to elements are not adversely affected.

1.06 PROTECTION AFTER INSTALLATION

- A. Provide protection of installed products to prevent damage from subsequent operations, usage or vandalism. Remove when no longer needed, prior to completion of work.
- B. Control traffic to prevent damage to equipment.

1.07 DAMAGED PRODUCTS

- A. Remove damaged or deteriorated materials from the premises. Replace materials which have been damaged.

PART 2. PRODUCTS (NOT APPLICABLE)

PART 3. EXECUTION (NOT APPLICABLE)

END OF SECTION 01610

SECTION 01640
AUTHORITY FURNISHED PRODUCTS

PART 1. GENERAL

1.01 SUMMARY

- A. Provide for expeditious transportation and delivery of products to project site undamaged, on schedule to avoid delay of the Work. See Part 2 for Authority furnished Products.
- B. Providing equipment and personnel at site to unload and handle products in manner to avoid damage to products.
- C. Provide secure storage and protection for products to be incorporated into the Work, and maintenance and protection for products after installation and until completion of the Work.

1.02 DELIVERY, STORAGE, HANDLING, AND PROTECTION

- A. Comply with requirements of Section 01610 and Division 16.

PART 2. PRODUCTS

2.01 AUTHORITY FURNISHED MATERIALS

See Data Sheet: Authority Furnished Materials List at end of this Section.

- A. Poles required for the project have been procured under separate contract and will be shipped directly to Akiak. See Section 16300 for requirements for Wood Poles. Contractor shall be responsible for taking receipt of poles and securely storing them, as specified in paragraph 1.01.B and C, Section 01610, and Division 16.
- B. All other materials included in the Authority Furnished Materials List have been procured under separate contracts and will be consolidated in a shipping container provided by the Authority at the AEA Warehouse. Contractor shall coordinate with the Project Manager to inspect and inventory the contents of the container against the Authority Furnished Materials List. If Contractor determines materials are missing, the Project Manager will coordinate with the Authority to provide the missing materials prior to transport of the shipping container. After verifying the items on the

- Authority Furnished Materials List have been all been accounted for, the Contractor shall be responsible for taking receipt of the containerized items, and shall handle them as specified in paragraph 1.01. At completion of project, the Contractor shall locate the container as directed by the Project Manager.
- C. As noted on the drawings, the Authority has provided an overhead transformer bank of three (3) 50kVA, 2,400V Delta/7,200/12,470V WYE step-down/step-up transformers, as shown on the drawings, mounted on Pole 2. Contractor may utilize the transformer bank and relocate it as required to minimize outages and facilitate the phasing of the work. At completion of project, the Contractor shall return this transformer bank to the Authority's Anchorage warehouse.
- D. The Authority will provide (5) dual voltage overhead transformers: 120/240/2,400V Delta and 120/240/7,200/12,470V WYE service transformers. Contractor may utilize and relocate as required to sectionalize portions of the city, maintain service to the consumers, and minimize the quantity and duration of outages. At completion of project, the Contractor shall return this transformer bank to the Authority's Anchorage warehouse.

PART 3. EXECUTION (NOT APPLICABLE)

Attached Data Sheet: Authority Furnished Materials List

END OF SECTION 01640

DATA SHEET - SECTION 01640
AUTHORITY FURNISHED MATERIAL LIST
RPSU AKIAK, AK ITB# 15113

Item	Description	UNIT	QUANTITY
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POLES

P1	POLE, 45/4	EA	67
P2	POLE, 40/4	EA	43

HARDWARE AND MISCELLANEOUS

1	CROSSARM 3-5/8" x 4-5/8" x 8', TYPE 03	EA	16
2	CROSSARM 3-3/4" x 4-3/4" x 10', TYPE 05X	EA	50
3	CROSSARM 5" x 7" x 10', TYPE 21X	EA	6
4	BRACE, CROSSARM, SIDE MOUNTING, PAIR	PAIR	13
5	BRACE, CROSSARM, 60" SPAN (30" X 2), PAIR	PAIR	40
6	BRACE, ALLEY ARM, 2-3/4" x 3-1/2" X 6' X 4' 8"	EA	6
7	INSULATOR, PIN, F-NECK, 15kV	EA	140
8	INSULATOR, SPOOL	EA	336
9	INSULATOR, EPOXILATOR, 15 Kv	EA	50
10	SHOE, DEADEND, BOLTED	EA	50
11	CLAMP, SUSPENSION, ANGLE, CLEVIS	EA	1
12	PIN, CROSSARM, 1" THREADS, 5/8	EA	70
13	PIN, CROSSARM, 1" THREADS, 5/8 x 8" SHANK	EA	20
14	PIN, POLE TOP, 1 THREADS, 5/8 SHANK	EA	50
15	SPACER, PIPE, 3/4" x 1-1/2"	EA	18
16	ROD, ARMOUR, #2 ACSR, SET	SET	120
17	ROD, ARMOUR, DOUBLE, #2 ACSR, SET	SET	24
18	TIE, WRAPLOCK, F-NECK, #2 ACSR W/ ARMOR	EA	75
19	TIE, DOUBLE, SIDE-TIE, F-NECK, #2 ACSR W/ARMOR	EA	16
20	TIE, DOUBLE, TOP-TIE, F-NECK, #2 ACSR W/ARMOR	EA	12
21	TIE, WRAPLOCK, SPOOL, 1-3/4" #2 ACSR W/ARMOR	EA	45
22	TIE, WRAPLOCK, SPOOL, 1-3/4" 1/0 ACSR W/ARMOR	EA	10
23	GRIP, DEADEND, #2 ACSR	EA	35
24	GRIP, SERVICE DEADEND, #4	EA	100
25	GRIP, SERVICE DEADEND, #2	EA	150
26	GRIP, SERVICE DEADEND, 1/0	EA	150
27	GRIP, SERVICE DEADEND, 4/0	EA	4
28	GRIP, GUY, PREFORMED, 3/8 EHS	EA	240
29	CLEVIS, 3", SWINGING	EA	240
30	CLEVIS, 3", RIGID	EA	60
31	BRACKET, SERVICE, MAST	EA	15
32	BRACKET, NEUTRAL OFFSET	EA	35
33	BRACKET, STREET LIGHT MOUNTING, STEEL, 2" PIPE, 30" LENGTH	EA	20
34	WASHER, 1-3/8" ROUND, 9/16" HOLE	EA	75
35	WASHER, STEEL, SQUARE, 2-1/4" x 3/16", 11/16" HOLE	EA	450
36	WASHER, STEEL, SQUARE, 2-1/4" x 3/16", 13/16" HOLE	EA	100
37	WASHER, STEEL, SQUARE,CURVED, 3", 11/16" HOLE, 1/4" THICK	EA	550
38	WASHER, STEEL, SQUARE,CURVED, 4", 13/16" HOLE, 3/8" THICK	EA	130

39	BOLT, CARRIAGE, 3/8, x 4-1/2"	EA	25
40	BOLT, 1/2, MACHINE, x 6" LONG	EA	80
41	BOLT, 5/8, MACHINE, x 10" LONG, 6" THREAD LENGTH	EA	70
42	BOLT, 5/8, MACHINE, x 12" LONG, 6" THREAD LENGTH	EA	130
43	BOLT, 5/8, MACHINE, x 14" LONG, 6" THREAD LENGTH	EA	20
44	BOLT, 5/8, MACHINE, x 16" LONG, 6" THREAD LENGTH	EA	25
45	BOLT, 5/8, OVAL-EYE, x 10" LONG, 6" THREAD LENGTH	EA	130
46	BOLT, 5/8, OVAL-EYE, x 12" LONG, 6" THREAD LENGTH	EA	175
47	BOLT, 5/8, OVAL-EYE, x 18" LONG, 6" THREAD LENGTH	EA	5
48	BOLT, 5/8", DOUBLE UPSET, x 18" LONG, 12" SHANK, 6" THREAD	EA	10
49	BOLT, 5/8, DA, x 18" LONG	EA	10
50	BOLT, 5/8, DA, x 22" LONG	EA	40
51	BOLT, 5/8, DA, x 24" LONG	EA	20
52	BOLT, 3/4, MACHINE, x 12" LONG	EA	220
53	BOLT, 3/4, THIMBLE EYE, x 12" LONG	EA	15
54	NUT, LOCK, 3/8 MF	EA	30
55	NUT, LOCK, 1/2 MF	EA	75
56	NUT, LOCK, 5/8 MF	EA	800
57	NUT, LOCK, 3/4 MF	EA	250
58	NUT, OVAL-EYE, 5/8	EA	120
59	NUT, THIMBLE EYE, 3/4	EA	15
60	SHACKLE, ANCHOR, 1/2	EA	10
61	SCREW, LAG, GIMLET, 3/8", 2-1/2" LONG, HEX HEAD	EA	20
62	SCREW, LAG, FETTERS, 1/2", 4" LONG	EA	400
63	NUMBER, "1", ALUMINUM, 3" TALL	EA	120
64	NUMBER, "2", ALUMINUM, 3" TALL	EA	50
65	NUMBER, "3", ALUMINUM, 3" TALL	EA	40
66	NUMBER, "4", ALUMINUM, 3" TALL	EA	20
67	NUMBER, "5", ALUMINUM, 3" TALL	EA	50
68	NUMBER, "6", ALUMINUM, 3" TALL	EA	10
69	NUMBER, "7", ALUMINUM, 3" TALL	EA	10
70	NUMBER, "8", ALUMINUM, 3" TALL	EA	10
71	NUMBER, "9", ALUMINUM, 3" TALL	EA	40
72	NUMBER, "0", ALUMINUM, 3" TALL	EA	10
73	NUMBER, "-", ALUMINUM, 3" TALL (DASH)	EA	120
74	LETTER, "A", ALUMINUM, 3" TALL	EA	40
75	LETTER, "B", ALUMINUM, 3" TALL	EA	30
76	LETTER, "C", ALUMINUM, 3" TALL	EA	30
77	LETTER, "D", ALUMINUM, 3" TALL	EA	10
78	LETTER, "E", ALUMINUM, 3" TALL	EA	10
79	LETTER, "N", ALUMINUM, 3" TALL	EA	30
80	LETTER, "W", ALUMINUM, 3" TALL	EA	10
81	NAIL, ALUMINUM, 1" LONG, LBS.	LB	3
82	NUMBER, "1", STICKER, 3" TALL, BLACK ON YELLOW RFLCT	EA	10
83	NUMBER, "2", STICKER, 3" TALL, BLACK ON YELLOW RFLCT	EA	10
84	LETTER, "S", STICKER, 3" TALL, BLACK ON YELLOW RFLCT	EA	10
85	GRID REFLECTOR, YELLOW, 8" x 12"	EA	10
86	STICKER, WARNING	EA	10

87	MARKER, GUY, 2" x 8' LONG	EA	125
88	HOOK, GUY, 3/4" BOLT, 20,000 LBS.	EA	110
89	PLATE, GUY, GUYING	EA	5
90	INSULATOR, GUY STRAIN, 21,000 LBS, 96", CLEVIS-THIMBLE, W/(1) ROLLER	EA	5
91	ROD, TWIN EYE ANCHOR ,3/4" x 8', WITH NUT	EA	100
92	CLAMP, GUY TO ANCHOR BONDING, TWIN EYE	EA	100
93	PLATE ANCHOR, 400 SQ. INC (24" PLATE ANCHOR)	EA	100
94	STIRRUP, FORGED, #6 TO 2/0	EA	50
95	CLAMP, HOTLINE, ALUMINUM	EA	50
96	CUT-OUT, NON-LOAD BREAK, 100A	EA	50
97	BRACKET, CUT-OUT, POLE MOUNT	EA	30
98	LUG, TRANSFORMER GROUNDING	EA	110
99	TRANSFORMER WILDLIFE PROTECTOR	EA	50
100	BLOCK, CONNECTOR, XFMR, 8 POSITION, #10-250	EA	150
101	MOUNT, TRANSFORMER, CLUSTER, TRIPLE, SMALL	EA	2
102	CONNECTOR, H-TAP, 0.419 TO 0.266 / 0.322 TO 0.162	EA	100
103	CONNECTOR, H-TAP, 0.419 TO 0.25 / 0.162 TO 0.064	EA	800
104	CONNECTOR, H-TAP, 0.47 TO 0.366 / 0.47 TO 0.366	EA	600
105	COVER, H-TAP	EA	800
106	CONNECTOR, "C" CRIMP, #6 SOL-#4 STR/#6 SOL-#6 STR.	EA	350
107	SEAL	EA	50
108	RING, METER	EA	10
109	COVER, METER SOCKET	EA	10
110	SHRINK, COLD, 1.4" MIN., 3" MAX	EA	10
111	ROD, GROUND, 5/8" x 8' COPPER CLAD STEEL, 10MIL	EA	50
112	STAPLE, COPPER COATED, 1-3/4" x 3/8" x .162 DIA.	LB	50
113	CLAMP, GROUND ROD, 5/8, BRONZE	EA	50
114	2" RIGID GALVANIZED STEEL CONDUIT, W/ COUPLING, 10' STICK	EA	10
115	2" PVC, CONDUIT, SCHEDULE 40, 10' STICK	EA	15
116	BELL END, PVC, 2"	EA	10
117	POST CAP, ALUMINUM, 2-3/8" DIA.	EA	2
118	ADHESIVE, PVC, 8 OUNCE CAN	CAN	3
119	BRACKET, STAND-OFF, CONDUIT, 12"	EA	35
120	CLAMP, PIPE, 2" RGS, GALVANIZED	EA	40
121	CLAMP, PIPE, 2-HOLE, GALVANIZED, 7/16 HOLE	EA	10
122	CLAMP, PIPE, 2" GROUNDING, #6 - 2/0	EA	30
123	DUCT SEAL	LB	15
124	ELBOW, CONDUIT, RGS, 2", LONG SWEEP, 36" RADIUS	EA	7
125	SPLICE, 2" CONDUIT, RIGID TO HDPE	EA	10
126	PEDESTAL, SECONDARY	EA	5
127	BLOCK, CONNECTOR, SECONDARY, UG, 8-POS	EA	15
128	LOCK, PEDESTAL, ON-TIME	EA	10
129	TAPE, WARNING, BURIED CABLE, RED, 6" WIDE x 1000'	ROLL	1
130	PRESERVATIVE, COPPER NAPHTHENATE,	QT	10
131	2" HDPE, SCHEDULE 40, RED OR BLACK 2/ RED STRIPES	FT	1000

WIRE AND CABLE			
132	#10 Copper, 7 strand, XHHW, Green	FT	200
133	#10 Copper, 7 strand, XHHW, White	FT	200
134	#10 Copper, 7 strand, XHHW, Black	FT	200
135	#4 Bare Solid Aluminum (Tie Wire)	FT	200
136	#6 Bare Solid Copper, Soft Drawn or Annealed; (10) 315' Reels	FT	3150
137	#6 Solid Copper, Transformer Riser wire, 110 mil XLP	FT	700
138	#2 Copper, 7 Strand, XHHW, Black	FT	100
139	#2 ACSR, SPARATE	FT	31500
140	#2 Triplex, CONCH	FT	3000
141	1/0 Triplex, NERITINA	FT	6800
142	#2 URD Triplex, #2-#2-#2 STEPHENS	FT	450
143	4/0 URD Triplex, 4/0-2/0-4/0 SWEET BRIAR	FT	900
144	Wire, Guy, 7 Strand, 3/8", EHS (Packaged, 300' per dispenser)	FT	5400
145	Guy Wire Dispenser	EA	18

STREETLIGHTS			
146	Streetlight, LED, w/Photocell	EA	20

TRANSFORMERS			
147	10kVA, POLE MOUNT, STAINLESS STEEL, 120/240/7,200/12,470	EA	36
148	15kVA, POLE MOUNT, STAINLESS STEEL, 120/240/7,200/12,470	EA	11
149	25kVA, POLE MOUNT, STAINLESS STEEL, 120/240/7,200/12,470	EA	2
150	15kVA, POLE MOUNT, DUAL VOLTAGE, 120/240/2,400 and 120/240/7,200/12,470	EA	5
151	(3) 50 kVA, 2,400V DELTA to 7,200/12,470V WYE (ON SITE, ON POLE 2)	EA	1

SECTION 01700
PROJECT CLOSEOUT

PART 1. GENERAL

1.01 GENERAL CONDITIONS

- A. This section describes an orderly and efficient transfer of the completed Work to the AUTHORITY.
- B. Definitions: Closeout is hereby defined to include general requirements near the end of contract time, in preparation for final acceptance, final payment, normal termination of contract, and similar actions evidencing completion of the work. Specific requirements for individual units of work are specified in sections of Division 2 through 16. Time of Closeout is directly related to “Substantial Completion”.

1.02 RELATED SECTIONS

- A. Documents affecting work of this section include, but are not necessarily limited to: General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
- B. Activities relative to Substantial Completion, Project Closeout, and Contract Closeout are described in the General Conditions.
- C. Document 00700 – General Conditions, Paragraphs 13.10 and 13.12 for Substantial Completion and Final Completion.
- D. Section 01720 – Project Record Documents shall be submitted prior to Substantial Completion.

1.03 QUALITY ASSURANCE

- A. Prior to requesting inspection by the Engineer, use adequate means to assure that the Work is substantially completed in accordance with the specified requirements, and is ready for the requested inspection.

1.04 PROCEDURES

- A. Substantial Completion:

1. Substantial completion is defined as that point at which the facilities are basically complete to the AUTHORITY's satisfaction in accordance with Document 00700 – General Conditions, Article 1, Definitions. All mechanical and life safety features shall have been installed, and be functionally operational. Remaining work shall be extremely minor or require seasonal opportunity to complete or subject to delayed completion items, and shall not impair the functionality or health and life safety features of the facilities.
 2. The Contractor shall notify the Engineer in writing, prior to the date when the work will be substantially completed and ready for inspection.
 3. Within a reasonable time after receipt of such notice, the Engineer will inspect to determine status of completion.
 4. Should the Engineer determine that the work is not substantially complete:
 - a. The Engineer promptly will so notify the Contractor, in writing, giving the reasons therefore.
 - b. The Contractor shall remedy the deficiencies and notify the Engineer when ready for re-inspection.
 - c. The Engineer will re-inspect the work.
 - d. The Contractor shall be liable for expenses incurred by the AUTHORITY and Engineer for reason of such Substantial Completion Re-inspection.
 5. When the Engineer concurs that the work is substantially complete:
 - a. The Engineer will prepare a "Memorandum of Acceptance", accompanied by the Punch List of items to be completed or corrected, as verified by the Engineer.
 - b. The Engineer will submit the Memorandum to the AUTHORITY and to the Contractor for their written acceptance of the responsibilities assigned to them in the Memorandum.
 - c. Once the Contractor executes the Memorandum, it must be returned to the Engineer.
- B. Immediately following approval of Substantial Completion, the Contractor shall submit the following documents:
1. Contractor's Certificate and Release.
- C. Final Inspection:
1. Final Inspection shall be defined as that period at which all Work in the Contract is 100% complete and no minor details remain to be performed in accordance with Document 00700 – General Conditions, Article 1, Definitions.
 2. Final Inspection shall not be made until all Work under the contract is completed. The Contractor shall notify the Engineer, in writing, prior to the date when the work will be ready for final inspection.

3. Following notification, a representative of the AUTHORITY will make an inspection of the Contractor's work and record any deficiencies on the Final Punch List. The Contractor shall immediately correct these deficiencies at his own expense and notify the Engineer in writing when all items have been corrected. The Engineer will re-inspect the work to assure correction of all deficiencies before release of amounts retained for minor, seasonal or delayed items. The Contractor shall be liable for all costs of re-inspection when the Substantial Completion Punch List deficiencies have not been corrected at the time of the Final Inspection and re-inspection is required.
4. Any reasonable delay by the AUTHORITY in making Final Inspection shall not relieve the Contractor of responsibility for the Work, nor shall the AUTHORITY be held responsible for damages or claims for compensation on account of continuing overhead, maintenance, etc., occasioned by such a delay.

PART 2. PRODUCTS (Not Applicable)

PART 3. EXECUTION (Not Applicable)

END OF SECTION 01700

SECTION 01710
CLEANING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. During the term of this Contract, the Contractor shall remove as promptly as possible any materials and equipment which are not required for the completion of the Work. All debris shall be removed from the site and legally disposed of. The Contractor shall take particular care to eliminate any hazards created by his operations.
- B. Related Sections:
 - 1. Documents affecting Work of this section include, but are not necessarily limited to: General Conditions, Special Conditions, and Sections in Division 1 of these Specifications.
 - 2. In addition to standards described in this section, comply with requirements for cleaning as described in other pertinent sections of these Specifications.

PART 2 PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

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

2.02 COMPATIBILITY

- A. Use only the cleaning materials and equipment which are compatible with the surface being cleaned, as recommended by the manufacturer of the material.
- B. Materials used for cleaning shall not harm the existing vegetative mat of the tundra.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. At the completion of the project, or prior thereto if so directed by the Engineer, the Contractor shall be responsible for complete cleaning of those portions of the project, which his work affects.
 - 1. Contractor shall remove from the facility all tools, equipment, surplus materials, debris, temporary structures, and other material not incorporated in the permanent installation.

- B. Restoration of Damaged Property
 - 1. To the extent that any roads, vegetation, structures, utilities or other items are damaged or displaced by the Contractor's operations, these shall be restored to their original or better condition prior to the Substantial Inspection. This shall include both on-site and off-site items. Any damage which is severe enough to disrupt community travel or utilities shall be repaired by the Contractor immediately, when requested by the AUTHORITY's Representative.

- C. Cleaning, repair, and restoration must be accomplished prior to Final Inspection, to the satisfaction of and at no additional cost to the AUTHORITY.

END OF SECTION 01710

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Maintenance of Record Documents and Samples.
- B. Submittal of Record Documents and Samples.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions, Paragraph 6.16 – Record Documents.
- B. Section 01300 – Submittals.
- C. Section 01770 – Contract Closeout.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. In addition to requirements in General Conditions, maintain at the site for AUTHORITY one accurate record copy of:
 - 1. Contract Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. Reviewed Shop Drawings, product data, and samples.
 - 6. Field records.
 - 7. Field test records.
 - 8. Inspection certificates.
- B. Prior to Substantial Completion, provide original or legible copies of each item maintained by CONTRACTOR as listed in 1.03.A above.
- C. Delegate responsibility for maintenance of Record Documents to one person on CONTRACTOR's staff.
- D. Promptly following award of Contract, secure from AUTHORITY, at no cost to the CONTRACTOR, one (1) complete set of all Documents comprising the Contract.

- E. Immediately upon receipt of job set described above, identify each Document with title “RECORD DOCUMENTS – JOB SET”.
- F. Store record documents and samples in field office apart from documents used for construction. Provide files, racks, and secure storage for record documents and samples.
- G. Label and file record documents and samples in accordance with section number listings in table of contents of this Project manual. Label each document “PROJECT RECORD” in neat, large, printed letters.
- H. Maintain record documents in a clean, dry and legible condition. Do not use record documents for construction purposes.
- I. Use all means necessary to maintain job set of Record Documents completely protected from deterioration and from loss and damage until completion of Work and transfer of recorded data to AUTHORITY.
- J. Keep record documents and samples available for inspection by AUTHORITY.
- K. Upon request by the AUTHORITY and at time of each Application for Payment, submit complete collection of record documents to the AUTHORITY for review and duplication as desired.
- L. AUTHORITY’s approval of current status of Record Documents will be prerequisite to AUTHORITY’s approval of requests for progress payments and request for final payment.
 - 1. Prior to submitting each request for progress payment, secure AUTHORITY’s approval of Record Documents as currently maintained.
 - 2. Prior to submitting request for Final Payment, obtain AUTHORITY’s approval of final Record Documents.
- M. Do not use job set for any purpose except entry of new data and for review and copying by AUTHORITY.

1.04 RECORDING

- A. Record information on a set of black line opaque Drawings, and in a copy of a Project manual, provided by AUTHORITY.
- B. Using felt tip marking pens, ballpoint pens, or colored pencil, maintaining separate colors for each major system, clearly describe changes by note and by graphic line, as required. Date all entries. Call attention to entry by a “cloud” around area or areas affected.

- C. Thoroughly coordinate all changes within Record Documents, making adequate and proper entries on each Specification Section and each sheet of Drawings and other Documents where such entry is required to properly show change or selection.
- D. When a change within Record Documents is referenced to another document, such as Design Clarification Request, Shop Drawing, or Change Order, attach a copy of the referenced document to the respective Record Drawing or Record Specification where the entry is made.
- E. Contract Drawings and Shop Drawings: Legibly mark each item to record actual construction, including:
 - 1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Accurate to the nearest inch.
 - 2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction.
 - 3. Field changes of dimension and detail.
 - 4. Changes made by modifications.
 - 5. Details not on original Contract Drawings.
 - 6. References to related Shop Drawings and modifications.
 - 7. Clearly label all changes and show dimensions to establish size and location. All identifications shall be sufficiently descriptive to relate reliably to Specifications.
- F. Specifications: Legibly mark each item to record actual construction, including:
 - 1. Manufacturer, trade name, and catalog number of each product actually installed, particularly optional items and substitute items.
 - 2. Changes made by Addenda and modifications.
- G. Other Documents: Maintain manufacturer's certifications, inspection certifications, and field test records required by individual Specifications sections.

1.05 SUBMITTALS

- A. Upon submittal of the completed Record Documents, make changes in Record Documents as required by the AUTHORITY.
- B. Transmit Record Documents, with cover letter in duplicate, listing:
 - 1. Date.
 - 2. AUTHORITY's Project title and number.
 - 3. CONTRACTOR's name, address, and telephone number.
 - 4. Number and title of each record document.

5. Signature of CONTRACTOR or authorized representative.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01720

SECTION 01770
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedures to be followed in closing out the Contract.

1.02 RELATED SECTIONS

- A. Document 00700 – General Conditions, Paragraphs 13.14, 13.15 and 13.17 for Final Payment, Final Acceptance, and Waiver of Claims by Contractor.
- B. Document 00700 – General Conditions.

1.03 SUBSTANTIAL COMPLETION

- A. Substantial completion date for the Contract shall be established as stated in the General Conditions.

1.04 FINAL SUBMITTALS

- A. No Contract will be finalized until all of the following have been submitted as required in Section 01300 – Submittals:
 - 1. Submittals.
 - 2. Operation and Maintenance manuals.
 - 3. Project Record Documents.
 - 4. Application for Final Payment.
- B. No Contract will be finalized until all warranties and guarantees, bonds, certifications, licenses, affidavits, evidence of payment of Subcontracts and suppliers, and certificate of release required for work or equipment as specified are satisfactorily filed with the Engineer and AUTHORITY.

1.05 RELEASE OF LIENS OR CLAIMS

- A. No Contract will be finalized until satisfactory evidence of release of liens has been submitted to AUTHORITY as required by the General Conditions.

1.06 WARRANTIES AND GUARANTEES

- A. As a condition precedent to Final Payment, all guarantees and warranties as specified under various sections of the Contract Documents shall be obtained by the CONTRACTOR and delivered to the AUTHORITY, in duplicate giving a summary of guarantees attached and stating the following in respect to each:
1. Character of Work affected.
 2. Name of Subcontractors.
 3. Period of Guarantee.
 4. Conditions of Guarantee.
- B. Delivery of said guarantees and/or warranties shall not relieve the CONTRACTOR from any obligations assumed under any other provision of the Contract.
- C. If, within any guarantee period, repairs or changes are required in connection with the guaranteed Work, which in the opinion of the AUTHORITY is rendered necessary as the result of the use of materials, equipment or workmanship, which are defective, or inferior, or not in accordance with the terms of the Contract, the CONTRACTOR shall, upon receipt of notice from the AUTHORITY, and without expense to the AUTHORITY, proceed within seven (7) calendar days to:
1. Place in satisfactory conditions in every particular all of such guaranteed Work, correct all defects therein, and make good all damages to the structure or site.
 2. Make good all Work or materials, or the equipment and contents of structures or site disturbed in fulfilling any such guarantee.
- D. If the CONTRACTOR, after notice, fails to comply without the terms of the guarantee, the AUTHORITY may have the defects corrected and the CONTRACTOR and CONTRACTOR's Surety shall be liable for all expenses incurred in connection therewith, including Engineer's fees.

1.07 STATEMENT OF ADJUSTMENT TO ACCOUNTS

- A. With the request for final payment, submit final statement reflecting adjustments to Contract Price indicating:
1. Original Contract Price.
 2. Previous Change Orders.
 3. Changes under allowances.
 4. Changes under Unit Prices.
 5. Deductions for uncorrected Work.
 6. Penalties and bonuses.
 7. Deductions for liquidated damages.

8. Deductions for reinspection fees.
 9. Other adjustments to Contract Price.
 10. Total Contract Price as adjusted.
 11. Previous payments.
 12. Sum remaining due.
- B. AUTHORITY will issue a final Change Order reflecting all remaining adjustments to Contract Price not previously made by Change Orders.

PART 2 PRODUCTS

2.01 SURPLUS MATERIALS

- A. Contractor shall furnish to the AUTHORITY upon acceptance of work all surplus materials specified to be provided for this project.
- B. Surplus materials must be in like new condition and be provided in the original manufacturers packaging.

PART 3 EXECUTION

3.01 FINAL CLEANING

- A. At completion of Work and immediately prior to final inspection, clean entire project according to the following provisions and Section 01710 – Cleaning:
1. Clean, sweep, wash, and polish work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the Engineer and AUTHORITY.
 2. Should Contractor not remove rubbish or debris, or not clean the facilities and site as specified above, the AUTHORITY reserves the right to have final cleaning done at the sole expense of the Contractor.
- B. The Contractor shall:
1. Employ experienced workers or professional cleaners for final cleaning.
 2. Conduct final inspection of exposed interior and exterior surfaces and of concealed spaces in preparation for substantial completion or occupancy.
 3. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from exposed interior and exterior finished surfaces; polish surfaces designated to shine finish.
 4. Repair, patch, and touch up marred surfaces to specified finish, and match adjacent surfaces.

5. Broom clean paved surfaces; rake clean other surfaces.
 6. Remove debris accumulated along the alignment of the Work, around access roads and temporary storage areas.
 7. Remove all abovegrade survey debris, including lathe, staking and flagging.
 8. Remove from the construction site and Contractor's staging area temporary structures and materials, equipment, and appurtenances not required as part of, or appurtenant to, the completed work. See Section 01500 – Temporary Facilities and Controls.
 9. Leave water courses, gutters, and ditches open and in condition satisfactory to Engineer.
- C. The Facility Owner or the respective participant will assume responsibility for cleaning as of the date of Final Completion.

3.02 FINAL INSPECTION

- A. After final cleaning and upon written notice from Contractor that Work is completed, Engineer will make preliminary inspection with the AUTHORITY and Contractor present. Upon completion of preliminary inspection, Engineer will notify Contractor in writing of particulars in which the completed Work is defective or incomplete.
- B. Upon receiving written notice from Engineer, Contractor shall immediately undertake Work required to remedy defects and complete the Work to the satisfaction of Engineer and AUTHORITY.
- C. After the items as listed in Engineer's written notice are corrected or completed, inform Engineer in writing that required Work has been completed. Upon receipt of this notice, Engineer, in the presence of AUTHORITY and Contractor, will make final inspection of the project.
- D. Should the Engineer find all Work satisfactory at the time of final inspection, Contractor will be allowed to make application for final payment in accordance with provisions of the General Conditions. Should Engineer still find deficiencies in the Work, Engineer will notify Contractor in writing of deficiencies and will not approve Contractor's request for final payment until such time as Contractor has satisfactorily completed the required Work.

END OF SECTION 01770

SECTION 01800
INCIDENTAL WORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Several items of Work, not covered in the Bid Proposal, will be considered incidental to the cost of the Contract. These items shall include, but are not limited to, the following:
1. Safe handling and disposal of fuel, oil, paint and thinners, and other hazardous material.
 2. Safety program to protect workers and residents.
 3. Sanitation facilities for workers.
 4. Post-construction cleanup.
 5. Climate controls for painting, such as tenting and heaters.
 6. Disposal and hauling of unsuitable materials removed from excavations.
 7. Protection of materials and work from weather during construction.
 8. Snow removal.
 9. Provisions for temporary fueling or fuel transfers.
 10. Items not specified that are required to provide a completed distribution system.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01800

SECTION 01900
UTILITY LOCATION REQUIREMENTS

PART 1. GENERAL

1.01 DESCRIPTION

- A. Upon receipt of written notification from any public agencies or utilities that Contractor has caused damage to any facility, equipment or installation of agency, and Contractor failed to request a utility locate service from said utility at least two (2) normal business days prior to damage, or if locate services were properly requested, that damage was not the result of error in locate services, the Authority will withhold Contract payment, including advances, a sum sufficient to protect Owner, Authority and utility from loss.
- B. Upon receipt of release of claim by notifying utility or upon judgment of a court having jurisdiction in matter and having established that Contractor is liable for a lesser amount or is not liable for damage, Owner will release excess funds to Contractor. Funds withheld pursuant to this provision shall not bear interest.

1.02 PROTECTION OF UTILITIES

- A. Any pipes or other utilities encountered in excavation shall be temporarily shored and braced as necessary by Contractor as to leave them in a proper working condition until such times as the utilities are buried in accordance with utility requirements.
- B. Any utilities mislocated or inadequately located by appropriate utility company which are damaged by Contractor shall not be grounds for additional compensation or project time extensions to Contractor. Contractor shall coordinate repair work with the affected utilities.
- C. Contractor shall coordinate his work to cooperate with original utility service installed.

PART 2. PRODUCTS (NOT APPLICABLE)

PART 3. EXECUTION (NOT APPLICABLE)

END OF SECTION 01900

SECTION 16120
WIRE AND CABLE

PART 1. GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES (AEIC)

AEIC C8	Extruded Dielectric Shielded Power Cables Rated 5 Through 46 kV
AEIC CS6	Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 69 kV

ASTM INTERNATIONAL (ASTM)

ASTM B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B230	Aluminum Wire, EC-H19 for Electrical Purposes
ASTM B231	Aluminum Conductors, Concentric-Lay-Stranded
ASTM B232	Aluminum Conductors, Concentric-Lay-Stranded Steel Reinforced (ACSR)
ASTM B496	Compact Round Concentric-Lay-Stranded Copper Conductors

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA WC 70	Non-Shielded Power Cables Rated 2000 Volts or less for the Distribution of Electrical Energy
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1.02 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS:

- A. Medium and Low Voltage Cable: Product data.
- B. Test Reports: Cable test reports for testing required by paragraph "Testing Instructions."

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Furnish cables on reels or coils. Each cable and the outside of each reel or coil, shall be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number, reel number, and country of manufacture. Each coil or reel of cable shall contain only one continuous cable without splices. Reels shall remain the property of the Contractor.

PART 2. PRODUCTS

2.01 MATERIALS

See Section 01640 AUTHORITY FURNISHED PRODUCTS. The specified items have been procured under separate contract. If in the course of the project it becomes necessary to procure additional materials, the Contractor shall provide the identical units provided by the Authority, but will not be required to provide submittals for those identical units. If identical units can not be procured, Contractor shall provide products as specified and shall follow all submittal procedures. Provide products as indicated in staking sheets and on the drawings.

All wire and cable shall have minimum rated circuit voltages in accordance with NEMA WC 70. Cables shall be single conductor type unless otherwise indicated. Conductors shall be as scheduled on the drawings and shall be RUS approved. Minimum wire size shall be as scheduled on the Drawings.

- A. Overhead Medium-Voltage Open Wire Cables (Primary): Conductors shall be #2 ACSR Sparate conductor as scheduled on the drawings, staking sheets, and bid units, and shall be RUS approved.
- B. Overhead Low-Voltage Cables (Secondary and Services): Low-voltage line conductors shall be as scheduled, of the neutral-supported secondary and service drop type with thermosetting insulation. Neutral-supported secondary and service drop conductors shall be insulated aluminum with bare ACSR neutrals. Cables shall be rated 600 volts and RUS approved.
- C. Underground Low-Voltage Cables: Low-voltage cables shall be as scheduled, and shall be rated 600 volts and shall conform to the requirements of NFPA 70, and must be UL listed for the application or meet the applicable section of either ICEA or NEMA.
- D. Grounding Conductors: Grounding conductors shall be bare copper, ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

PART 3. EXECUTION

3.01 INSTALLATION INSTRUCTIONS

The following information shall be provided by the cable manufacturer for each size, conductor quantity, and type of cable furnished:

- A. Minimum bending radius, in inches.
- B. Pulling tension and sidewall pressure limits, in pounds and pounds/foot.
- C. Instructions for stripping semiconducting insulation shields, if furnished, with minimum effort without damaging the insulation.

3.02 TESTING INSTRUCTIONS

- A. After the installation is completed, the voltage shall be measured at the services with all concurrent loads anticipated to be on and verified to be within 2.5% above or below the specified voltage. If it does not fall within 2.5%, the Contractor shall make corrective measures to bring the voltage into compliance.

END OF SECTION 16120

SECTION 16300
ELECTRICAL DISTRIBUTION SYSTEM, AERIAL

PART 1 GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C42.100 Standard Dictionary of Electrical and Electronics Terms

ALLIANCE FOR TELECOMMUNICATIONS INDUSTRY
SOLUTIONS (ATIS)

ATIS O5.1 Specifications and Dimensions (for Wood Poles)

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

AWPA C4 Poles - Preservative Treatment by Pressure Processes
AWPA P8 Standard for Oil-Borne Preservatives
AWPA P9 Standards for Solvents and Formulations for Organic
Preservative Systems

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 475 Zinc-Coated Steel Wire Strand
ASTM B 117 Operating Salt Spray (Fog) Apparatus
ASTM B 8 Concentric-Lay-Stranded Copper Conductors, Hard,
Medium-Hard, or Soft
ASTM D 1654 Evaluation of Painted or Coated Specimens Subjected to
Corrosive Environments

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
(IEEE)

IEEE C2 National Electrical Safety Code (NESC)
IEEE C57.12.00 Standard General Requirements for Liquid-Immersed
Distribution, Power, and Regulating Transformers
IEEE C57.12.20 Overhead-Type Distribution Transformers, 500kVA and
Smaller: High Voltage, 34500V and Below; Low Voltage,
7970/13800Y V and below
IEEE C57.12.31 Pole Mounted Equipment – Enclosure Integrity

IEEE C57.12.90	Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
IEEE C57.12.91	Loading Mineral-Oil-Immersed Transformers
IEEE Std 81	Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1) Normal Measurements

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
(NEMA)

NEMA HV 2	Application Guide for Ceramic Suspension Insulators
NEMA LA 1	Surge Arresters
NEMA TR 1-1993 (R2000)	Transformers, Regulators and Reactors, Table 0-2 Audible Sound Levels

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2008) National Electrical Code
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U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1728F-803	Specifications and Drawings for 24.9/14.4kV Line Construction
RUS Bull 1728F-804	Specifications and Drawings for 12.47/7.2kV Line Construction
RUS Bull 1728H-701	Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys

U.S. DEPARTMENT OF ENERGY (DOE)

10 CFR Part 431	Energy Conservation Program for Commercial Equipment: Distribution Transformers Energy Conservation Standards; Final Rule
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UNDERWRITERS LABORATORIES (UL)

UL 467	Grounding and Bonding Equipment
UL 486A-486B	Wire Connectors

1.02 GENERAL REQUIREMENTS

- A. Terminology used in this specification is as defined in ANSI C42.100.

1.03 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS:

- A. Product Data: Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the

requirements of the contract documents. Where materials or equipment are specified to conform to the standards of the UL, ANSI, IEEE, or NEMA, the label of, listing by, certification, or a published catalog specification data statement, to the effect that the item is in accordance with the referenced standard, will be acceptable as evidence that the item conforms. Separate certification is not required.

- B. Test Reports: Field Testing, see Part 3 paragraph "Field Testing."
- C. Operation and Maintenance Data: Operation and Maintenance manual for the electrical distribution system (combined with Section 16400, Electrical Distribution Systems, Underground) shall include as-built layout drawing showing pole numbering and framing units as installed, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, a recommended list of spare parts to be stocked, and routine maintenance requirements. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare-parts data.
- D. As-Built Drawings: The Contractor shall submit the as-built drawings as a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, dimensions, part identification, and other information. Additional sheets may be added. Upon completion of the work, the Contractor shall submit full sized sets of the marked prints to the Engineer to incorporate into the digital drawing file.

1.04 DELIVERY, STORAGE, AND HANDLING

See Section 01610 DELIVERY, STORAGE, AND HANDLING. Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements. Wood poles held in storage for more than 2 weeks shall be stored covered and supported on dunnage providing not less than 3" of clearance above ground. Handling of wood poles shall be in accordance with RUS recommendations, and pointed tools capable of producing indentations more than inch in depth shall not be used.

1.05 EXTRA MATERIALS

Where additional materials have been provided, such as poles, spare fuses, crossarms, hardware etc, these shall be delivered to the Owner when the electrical system is accepted and stacked neatly and organized at a location designated by the Project Manager and Owner.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. See Section 01640 AUTHORITY FURNISHED PRODUCTS. The specified items have been procured under separate contract. If in the course of the project it becomes necessary to procure additional materials, the Contractor shall provide the identical units provided by the Authority, but will not be required to provide submittals for those identical units. If identical units can not be procured, Contractor shall provide products as specified and shall follow all submittal procedures. Provide products as indicated in staking sheets and on the drawings:

1. Connectors and Splices
2. Poles
3. Pole Line Hardware
4. Guys and Anchors
5. Insulators
6. Crossarm Assemblies
7. Fuses
8. Grounding and Bonding
9. Pole mounted transformers

2.02 STANDARD PRODUCT

Material and equipment shall be the standard product of a manufacturer regularly engaged in the manufacture of the product and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

2.03 CORROSION PROTECTION

A. Aluminum Materials: Aluminum shall not be used in contact with earth or concrete. Where aluminum conductors are connected to dissimilar metal, use RUS approved fittings.

B. Ferrous Metal Materials

1. Hardware: Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M.

2. Equipment and component items, including but not limited to transformers and ferrous metal luminaries not hot-dip galvanized or porcelain enamel finished, shall be provided with corrosion-resistant finishes which shall withstand 120 hours of exposure to the salt spray test specified in ASTM B 117 without loss of paint or release of adhesion of the paint primer coat to the metal surface in excess of 1/16 inch from the test mark. The described test mark and test evaluation shall be in accordance with ASTM D 1654 with a rating of not less than 7 in accordance with TABLE 1, (procedure A). Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard. Provide stainless steel finishes where specified.

2.04 CONDUCTORS, CONNECTORS, AND SPLICES

- A. Conductors shall be as specified in SECTION 16120 WIRE AND CABLE.
- B. Connectors and splices shall be of copper alloys for copper conductors, aluminum alloys for aluminum-composition conductors, and a type designed to minimize galvanic corrosion for copper to aluminum-composition conductors. Aluminum-composition, aluminum-composition to copper, and copper-to-copper shall be RUS approved connectors and splices.

2.05 LOW-VOLTAGE LINES

Aluminum conductor shall be as specified in SECTION 16120 WIRE AND CABLE.

2.06 POLES

Poles shall be of lengths and classes indicated.

- A. Wood poles shall be Douglas Fir, and shall comply with ATIS O5.1, and shall be pressure treated in accordance with AWPA C4, with oil-borne preservatives and petroleum conforming to AWPA P8 and AWPA P9, respectively, and waterborne preservatives conforming to AWPA P5. Waterborne preservatives shall be either chromated or ammoniacal copper arsenate. Wood poles shall have pole markings located approximately 10 feet from pole butts for poles 50 feet or less in length, and 14 feet from the pole butts for poles longer than 55 feet in length. Poles shall be machine trimmed by turning smooth full length, and shall be roofed, gained, and bored prior to pressure treatment. Where poles are not provided with factory-cut gains, metal gain plates shall be provided.

2.07 POLE LINE HARDWARE

All pole line hardware shall be approved for installation on RUS borrower systems.

2.08 GUYS AND ANCHORS

Guy assemblies shall be zinc-coated steel in accordance with ASTM A 475. Guy assemblies, including insulators and attachments, shall provide a strength exceeding the required guy strength. Three-eye thimbles shall be provided on anchor rods to permit attachment of individual primary, secondary, and communication down guys. Anchors shall provide adequate strength to support all loads. Guy strand shall be 7 strand. Guy material shall be Class A zinc-coated-steel extra-high-strength grade, with a minimum breaking strength not less than 15,000 pounds. Guy marker shall be not less than 8 feet in length by 1-1/4 inch in diameter.

2.09 INSULATORS

Insulators shall comply with NEMA HV 2 for general requirements. Suspension insulators shall be used at corners, large angles, dead-ends, other areas where line insulators do not provide adequate strength, and as indicated. Mechanical strength of suspension insulators and hardware shall exceed the rated breaking strength of the attached conductors.

A. Medium-voltage line insulators shall be as indicated.

2.10 CROSSARM ASSEMBLIES

Crossarms shall comply with RUS Bull 1728H-701 and shall be solid wood, distribution type. Cross-sectional area minimum dimensions shall be as noted in specifications and drawings. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment. Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators.

2.11 FUSES, MEDIUM-VOLTAGE

Medium-voltage fuses and cutouts shall be of the loadbreak type construction rated 15 kV and of the heavy-duty type. Open-link cut-outs are not acceptable. Fuses shall be dropout type. Fuse ratings shall be as indicated. Fuse cutouts shall be equipped with mounting brackets suitable for the indicated installations.

2.12 GROUNDING AND BONDING

A. Driven ground rods shall be of copper-clad steel conforming to UL 467 not less than 5/8 inch in diameter by 8 feet in length and driven full length into the earth.

B. Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable. Vertical pole ground

shall be #6 bare solid copper and equipment grounding jumpers shall be #6 or #4 bare or stranded copper, or the grounding strap provided.

2.13 POLE MOUNTED TRANSFORMERS

Single-Phase Overhead Distribution Transformers: Submittals data to include: Core losses, winding losses, and percent impedance. Ermco, Howard, ABB, or approved equal, as specified.

- A. Provide single-phase overhead distribution transformers with kVA ratings as indicated on the drawings.
- B. The primary voltage shall be 7200V/12470VGrdY and the basic insulation level (BIL) shall be 95 kV. Two high-voltage bushings provided shall be:
 - 1. Terminals: Tin plated, 5/16" opening to accommodate #8 solid to #2 stranded
 - 2. BIL Withstand (kV): 95
 - 3. Creepage Distance: 10.5 +/-0.5 inches
 - 4. 60-Hz Dry 1-minute Withstand (kV): 35
 - 5. 60-Hz Wet 10-second Withstand (kV): 30
- C. The secondary voltage shall be 120/240 (3 Bushings) and the the BIL shall be 30 KV; no taps. The internal secondary leads shall be permanently embossed with the letters A, B, C, and D per ANSI C57.12.00 and C57.12.20. Low voltage bushings provided shall be:
 - 1. Terminals: Tin plated, 5/8" opening to accommodate #6 solid to 4/0 stranded
 - 2. BIL Withstand (kV): 30
 - 3. Creepage Distance: per IEEE
 - 4. 60-Hz Dry 1-minute Withstand (kV): 10
 - 5. 60-Hz Wet 10-second Withstand (kV): 6
- D. Amorphous core, vacuum processed, grain-oriented silicon steel core with insulated coils.
- E. Stainless constructed. Stainless steel: tank, cover, and cover ring loop. Cover ring loop bolt to be stainless steel or bronze. A bronze cover ring nut shall also be provided to eliminate corrosion problems and avoid galling. Tank shall have a stainless steel or an anodized aluminum engraved nameplate per ANSI C57.12.00, nameplate A. Tank shall include two grounding provisions, two ANSI support lugs (hanger brackets) and lift lugs.
- F. Tank shall have recessed bottom, internal oil level mark per Secion 7.2.3 of ANSI C57.12.20, and pressure relief device, with venting and sealing characteristics:

1. Cracking pressure: 10psig +/-2psig
 2. Resealing pressure: 6psig min.
 3. Zero leakage from reseal pressure to -8psig
 4. Flow at 15psig: 35 SCFM min.
- G. No overcurrent protection is required with the transformer.
- H. Finish: Transformer shall be painted Munsell Notation 5BG7.0/0.4, ANSI 70 Gray. The coating system shall meet or exceed ANSI C57.12.31 coating system requirements for pole-mount equipment.
- I. Production Testing: All transformer units shall be tested for the following:
1. No-Load (85°C or 20°C) losses at rated current
 2. Total (85°C) losses at rated current
 3. Percent Impedance (85°C) at rated current
 4. Excitation current (100% voltage) test
 5. Winding resistance measurement tests
 6. Ratio tests using all tap settings
 7. Polarity and phase relation tests
 8. Induced potential tests
 9. Full wave wave impulse test
- J. Accessories include: stainless steel hardware, stainless steel cover band, tank ground connector, and ground strap.
- K. Shipping: The unit shall be sufficiently banded or blocked to a suitable wood pallet.
- L. Service: Manufacturer shall have regional service centers with service personnel factory trained in commissioning and routine service of specified transformers.

Insulated trainer brackets shall be used at pole transformers to secure secondary multiplex cable leads to prevent chafing due to wind movement.

Transformers internally wired for 120 Volt secondary (G312 detail) shall be labeled "120V" with reflective tags, 2.5" minimum height.

2.14 POLE RISERS

- A. Unistrut standoff brackets shall be used on all riser poles to attach the riser conduit to the pole.
- B. The first ten feet of all risers shall be rigid metal conduit. Schedule 40 PVC conduit may be used for the remaining length above the rigid metal conduit.
- C. The clearance between the lowest standoff bracket and the next bracket up must

be a minimum of 8'-6" to meet NESC rule 217A2c.

2.15 CONDUIT

All liquid-tite metal flex conduit shall be terminated with insulated throat bushings and properly grounded according to the specification drawings.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. 12.5/7.2 kV line construction shall conform to REA/RUS Bulletin 50-3 (Standard D-804) Specifications and Drawings, with supplementary requirements as specified. All construction work shall be done in a thorough and workman-like manner in accordance with the staking sheets, plans and specifications, and the construction drawings.

- A. Conformance to Codes: The installation shall comply with the requirements and recommendations of the latest edition of IEEE C2 (NESC) for heavy loading districts, Grade C construction. No reduction in clearance shall be made. The installation shall also comply with the applicable parts of NFPA 70.
- B. Verification of Dimensions: The Subcontractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the Engineer of any discrepancy before performing any work.

3.02 POLE INSTALLATION

- A. Electric poles for overhead electric lines shall be wood poles, many utilizing crossarm construction. Pole equipment mounts shall be as indicated on drawings.
- B. Distributing Poles: In distributing the poles, large, choice, close-grained poles shall be used for transformers, deadend, angle, and corner poles.
- C. Wood Pole Setting

Wood poles shall be set straight and firm. In normal firm ground, minimum pole-setting depths shall be as listed below. Poles in straight runs shall be in a straight line. Curved poles shall be placed with curvatures in the direction of the pole line. Poles shall be set to maintain as even a grade as practicable. When the average ground run is level, consecutive poles shall not vary more than 5 feet in height. When the ground is uneven, poles differing in length shall be kept to a minimum by locating poles to avoid the highest and lowest ground points. If it becomes necessary to shorten a pole, a piece shall be sawed off the top end and

roofed. If any pole is shortened after treatment, the shortened end of the pole shall be given a heavy application of copper naphthenate. Where poles are set on hilly terrain, along edges of cuts or embankments, or where soil may be washed out, special precautions shall be taken to ensure durable pole foundations, and the setting depth shall be measured from the lower side of the slope at the pole. Holes shall be dug large enough to permit proper use of tampers to the full depth of a hole. Earth shall be placed into the hole in 6 inch maximum layers, then thoroughly tamped before the next layer is placed. Pole backfill shall be thoroughly tamped the full depth. Surplus earth shall be placed around each pole in a conical shape and packed tightly to drain water away from poles.

MINIMUM POLE-SETTING DEPTH (FEET)

<u>Length</u> <u>Overall</u> <u>Feet</u>	<u>Pole</u> <u>Setting</u> <u>Depth</u>
25	6.0
30	6.0
35	6.5
40	7.0
45	7.5
50	8.0
55	8.5

Poles shall be set so that alternate crossarm gains face in opposite directions, except at terminals and deadends where the gains of the last two (2) poles shall be on the side facing the terminal or deadend. On unusually long spans, the poles shall be set so that the crossarm comes on the side of the pole away from the long span. Where pole top pins are used, they shall be on the opposite side of the pole from the gain, with the flat side against the pole.

Poles shall be set in alignment and plumb except at corners, terminals, angles, junctions, or other points of strain, where they shall be set and raked against the strain so that the conductors shall be in line. Vertical angle structures (A3, B3, C3) shall be offset from centerline by the length of the insulator string hardware, to prevent adjacent poles from leaning into the angle.

Poles shall be raked against the conductor strain not less than one inch for each ten feet of pole length, but not more than two inches for each ten feet of pole length after conductors are installed at the required tension.

3.03 CROSSARM MOUNTING

Crossarms shall be bolted to poles as indicated on drawings, and shall be provided with crossarm braces as indicated on drawings. Double crossarms shall be securely held in position by means of double-arming bolts as indicated on drawings. Each double-arming bolt shall be equipped with four nuts and four square washers.

Pole tap assemblies shall be framed so that the source is on top and the load (tap) is below.

- A. Line Arms and Buck Arms: Line arms and buck arms shall be set at right angles to lines for straight runs and for angles 10 degrees and greater; and line arms shall bisect angles of turns of less than 10 degrees. Dead-end assemblies shall be used for turns where shown. Buckarms shall be installed, as shown, at corners and junction poles. Deadends shall utilize manufactured deadend assemblies as indicated in drawings.
- B. Equipment Arms: Equipment arms shall be set parallel or at right angles to lines as required to provide climbing space. Equipment arms shall be located below line construction to provide necessary wire and equipment clearances.

3.04 LOCKNUTS

Locknut shall be installed with each nut, eyenut or other fastener on all bolts or threaded hardware such as insulator pins, upset bolts, double arming bolts, etc.

3.05 GUY INSTALLATION

Guys shall be provided where shown, with loads and strengths as indicated, and wherever conductor tensions are not balanced, such as at angles, corners, and dead-ends. Where a single guy will not provide the required strength, two or more guys shall be provided. Approved guy grips shall be provided at each guy terminal. Orange, yellow, or orange and yellow polyvinyl, plastic guy marker, not less than 8 feet in length, shall be provided at the anchor end of each guy shown, securely clamped to the guy or anchor at the bottom and/or top of the marker. Holding capacities for down guys shall be based on a lead angle as indicated.

Guys shall be placed before the conductors are strung and shall be attached to the pole as shown in the construction drawings.

All anchors and rods shall be in line with the strain and shall be so installed that approximately six inches of the rod remain out of the ground. In cultivated fields or other locations, as deemed necessary, the projection of the anchor rod above the earth may be increased to a maximum of 9 inches to prevent burial of the rod eye. The backfill of all anchor holes must be thoroughly tamped the full depth.

Guy bonding clamps shall be installed in the eyes of all anchor rods. All guys (primary and secondary) shall be effectively grounded according to REA/RUS specifications. On secondary poles, guys shall be bonded to the secondary neutral.

All anchors shall consist of 24" plate anchors buried to proper depth in line with the strain; or screw anchors as specified on drawings and staking sheets. A 1:1 guy height to lead ratio

shall be provided wherever possible, with a minimum allowable lead of 2:1 high to lead ratio, unless otherwise specified.

3.6 CONDUCTOR INSTALLATION

A. Line Conductors

Unless otherwise indicated, conductors shall be installed in accordance with manufacturer's approved tables of sags and tensions. Proper care shall be taken in handling and stringing conductors to avoid abrasions, sharp bends, cuts, kinks, or any possibility of damage to insulation or conductors. Conductors shall not be trampled on nor run over by vehicles. Each reel shall be examined and the wire shall be inspected for cuts, kinks, or other injuries. Injured portions shall be cut out and the conductor spliced. Conductors shall be paid out with the free end of conductors fixed and cable reels portable, except where terrain or obstructions make this method unfeasible. Bend radius for any insulated conductor shall not be less than the applicable NEMA specification recommendation. Conductors shall not be drawn over rough or rocky ground, nor around sharp bends. The conductors shall be pulled over suitable rollers or stringing blocks properly mounted on pole or crossarm if necessary to prevent binding while stringing. When installed by machine power, conductors shall be drawn from a mounted reel through stringing sheaves in straight lines clear of obstructions. Initial sag and tension shall be checked by the Subcontractor, in accordance with the manufacturer's approved sag and tension charts, within an elapsed time after installation as recommended by the manufacturer. The neutral conductor shall be installed on the road side of the pole for tangent construction and for angles not exceeding 30 degrees. For line angles of 0 to 5 degrees in locations known to be subject to considerable conductor vibration, insulated brackets may be substituted for the single and double upset bolts used for supporting the neutral and secondary conductors.

B. Secondaries and service drops

Secondary conductors shall be multi-conductor service cable. The conductors shall be sagged in accordance with the manufacturer's recommendations.

Conductors for secondary underbuild on primary lines will be insulated in those instances where prevailing conditions may limit primary span lengths to the extent that covered wires or service cables may be used. Service drops shall be multiplex cables as scheduled and specified.

Secondaries and service drops shall be so installed as not to obstruct climbing space. There shall not be more than one splice per conductor in any span, and splicing sleeves shall be located at least ten feet from the conductor support. Where the same covered conductors or service cables are to be used for the secondary and service drop, they may be installed in one continuous run.

- #4 Service drops over 140' in length shall be solidly guyed.
- #2 Service drops over 100' in length shall be solidly guyed.

Install a wrap of tape around multi-plex cable at ends, to prevent further unraveling. Where multi-plex cable is open-ended, fold leads back and tape to mainline. Also tape the rough edges of pre-formed grips to protect the insulated leads from abrasion caused by wind vibration.

Unless otherwise noted: provide #2 triplex for service entrances up to 200 amp utilizing #2/0 copper; #1/0 triplex to be provided where noted, and for service entrances 200 amp or greater, utilizing large resistive cooking equipment or large resistive water heaters and clothes dryers.

Where both 240/120 volt 1-phase and a 3-phase or higher voltage (120/208 or 480 volt) secondary are to be installed, the higher voltage circuit shall be attached at least 16" above the lower voltage circuit (up to 4/0 quadruplex over 1/0 triplex, 200' maximum span).

C. Phasing Convention

Multi-phase riser cables shall be color coded at terminators to indicate corresponding phase at the URD source/load as applicable, as follows: A ϕ = RED, B ϕ = BLUE, C ϕ = YELLOW.

Distribution A ϕ shall always be at the top or at the extreme left, when viewed facing the load, with power source at your back.

D. Connectors and Splices

Connectors and splices shall be mechanically and electrically secure under tension and shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors shall be noncorrosive and shall not adversely affect conductors.

All conductors shall be cleaned thoroughly by wire brushing before splicing or installing connectors or clamps. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer.

Primary line apparatus taps shall be by means of hot line clamps attached to compression type bail clamps (stirrups), or as indicated on the drawings. On all hot-line clamp installations, the clamp and jumper shall be so installed so that

they are permanently bonded to the load side of the line, allowing the jumper to be de-energized when the clamp is disconnected. Hot line clamps shall not be used to connect a URD feeder source to the overhead distribution lines, such as at plant riser poles. Compression connectors shall be used in those circumstances.

Inhibitor compound shall be used in all mechanical (setscrew) connections at secondary connections at the polemount transformers.

Low-voltage connectors for copper conductors shall be of the solderless pressure type. Noninsulated connectors shall be smoothly covered and taped with RUS approved covers to provide insulation equivalent to the original insulation, when installed on insulated conductors. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper, and the connections shall be made with an approved "H" type compression top connector. All scrap cable shall be discarded properly. Conductors shall be spliced and dead-ended as shown on the construction drawings. There shall be not more than one splice per conductor in any span and splicing sleeves shall be located at least ten feet from the conductor support. No splices shall be located in grade B crossing spans and preferably not in the adjacent spans. Splices shall be installed in accordance with the manufacturer's recommendations.

E. Taps and jumpers

Jumpers and other leads connected to line conductors shall have sufficient slack to allow free movement of the conductors. Where slack is not shown on the construction drawings it will be provided by at least two (2) bends in a vertical plane, or one (1) in a horizontal plane, or the equivalent. In areas where aeolian vibration occurs, special measures to minimize the effects of jumper breaks shall be used as specified.

All leads on equipment such as transformers, reclosers, etc., shall be a minimum of #6 copper conductivity. Where aluminum jumpers are used, a connection to an unplated bronze terminal shall be made by splicing a short stub of copper to the aluminum jumper using a suitable aluminum compression sleeve.

All primary jumpering shall consist of #2 ACSR. Use AL main/AL tap rated clamp for ACSR jumpering.

F. Conductor-To-Insulator Attachments

Conductors shall be attached to insulators by means of factory formed wire ties for securing conductors to pin and spool insulation. At all pin and spool conductor attachments armor rods shall be provided.

G. Armor Rods/Line Guards

Armor rods shall be provided for AAC, AAAC, and ACSR conductors. Armor rods shall be installed at supports on all primary and neutral conductors, except at primary dead-end assemblies if aluminum or aluminum-lined zinc-coated steel clamps are used. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. Hot line clamps shall be installed over armor rods, or on stirrups, as specified.

H. Low-Voltage Insulated Cables

Low-voltage cables shall be supported on clevis fittings using spool insulators. Clevis attachments shall be provided with not less than 5/8 inch through-bolts.

I. Conductor Ties

Ties shall be in accordance with construction drawings and applied per manufacturer's recommendations. Hot-line ties shall not be used at grade "B" crossings. All primary ties will be of the factory-formed type.

J. Sagging of conductors

Conductors shall be sagged in accordance with the conductor manufacturer's recommendations. All conductors shall be sagged evenly. The air temperature at the time and place of sagging shall be determined by a certified etched glass thermometer.

The sag of all conductors after stringing shall be in accordance with the conductor manufacturer's recommendations, except that maximum increase of three inches of the specified sag in any span will be acceptable. However, under no circumstances will a decrease in the specified sag be allowed.

Maximum unbalanced conductor tension on dead-end crossarm assemblies such as A7 and C7 is 1000 lbs./conductor, or 2,200 lbs./conductor for A7-1 and VC7-1.

3.07 CONNECTIONS TO UTILITY LINES

The Contractor shall coordinate the work with the local utility and shall provide for final connections to the electric lines.

3.08 GROUNDING

Noncurrent-carrying metal parts of equipment and conductor assemblies, such as luminaires, medium-voltage cable terminations and messengers, metal poles, operating mechanisms of noncurrent-carrying metal items shall be grounded. Additional grounding of equipment, neutral, and surge arrester grounding systems shall be installed at poles where indicated.

A. Grounding Electrodes

Driven rod electrodes - Unless otherwise indicated, ground rods shall be located not less than 2 feet out from base of the pole and shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade.

B. Grounding and Bonding Connections

Connections above grade shall be made by the fusion-welding process, compression connection, or with bolted solderless connectors in compliance with UL 467, and those below grade shall be made by a fusion-welding process or compression connectors. Mechanical (bolted RUS approve) ground rod connectors are acceptable. Where grounding conductors are connected to aluminum-composition conductors, specially treated or lined copper-to-aluminum connectors suitable for this purpose shall be used.

C. Grounding Electrode Conductors

On multi-grounded circuits, as defined in IEEE C2 (NESC), provide a single continuous vertical grounding electrode conductor. Neutrals, surge arresters, and equipment grounding conductors shall be bonded to this conductor. Grounding electrode conductors shall be sized as shown. Secondary system neutral conductors shall be connected directly to the transformer neutral bushings on transformer poles. All equipment shall have at least two connections from the frame, case or tank to the multi-grounded neutral conductor. The equipment ground, neutral wires and any lightning-protective equipment shall be interconnected and attached to a common ground wire.

Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet, except for the top and bottom 8 feet where the staples shall be at intervals not less than 6 inches. The primary neutral shall have a ground connection at least every 1,320 ft/402 m, and preferably every 1,056 ft. (ref.REA/RUS Bul.83-1).

3.09 FACTORY TESTING

Transformers: Certification of Production Line Impulse Test

3.10 FIELD TESTING

A. General

The Contractor shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer unless specifically waived by the Engineer. The Contractor shall maintain a written record of tests which includes date, test performed,

personnel involved, devices tested, serial number and name of test equipment, and test results. Field reports will be signed and dated by the Contractor.

B. Sag and Tension Test

The Engineer shall be given prior notice of the time schedule for stringing conductors or cables serving overhead circuits and reserves the right, at the request of the Owner, to witness the procedures used for ascertaining that initial stringing sags and tensions are in compliance with requirements for the applicable loading district and cable weight. Engineer will provide sag charts in lieu of using manufacturer's data.

3.11 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

END OF SECTION 16300

SECTION 16400
ELECTRICAL DISTRIBUTION SYSTEM, UNDERGROUND

PART 1 GENERAL

1.01 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI C42.100 Standard Dictionary of Electrical and Electronics Terms

ASTM INTERNATIONAL (ASTM)

ASTM A 123/A 123M Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM D 923 Sampling Electrical Insulating Liquids

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE C2 National Electrical Safety Code

IEEE Std 386 Separable Insulated Connector Systems for Power Distribution Systems Above 600V

IEEE Std 399 Recommended Practice for Power Systems Analysis - Brown Book

IEEE Std 81 Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1) Normal Measurements

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA AB 1 Molded-Case Circuit Breakers, Molded Case Switches, and Circuit-Breaker Enclosures

NEMA LA 1 Surge Arresters

NEMA SG 6 Power Switching Equipment

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 467 Grounding and Bonding Equipment

- UL 489 Molded-Case Circuit Breakers, Molded-Case Switches, and
Circuit-Breaker Enclosures
- UL 6 Rigid Metal Conduit

1.02 GENERAL REQUIREMENTS

- A. Terminology used in this specification is as defined in ANSI C42.100.

1.03 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTALS:

- A. Product Data: Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents for the products listed in Part 2. Where materials or equipment are specified to conform to the standards of the UL, ANSI, IEEE, or NEMA, the label of, listing by, certification, or a published catalog specification data statement, to the effect that the item is in accordance with the referenced standard, will be acceptable as evidence that the item conforms. Separate certification is not required.
- B. Installation Requirements: Provide installation procedures for splices, cable pulling plans, diagrams, instructions, and precautions required to install, adjust, calibrate, and test the devices and equipment.
- C. Test Reports: Field Testing; See Part 3 paragraph "Field Testing."
- D. Operations and Maintenance Data: Operation and Maintenance manual for the electrical distribution system (combined with Section 16300, Electrical Distribution Systems, Aerial) shall include as-built layout drawing showing underground cable routing and above ground equipment as installed, operation and maintenance instructions, spare parts data which provides supplier name, current cost, catalog order number, a recommended list of spare parts to be stocked, and routine maintenance requirements. Documents shall be bound in a binder marked or identified on the spine and front cover. A table of contents page shall be included and marked with pertinent contract information and contents of the manual. Tabs shall be provided to separate different types of documents, such as catalog ordering information, drawings, instructions, and spare-parts data.
- E. As-Built Drawings: The Contractor shall submit the as-built drawings as a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, dimensions, part identification, and other information. Additional sheets may be added. Upon completion of the

work, the Contractor shall submit full sized sets of the marked prints to the Engineer to incorporate into the digital drawing file.

1.04 DELIVERY, STORAGE, AND HANDLING

See Section 01610 DELIVERY, STORAGE, AND HANDLING. Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced.

1.05 EXTRA MATERIALS

Where additional materials have been provided, such as conduit, enclosures, cable, etc., these shall be delivered to the Owner when the electrical system is accepted. Two complete sets of all special tools required for maintenance shall be provided, complete with a suitable tool box. Special tools are those that only the manufacturer provides, for special purposes (to access compartments, or operate, adjust, or maintain special parts).

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. See Section 01640 AUTHORITY FURNISHED PRODUCTS. The specified items have been procured under separate contract. If in the course of the project it becomes necessary to procure additional materials, the Contractor shall provide the identical units provided by the Authority, but will not be required to provide submittals for those identical units. If identical units can not be procured, Contractor shall provide products as specified and shall follow all submittal procedures. Provide products as indicated in staking sheets and on the drawings:

1. Cable
2. Secondary Pedestals
3. Connectors
4. Conduit & Ducts
5. Ground Rods

2.02 CORROSION PROTECTION

A. Ferrous Metal Materials

1. Hardware: Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A 153/A 153M and ASTM A 123/A 123M or stainless steel.

2. Equipment and component items shall be provided with corrosion-resistant finishes. Cut edges or otherwise damaged surfaces of hot-dip galvanized sheet steel or mill galvanized sheet steel shall be coated with a zinc rich paint conforming to the manufacturer's standard.

2.03 CABLES

Cables shall be as specified in SECTION 16120 WIRE AND CABLE

2.04 SECONDARY PEDESTALS

Provide fiberglass secondary pedestals as scheduled and detailed.

2.05 CABLE JOINTS, TERMINATIONS, AND CONNECTORS

Low-voltage cable terminations shall be rated at not less than 600 Volts. Low-voltage cable splices shall not be allowed.

2.06 CONDUIT AND DUCTS

1. Metallic conduit shall be rigid galvanized steel (RGS).
2. Nonmetallic Ducts shall be HDPE Schedule 40.

2.07 GROUNDING AND BONDING

1. Driven Ground Rods: ground rods shall be copper-clad steel conforming to UL 467 not less than 5/8 inch in diameter by 8 feet in length. Sectional type rods may be used.
2. Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated grounding conductors shall be as specified in SECTION 16120 WIRE AND CABLE

PART 3 EXECUTION

3.01 INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions. Circuits installed aerially shall conform to the requirements of SECTION 16300 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL.

- A. Conformance to Codes

The installation shall comply with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable.

B. Verification of Dimensions

The Contractor shall become familiar with details of the work, shall verify dimensions in the field, and shall advise the Designer of Record of any discrepancy before performing any work.

C. Disposal of Liquid Dielectrics

PCB-contaminated dielectrics must be marked as PCB and transported to and incinerated by an approved EPA waste disposal facility. The Contractor shall furnish certification of proper disposal. Contaminated dielectrics shall not be diluted to lower the contamination level.

3.02 CABLE INSTALLATION

The Contractor shall obtain from the manufacturer an installation manual or set of instructions which addresses such aspects as cable construction, insulation type, cable diameter, bending radius, cable temperature, lubricants, coefficient of friction, conduit cleaning, storage procedures, moisture seals, testing for and purging moisture, etc.

A. Cable Installation Plan and Procedure

Cable shall be installed strictly in accordance with the cable manufacturer's recommendations. Each circuit shall be identified by means of a fiber, laminated plastic, or non-ferrous metal tags, or approved equal, at riser poles, pedestals, and service entrances. Each tag shall contain the following information: cable destination, and phase identification (for 3-phase circuits).

1. Cable Inspection

The cable reel shall be inspected for correct storage positions, signs of physical damage, and broken end seals. If end seal is broken, moisture shall be removed from cable in accordance with the cable manufacturer's recommendations.

2. Cable Installation

The Contractor shall provide a cable feeding truck and a cable pulling winch as required. The Contractor shall provide a pulling grip or pulling eye in accordance with cable manufacturer's recommendations. The pulling grip or pulling eye apparatus shall be attached to polypropylene or manila rope followed by lubricant front end packs and then by power cables. Pulling tension shall not exceed cable manufacturer's

recommendations. The Contractor shall not allow cables to cross over while cables are being fed into duct. For cable installation in cold weather, cables shall be kept at (10 degrees C) 50 degrees F temperature for at least 24 hours before installation.

3. Low-Voltage Cable Splices and Joints

Secondary cables shall not be spliced. Secondary joints are only allowed within pedestals.

B. Trenching

Trenches for direct-burial cable shall be excavated to depths required to provide the minimum necessary cable cover. Bottoms of trenches shall be smooth and free of stones and sharp objects. Where bottoms of trenches comprise materials other than materials free of stones or sharp objects, a 3 inch layer of sand shall be laid first and compacted to approximate densities of surrounding firm soil.

C. Buried Cable Marking Tape

A 5 mil brightly colored plastic tape, not less than 6 inches in width and continuously inscribed indicating buried electrical utility, placed approximately 12" inches below finished grade levels, above cables.

3.03 DUCT LINES

A. Requirements

Numbers and sizes of ducts shall be as indicated. The minimum manufactured duct bend radius shall be 36 inches for ducts of less than 3 inch diameter, and 60 inches for ducts 3 inches or greater in diameter. Straight sections may be used to form long sweep bends.

B. Treatment

Ducts shall be kept clean of concrete, dirt, or foreign substances during construction. Field cuts requiring tapers shall be made with proper tools and match factory tapers. A coupling recommended by the duct manufacturer shall be used whenever an existing duct is connected to a duct of different material or shape. Ducts shall be stored to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Ducts shall be thoroughly cleaned before being laid. Plastic ducts shall be stored on a flat surface and protected from the direct rays of the sun.

C. Duct Cleaning

Duct shall be cleaned with an assembly that consists of a flexible mandrel that is 1/4 inch less than inside diameter of duct, 2 wire brushes, and a rag, as required. The cleaning assembly shall be pulled through conduit until less than a volume of 3 cubic inches of debris is expelled from the duct.

D. Duct Lubrication

The cable lubricant shall be compatible with the cable jacket for cable that is being installed. Application of lubricant shall be in accordance with lubricant manufacturer's recommendations.

E. Installation of Couplings

Joints in each type of duct shall be made up in accordance with the manufacturer's recommendations for the particular type of duct and coupling selected. HDPE plastic duct joints shall be made by electrofusion welded connectors, thermal welding, or approved non-magnetic connectors.

F. Trenching

Trenches for direct-burial ducts shall be excavated to depths required to provide the minimum necessary cable cover. Bottoms of trenches shall be smooth and free of stones and sharp objects. Where bottoms of trenches comprise materials other than materials free of stones or sharp objects, a 3 inch layer of sand shall be laid first and compacted to approximate densities of surrounding firm soil.

G. Nonencased Direct-Burial Ducts

Top of duct lines shall be not less than 48 inches below finished grade.

H. Duct Line Markers

A 5 mil brightly colored plastic tape, not less than 6 inches in width and continuously inscribed indicating buried electrical utility, placed approximately 12" inches below finished grade levels, above each duct bank.

3.04 CONNECTIONS BETWEEN AERIAL AND UNDERGROUND SYSTEMS

Connections between aerial and underground systems shall be made as shown. Underground cables shall be extended up poles in conduit to transformer secondary bushings. Conduits shall be installed on stand-off brackets spaced not more than 10 feet apart and within 12 inches of bends or terminations, secured to the brackets by galvanized steel pipe straps. Pole installation shall be in accordance with SECTION 16300 ELECTRICAL DISTRIBUTION SYSTEM, AERIAL.

3.05 CONNECTIONS TO RIGID GALVANIZED STEEL CONDUIT ELBOWS

Connection between HDPE conduit and RGS conduit sweeps at riser poles: Rigid steel elbows are to be connected to the ridged steel conduit of the riser with a rigid steel coupling. The rigid steel elbows are to be connected to the HDPE duct with a Shurlock connector.

A. Grounding Electrodes

Unless otherwise indicated, driven ground rod electrodes shall be installed as shown on the drawings and as follows: shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade.

B. Grounding and Bonding Connections

Connections shall be made by the fusion-welding process, compression connectors or with bolted solderless connectors, in compliance with UL 467.

C. Grounding and Bonding Conductors

Grounding and bonding conductors include conductors used to bond transformer enclosures and equipment frames to the grounding electrode system. Grounding and bonding conductors shall be sized as shown, and located to provide maximum physical protection. Routing of ground conductors through concrete shall be avoided. When concrete penetration is necessary, nonmetallic conduit shall be cast flush with the points of concrete entrance and exit so as to provide an opening for the ground conductor and the opening shall be sealed with a suitable compound after installation.

D. Riser Pole Grounding

A single continuous vertical grounding electrode conductor shall be installed on each riser pole and connected directly to the grounding electrodes indicated on the drawings or required by these specifications. All equipment, neutrals, surge arresters, and items required to be grounded shall be connected directly to this vertical conductor. The grounding electrode conductor shall be sized as shown. Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet, except for the top 8 feet and bottom 8 feet where it shall be stapled at intervals not exceeding 6 inches.

3.06 FIELD TESTING

Contractor shall confirm correct voltage at: secondary pedestals and at service entrances.

3.07 ACCEPTANCE

Final acceptance of the facility will not be given until the Contractor has successfully completed all tests and after all defects in installation, material or operation have been corrected.

END OF SECTION 16400