Chugach Electric Association, Inc. **Via e-mail**
INVITATION TO BID
March 23, 2023

TO: Chugach Electric Association, Inc., 2022-2023 Outside Electrical Line Construction Contract Contractors

You are invited to submit a Bid for Chugach Work Order P1700073, Plant 1 Breaker Changeout.

This project will replace six 115kV oil breakers in the Plant 1 Switchyard with six SF6 gas breakers on the existing foundations. New control cables will be pulled into the existing conduit system to support these new breakers. Additionally, the AC station service will be upgraded. This station service upgrade will consist of an additional distribution transformer fed from the 35kV part of the yard, an upgraded distribution transformer fed from Sub 10, a new transfer switch, and a new AC panel.

This project is subject to the union signatory sections of Chugach's Outside or Generation Agreements contained in Exhibit N of the 2022-2023 Outside Electrical Line Construction Contract.

Contractors are not required to be signatory to a current collective bargaining agreement with IBEW Local 1547 in order to bid on the project. The signatory requirement only becomes applicable to the successful bidder once a contract is awarded. The successful bidder can comply by either establishing that; 1) it is signatory to a current collective bargaining agreement with IBEW Local 1547; 2) by executing a collective bargaining agreement with IBEW Local 1547, or 3) by executing an agreement with IBEW Local 1547 to comply with the terms and conditions set forth in the most current agreement between IBEW Local 1547 and the Alaska Chapter National Electrical Contractors Association, Inc. If the successful bidder elects the third option, the agreement will be limited to the scope of the work and duration of the project.

Please base your bids on the following conditions:

- All Contractor bids must be valid until 5:00 pm on May 20, 2023. After that time, the Contractor shall have the option of retracting its bid. Projects awarded as late as and including the last day the Contractor's bids are valid are not subject to contractor claim for delay of award.
- Contractor shall begin work within seven (7) calendar days of Notice to Proceed.
- Completion date for this project is August 23, 2023.
- No clearing is anticipated for this project.
- As-built drawings are required.
- Liquidated damages in the amount $1,000.00 per day shall apply if the Contractor fails to meet the required completion date.

- A Bid Bond is required. A Bid Bond in the amount of 10% of the Bid shall be provided with the Bid documents. A certified check made payable to "Chugach Electric Association, Inc." may be substituted for the Bid Bond.

- Written releases of liens are required.

A Pre-Bid Conference is scheduled for 10:00 A.M. Anchorage time, March 29th , 2023 at Chugach North Campus Building N1 in the North Girdwood Conference room. Contractor representation and attendance of this Pre-Bid Conference is mandatory. A site visit to Plant 1 will immediately follow the Pre-Bid Conference meeting, please bring appropriate PPE.

RFB documentation is available on Chugach's website at www.chugachelectric.com, under Inside Chugach, Bid Opportunities tab. Contractors can access the RFB documentation under the "View advertisement and associated documents" button in WO P1700073.

All bids are to be delivered either in person at Chugach's North Campus Building N1 at the front desk, 1200 E. 1st Ave, Anchorage, Alaska or submitted by email To: Jesse_Moe@chugachelectric.com CC: Marge_Wisthoff@chugachelectric.com and must be received prior to 2:00 P.M. Anchorage time, April 20, 2023.

Notice to Proceed shall not be issued until Chugach has received (1) all bonds required by this Invitation to Bid (ITB) in the required amounts and forms and properly executed by the appropriate individuals, (2) a site specific HSE plan, (3) all documentation required in the Bid Documents including insurance certificates, proof of builder's risk insurance, and an MS Project based schedule. The contract time allowed for completion of this contract shall not be extended or suspended by any delay by Contractor in providing these documents necessary for the Notice to Proceed to be issued. If the total amount of the winning bid should exceed $2,000,000.00, the NTP will be delayed pending Chugach Electric Association's Board Approval.

No work shall begin until the successful Bidder has been issued a written Notice to Proceed.

A Pre-Construction Conference will be required. Construction progress meetings will be held. Frequency and schedule of Construction Progress Meetings will be determined based on construction activity.

All work shall be performed in compliance with all applicable local, state and federal ordinances, orders, statutes, rules and regulations.

The Contractor shall furnish all material required for the project that is not indicated on Chugach's material issue form. Chugach must approve all Contractor-furnished material prior to installation.

The Contractor shall secure locates and assume responsibility for damage to any and all overhead and underground facilities.

Construction of this project will involve work on or around energized equipment. Outages will be granted based on the outage schedule contained in Section 3.2 in the Special Provisions of the Bid Documents.

Outages will be subject to advanced coordination/notification and Chugach electrical system requirements in effect for the time period the outage is requested. Outages are subject to system conditions.

Contractor shall take delivery of all available materials within seven (7) days of Notice to Proceed, excluding the breakers.

Contractor's workmanship shall be warrantied for two (2) years following Chugach acceptance of the project completion documentation.

The Contractor will not energize new or existing primary facilities in the absence of Chugach's Site Representative unless advanced written approval is secured from Chugach.

Payment for Contractor work is accomplished through use of a Construction Completion Report prepared by Chugach's Site Representative and signed off by the Contractor's representative. Total payment is made on actual units completed not on estimated units stated in the Bid Documents unless otherwise stated in writing. Chugach has no obligation to subsequently reconcile or assist in reconciling the Contractor's billing records.

Chugach reserves the right to define and waive irregularities, to accept or reject any or all proposals/bids, in whole or in part, and to reissue, withdraw or cancel the solicitation/project in its entirety for any reason including its subsequent determination to perform the Work in-house without liability of any type to Bidder, including but not limited to any costs associated with Bid preparations and submittal.

All questions regarding the bid documents are to be directed to Chugach's Project Engineer, Jesse Moe, via email jesse_moe@chugachelectric.com. Questions shall be submitted no later than 12:00 PM, April, 7, 2023. Answers to Bidder's questions will be returned no later than 5:00 PM, April 14, 2023.

CHUGACH ELECTRIC ASSOCIATION, INC.

PM Reid

Peyton Reid, PE
Manager, PROJECTS

cc:
W.O. P1700073 File

BID PACKAGE FOR:

PLANT 1 BREAKER CHANGEOUT

W.O. P1700073

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Bid Sheet

WORK ORDER NUMBER: P1700073 CONTRACTOR: _____

LOCATION: Nikkels Plant (Plant 1) Switchyard DATE: March 23, 2023

BIDS ARE DUE PRIOR TO 2:00 P.M: April 20, 2023

This bid is submitted subject to the terms of the 2022-2023 Outside Electrical Line Construction Contract between Chugach Electric Association, Inc. and the undersigned for the above project as set out in the Invitation to Bid.

Project Bid Quotation:

Quotation Expires: May 20, 2023 5 P.M.

Contractor's Alaska License No.: _____

Insurance Expires: _____

Worker's Compensation: _____

Liability: _____

Automobile: _____

Contractor Sell Rate: _____

Contractor Labor Man-Hours: _____

EXCEPTIONS AND QUALIFICATIONS
Exceptions or qualifications taken by the Bidder to any of the documents furnished with this Invitation to Bid or clarifications to the Proposal shall be stated below and, if none, Bidder shall state "NONE".

_____

_____

SUBCONTRACTORS
The Bidder shall indicate below the Work intended to be subcontracted to others.

_____

_____

By Contractor: _____
Dated: _____

BID ACCEPTED SUBJECT TO TERMS AND CONDITIONS OF THE OUTSIDE ELECTRICAL LINE CONSTRUCTION CONTRACT

By Chugach Electric Association, Inc: _____
Dated: _____

PLANT 1 BREAKER CHANGEOUT
BID SCHEDULE
W.O. P1700073

BID UNIT	DESCRIPTION	QTY.	UNIT	UNIT LABOR	UNIT MATERIAL	UNIT LABOR & MATERIAL	EXTENDED PRICE
Group C: CIRCUITS AND BUSWORK							
C1	BUSWORK, RIGID AND FLEXIBLE	1	lot				
C2	MEDIUM VOLTAGE RISER AND ASSOCIATED EQUIPMENT	1	lot				
						Total Group C:	
Group E: CIRCUIT BREAKERS							
E1	CIRCUIT BREAKER, 138KV	6	ea.				
						Total Group E:	
Group F: FOUNDATIONS							
F1	FOUNDATION, 34.5 KV SINGLE PHASE TRANSFORMER PAD	1	ea.				
						Total Group F:	
Group G: METERS, RELAYS, AND INSTRUMENT TRANSFORMERS							
G1	HIGH VOLTAGE BREAKER JUNCTION BOX	6	ea.				
G2	MARSHALLING PANEL	1	ea.				
G3	SECONDARY EQUIPMENT	1	lot				
						Total Group G:	
Group H: TRANSFORMERS							
H1	STATION SERVICE 12.47kV TRANSFORMER	1	ea.				
H2	STATION SERVICE 34.5kV TRANSFORMER	1	ea.				
						Total Group H:	
Group K: CONDUIT AND CABLE							
K1	CONDUIT, 2" RGS	1	lot				
K2	CONDUIT, 4" RGS	1	lot				
K3	CABLE, CONTROL, 600V AC & DC	1	lot				
K4	CABLE, POWER, 600V AC & DC	1	lot				
K5	CABLE, COMMUNICATION	1	lot				
K6	CABLE, 34.5kV	1	lot				
*K7	MANHOUR	150	ea.				
						Total Group K:	

PLANT 1 BREAKER CHANGEOUT
BID SCHEDULE
W.O. P1700073

BID UNIT	DESCRIPTION	QTY.	UNIT	UNIT LABOR	UNIT MATERIAL	UNIT LABOR & MATERIAL	EXTENDED PRICE
Group M: SITE WORK							
M1	GEOTEXTILE FABRIC	1	lot				
M2	CRUSHED ROCK SURFACE COURSE	1	lot				
M3	FINAL GRADE / CLEANUP	1	lot				
M4	SWPPP, ADMINISTRATION AND IMPLEMENTATION	1	lot				
M5	CONTAMINATED SOIL MITIGATION	1	lot				
M6	ASPHALT	1	lot				
*M7	CLASSIFIED FILL	40	ton				
						Total Group M:	
Group O: GROUNDING							
O1	GROUNDING, SUBSTATION	1	lot				
						Total Group O:	
Group I: RETIREMENT							
I-E1	RETIREMENT,CIRCUIT BREAKER 115KV	6	ea.				
I-H1	RETIREMENT, STATION SERVICE TRANSFORMER	1	ea.				
						Total Group I:	

*Note: This unit will be applied only if required and authorized by Chugach. Unit quantity of this bid unit may be increased, decreased, and/or deleted from Contract without adjustments to the unit price.

BID BOND

KNOW ALL MEN BY THESE PRESENT, That we,_____
_____ of
_____
_____as Principal, and _____
_____a corporation organized under the laws of _____
_____ and authorized to transact surety business in the State of Alaska, of_____as Surety, are held and firmly bound unto Chugach Electric Association, Inc., as Obligee in the full and just sum of _____ ($_____) dollars, lawful money of the UNITED STATES, for the payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the said Principal is herewith submitting its proposal for
_____
_____
_____
_____

The condition of this obligation is such that if the aforesaid Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this Obligation to be void; otherwise, the Principal and Surety will pay unto the Obligee the amount stated above.

Signed, sealed, and delivered_____, 20___.
WITNESS AS TO PRINCIPAL:

_____

_____
Signature

_____
Print Name

Principal
By: _____

Title _____

_____(Seal)
Corporate Surety

_____
Business Address

_____

By:_____
Attorney-in-Fact

CONTRACTOR'S BOND **Bond Number: _____**

1. Know all men that we, _____, as Principal, and_____, as Surety, are held and firmly bound unto CHUGACH ELECTRIC ASSOCIATION, INC. (hereinafter "Chugach") and unto all persons, firms and corporations who or which may furnish materials for or perform labor on the Work for the Project known as Plant 1 Breaker Changeout awarded to Principal by Chugach under the Outside Electrical Line Construction Contract (OELCC) executed by the parties on _____, 20____ and to its successors in the penal amount of _____ dollars ($_____), as hereinafter set forth and for the payment of which sum well and truly to be made, we bind ourselves, our executors, administrators, successors and assigns jointly and severally by these present.

2. The condition of this obligation is such that if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions, and agreements of the OELCC and any Projects thereunder and any amendments thereto, whether such amendments are for additions, decreases, or changes in materials, their quantity, kind of price, labor costs, mileage, routing or any other purpose whatsoever, and whether such amendments are made without notice to the Surety, and shall fully indemnify and hold harmless Chugach from all costs and damages which it shall suffer or incur by reason or any failure so to do, and shall fully reimburse and repay Chugach for all outlay and expense which Chugach shall incur in making good any such failure or performance on the part of the Principal and shall promptly make payment to all persons working on or supplying labor or materials for use in the construction of the Projects hereunder, in respect of such labor or materials furnished and used therein, to the full extent thereof, and in respect of such labor or materials furnished but not so used, the extent of the quantities estimated in the Projects to be required for the construction of the Projects, and shall well and truly reimburse Chugach for any excess in cost of construction of said Projects over the cost of such construction as provided in the Projects, occasioned by a default of the Principal under the Projects, then this obligation shall be null and void but otherwise shall remain in full force effect.

3. It is expressly agreed that this bond shall be deemed automatically and immediately amended, without formal and separate amendments hereto, upon any amendment to this Contract or the Projects hereunder so as to bind the Principal and the Surety to the full and faithful performance of the Projects as so amended provided only that the total amount of all increases in the costs of construction shall not exceed twenty percent (20%) of the amount of maximum price set forth in the construction contract. The terms "Amendment" wherever used in this bond and whether referring to this bond or the Projects shall include any alternation, addition, extension, modification, amendment, rescission, waiver, release or annulment, or any character whatsoever.

4. It is expressly agreed that any amendment which may be made by agreement between the Principal and Chugach in the terms, provisions, and conditions of a Project, or to the terms, provisions, and conditions of this Contract shall not in any way release the Principal and the Surety, or either of them or their respective executors, administrators, successors or assigns, from liability hereunder. The Surety hereby acknowledges receipt of notice of any amendment, indulgence, or forbearance, made, granted or permitted.

5. This bond is made for the benefit of all persons, firms and corporations who or which may furnish any materials or perform any labor for or on account of the construction to be performed on any projects, and they, and each of them, are hereby made obliges hereunder with the same force and effect as if their names were written herein as such, and they and each of them may sue hereon.

IN WITNESS WHEREOF, the undersigned have caused this instrument to be executed and their respective corporate seals to be affixed and attested by their duly authorized representative this day of _____, 20_____.

_____
Principal
By: _____

Attest: Its: _____

_____
Secretary

_____
Surety
By:_____

Attest: Its: _____

_____

_____
Address of Surety's Home Office

_____

By: _____
Resident Agent of Surety
(For service of process)

Signatures

The Contractor's Bond must be signed with the full name of the Contractor. If the Contractor is a partnership, a partner must sign the Contractor's bond in the partnership name. If the Contractor is a corporation, the Contractor's bond must be signed in the corporate name by a duly authorized officer and the corporate seal affixed and attested by the Secretary of the corporation. A typewritten copy of all such names and signatures shall be appended.

Power of Attorney

The Contractor's Bond must be accompanied by a power of attorney authorizing execution on behalf of the Surety by a duly authorized Alaska resident agent of the Surety.

PLANT 1 BREAKER CHANGEOUT
BID UNIT DESCRIPTIONS
W.O. P1700073

BID UNIT	DESCRIPTION
NOTES	GENERAL NOTES APPLICABLE TO ALL BID UNITS
	1. Cost for loading, transporting to construction site and offloading of Chugach furnished material is incidental to the cost of the affected Bid Unit. No additional compensation will be paid for loading, transporting to construction site and offloading of Chugach furnished material. Reference List Of Owner Furnished Material for materials furnished by Chugach and Bid Units affected by the material.
	2. Chugach will only furnish materials identified on the List Of Owner Furnished Material. All other materials required to complete the Work are to be furnished by the Contractor.
	3. Cost of dewatering is incidental to cost of affected Bid Unit. No additional compensation will be paid for dewatering. Chugach's desire is to limit or reduce the need for dewatering.
	4. Cost of surveying is incidental to cost of affected Bid Unit. No additional compensation will be paid for surveying or surveying related expenses.
	5. Cost of providing temporary station service to the jobsite is incidental to the cost of affected Bid Unit.
C1	BUSWORK, RIGID AND FLEXIBLE - This unit includes installing all buswork, insulators, conductors, connectors, clamps, and fittings required for rigid and flexible bus. This unit includes installing all jumpers for connecting all equipment to rigid and flexible buswork. This unit includes furnishing and installation of all filler compounds, fasteners, insulators on flexible and rigid bus and all miscellaneous labor and materials to provide a complete bus system for all connections required to make a complete and functional bus.
C2	MEDIUM VOLTAGE RISER AND ASSOCIATED EQUIPMENT - This unit includes installing a 34.5kV primary fuse, jumpers, conduit riser structure on the 34.5kV lattice work, and 2" rigid steel conduit to a new padmount transformer and pad in accordance with specifications, drawings and manufacturer's instructions. This unit includes furnishing and installing all additional materials and equipment including fasteners, equipment identification labels, and all other materials necessary for a complete installation.
E1	CIRCUIT BREAKER, 138 kV - This unit includes installation of one Chugach furnished gas circuit breaker. The unit includes placement, anchoring, adjustment, and testing in accordance with specifications, drawings, and manufacturer's instructions. The unit includes all labor, miscellaneous materials and equipment necessary for a complete gas circuit breaker installation.
F1	FOUNDATION, 34.5 KV SINGLE PHASE TRANSFORMER PAD - This unit includes all equipment and labor to install one Chugach furnished single phase 34.5KV transformer pad. This unit includes all required excavating, compaction; furnishing backfill and miscellaneous materials required for a complete foundation.
G1	HIGH VOLTAGE BREAKER JUNCTION BOX - This unit includes the installation of one Chugach furnished breaker junction box with backplane and wire duct in accordance with specifications and drawings. The unit includes mounting the backplane and installing all associated terminal blocks and wire duct. This unit includes providing and installing all heaters, miscellaneous hardware including unistrut, fasteners, field drilling as required, conduits and fittings between each junction box and the high voltage breaker cabinet, conduits and fittings between each junction cabinet and the handhole, equipment identifications labels, SIS wire, and all other materials necessary for a complete installation.

PLANT 1 BREAKER CHANGEOUT
BID UNIT DESCRIPTIONS
W.O. P1700073

BID UNIT	DESCRIPTION
G2	MARSHALLING PANEL - This unit includes relocating and installing one Chugach furnished 6x6 floor mounted marshalling panel and backplane and terminal blocks and wire duct in accordance with specifications and drawings. The unit includes mounting the backplane and installing all associated terminal blocks and wire duct. This unit includes providing and installing all miscellaneous hardware including unistrut, fasteners, field drilling as required, and equipment identifications labels, SIS wire, and all other materials necessary for a complete installation.
G3	SECONDARY EQUIPMENT - This unit includes installation of one transfer switch and AC Panel for the station service in accordance with specifications, drawings, and manufacturer's instructions. The unit includes furnishing and installing all additional materials and equipment including fasterners, unitstrut, equipment identification labels, and all other materials necessary for a complete installation.
H1	STATION SERVICE 12.47kV TRANSFORMER - This unit includes installation of one 12.47 kV pad-mounted distribution transformer on an existing 4x4 concrete pad in accordance with specifications, drawings, and manufacturer's instructions. The unit includes furnishing and installing all additional materials and equipment including fasteners, equipment identification labels, and all other materials necessary for a complete installation.
H2	STATION SERVICE 34.5kV TRANSFORMER - This unit includes installation of one 34.5 kV pad-mounted distribution transformer in accordance with specifications, drawings, and manufacturer's instructions. The unit includes furnishing and installing all additional materials and equipment including fasteners, equipment identification labels, and all other materials necessary for a complete installation.
K1	CONDUIT, 2" RGS - This unit includes furnishing and installing all 2" RGS conduits as shown on drawings and in conduit schedules. The unit includes furnishing and installing all couplings, fittings, elbows, bending, grounding hardware, trenching, trench backfill, compaction and testing, and wall penetrations. This unit includes providing and installing conduit sealing bushings for spare conduits, and providing and installing pull ropes in all conduits. This unit includes all flexible liquid tight conduits and fittings for risers from GRS conduits to equipment cabinets and provision of entrance hole in equipment cabinets. This unit includes all miscellaneous labor and material for a complete conduit system.
K2	CONDUIT, 4" RGS - This unit includes furnishing and installing all 4" RGS conduits as shown on drawings and in conduit schedules. The unit includes furnishing and installing all couplings, fittings, elbows, bending, grounding hardware, trenching, trench backfill, compaction and testing, and wall penetrations. This unit includes providing and installing conduit sealing bushings for spare conduits, and providing and installing pull ropes in all conduits. This unit includes all flexible liquid tight conduits and fittings for risers from GRS conduits to equipment cabinets and provision of entrance hole in equipment cabinets. This unit includes all miscellaneous labor and material for a complete conduit system.
K3	CABLE, CONTROL, 600V AC & DC - This unit includes installating of all new Chugach furnished 600V control cables as shown on drawings and in cable schedules. This unit includes providing and installing terminations, cable tags, cable ties, conduit sealing materials, testing and all miscellaneous labor and materials to provide a complete cable installation.

PLANT 1 BREAKER CHANGEOUT
BID UNIT DESCRIPTIONS
W.O. P1700073

BID UNIT	DESCRIPTION
K4	CABLE, POWER, 600V AC & DC - This unit includes installing of all Chugach furnished 600V power cables as shown on drawings and in cable schedules. This unit includes providing terminations, cable tags, cable ties, conduit sealing materials, testing and all miscellaneous labor and materials to provide a complete cable installation.
K5	CABLE, COMMUNICATION - This unit includes installation of all communication cables as shown on drawings and in cable schedules. This unit includes providing and installing terminations, cable tags, cable ties, conduit sealing materials, testing and all miscellaneous labor and materials to provide a complete cable installation.
K6	CABLE, 34.5 kV - This unit includes installation of all new AL JCN 34.5 kV EPR cable for 1-phase circuits as shown on drawings and in cable schedules. This unit includes providing and installing terminations, conduit sealing/cable support bushings, brackets, filler compounds, fasteners, conduit fittings, conduit riser, riser hardware, pulling of cables, cable tags at both ends of individual cables, line jumpers, line terminals, line support hardware, and phasing of circuit. This unit also includes Hipot testing the 34.5kV Cable. The unit includes terminations, testing, and all miscellaneous labor and materials to provide a complete 34.5 kV cable installation.
*K7	MANHOUR - This unit includes all labor and miscellaneous support tools required to perform one hour of Chugach-directed work.
M1	GEOTEXTILE FABRIC - This unit Includes furnishing and installation of all separation geotextile fabric on top of the substation pad, beneath the surface course as shown on the drawings.
M2	CRUSHED ROCK SURFACE COURSE - This unit includes all labor and materials to provide 6" of crushed rock surface course to restore the disturbed areas of the site to the pre-construction condition to the satisfaction of the Owner.
M3	FINAL GRADE/ CLEANUP - This unit includes the final grading and compaction of the substation pad, prior to placement of the surface course. Excess material to be removed is covered under Bid Unit M5 Contaminated Soil Mitigation.
M4	SWPPP, ADMINISTRATION AND IMPLEMENTATION - Includes all labor, equipment, and material required for the administration and implementation of the Type 1 SWPPP provided by Chugach for the substation area and the plant outside of the switchyard.
M5	CONTAMINATED SOIL MITIGATION- This unit includes the labor of stockpiling any excess soils from within the substation fence, and all soil and asphalt removed from outside of the fence. This material will be stockpiled in a Chugach supplied container on site for further testing and transport. The Contractor will not be responsible for further handling or disposal of excess soils, apart from loading the excess soils into the Chugach supplied container.
M6	ASPHALT - This unit consists of all material, labor and equipment to cut, remove, dispose and replace asphalt up to four inches (4”), in thickness as per MASS, Division 40. Asphalt shall be class AC. Obtaining, delivering, installing, and compacting the leveling course of D1 is included in this unit. All cuts of existing asphalt shall be saw-cut in a straight-line. Street sweeping necessary, due to the extent of this work, is included in this unit.

PLANT 1 BREAKER CHANGEOUT
BID UNIT DESCRIPTIONS
W.O. P1700073

BID UNIT	DESCRIPTION
M7*	CLASSIFIED FILL - This unit includes furnishing, importation, placement, smoothing, rolling, compaction, testing services, and all miscellaneous labor, equipment, and material to provide one ton of Classified Fill as directed by Chugach. This unit does not include furnishing and placement of material that is included in other Bid Units.
O1	GROUNDING, SUBSTATION - This unit includes installation of all copper ground conductor for ground grid, jumpers and structure mounted ground bus as shown on drawings. This unit includes all excavation and backfill required to install the ground grid as shown on the Drawings. This unit includes installation of all ground rods, and furnishing and installation of all copper connectors, clamps, fittings, copper grounding braid, and all other materials necessary for grounding of all equipment in accordance with specifications, drawings and manufacturer's instructions.
I-E1	RETIREMENT-CIRCUIT BREAKER, 115KV - This unit includes the all labor, equipment, and material for the complete removal and disposal of one 115kV oil breaker. The oil will be removed by Chugach personnel. High voltage bushings are to be removed and delivered to Chugach Transformer Shop. This unit also includes removal and disposal of the high voltage jumpers, and the disconnection of the low voltage connections in the breaker so control and signal cables can be pulled back to the handhole in the yard for reuse.
I-H1	RETIREMENT-STATION SERVICE TRANSFORMER- This unit all labor, equipment, and material, for the removal of one existing Chugach 12.47kV pad-mounted distribution transformer and its return to the Chugach Transformer Shop.

*Note: This unit will be applied only if required and authorized by Chugach. Unit quantity of this bid unit may be increased, decreased, and/or deleted from Contract without adjustments to the unit price.

Owner Furnished Materials List
Plant 1 Breaker Changeout
P1700073

Drawing Item #	Description		Provided	Manufacturer/Catalog Number	Purchase Order / Vendor	Cost	Extended Cost
100	GAS CIRCUIT BREAKER, 138KV, 3000 AMP	EA	6	MITSUBISHI/120-SFMT-40HE-1	Mitsubishi	$ 120,000.00	$ 720,000.00
103	TERMINAL, 4" WIDE, 4-HOLE, 2 CABLES, 45 DEG ANGLE, ARBUTUS	EA	36	DMC POWER/CPLK9644D07950S	Anixter	$ 126.81	$ 4,565.16
104	795 AAC, 37 STRAND, ARBUTUS	FT	1000	SOUTHWIRE/ARBUTUS/CEA 1245		$ 2.00	$ 2,000.00
105	SPLIT SPACER, 2 SPLIT CABLE RUNS, 4", ARBUTUS	EA	36	DMC POWER/CL702D07950-4S	Anixter	$ 275.07	$ 9,902.52
106	TERMINAL, 4" WIDE, 4-HOLE, 2 CABLES, OFFSET, ARBUTUS	EA	36	DMC POWER/CPLK9642D07950S	Anixter	$ 114.47	$ 4,120.92
110	POWER FUSE, SMD1A W/50E AMP FUSE	EA	1	S&C/186704R1/CEA 200-59-101 & CEA 200-59-100		$ 475.00	$ 475.00
111	COVERED JUMPER WIRE, #2 CU STR	FT	20	CEA 12097		$ 5.25	$ 105.00
112	2 HOLE PADDLE FOR #2	EA	4	CEA 200-52-498		$ 5.00	$ 20.00
113	COLD SHRINK TERMINATION, 35KV/, 1/0 CU UNISHIELD	EA	1	3M/COLDSHRINK QT-III 7684-S-8		$ 175.00	$ 175.00
114	SINGLE PHASE CUTOUT BRACKET	EA	1	AB CHANCE/1SBM18C CEA 200-08-610		$ 50.00	$ 50.00
115	SUPPORT, CABLE, 2IN	EA	1	ALUMIFORM/CS-820		$ 20.00	$ 20.00
116	1/0 35KV UNISHIELD CABLE	FT	90	CEA 200-23-820		$ 5.00	$ 450.00
125	CONCRETE PAD, 4X4 PER CEA SUM1	EA	1	CEA 200-41-400		$ 800.00	$ 800.00
130	SINGLE PHASE PADMOUNT TRANSFORMER, 100KVA, 34.5GRDY/19.92KV X 240/120V, PER CEA SUG6	EA	1			$ 5,000.00	$ 5,000.00
131	34.5KV 200 AMP LOADBREAK ELBOW PER CEA HTP1	EA	1	CEA 200-34-220		$ 150.00	$ 150.00
134	SECONDARY CONDUCTOR, UG, TRIPLEX, CU, 500KCM	FT	190	CEA 361		$ 40.00	$ 7,600.00
135	DOUBLE THROW SAFETY SWITCH, 3 POLE, 600AMP, 240VAC, NEMA 3R	EA	1	SIEMENS/DTNF366R	North Coast	$ 6,487.40	$ 6,487.40
136	SINGLE PHASE PADMOUNT TRANSFORMER, 100KVA, 12.47GRDY/7.2KV X 240/120V, PER CEA SUG6	EA	1			$ 5,000.00	$ 5,000.00
140	AC PANEL, NEMA 1, 600AMP, 120/240VAC, 1PH, 3W, 35KAIC	EA	1	SIEMENS/P3A80VJ600FTS	North Coast	$ 5,840.00	$ 5,840.00
143	4 POSITION SHORTING TERMINAL BLOCK	EA	84	GE/EB27B04S/CEA 200-95-470		$ 20.00	$ 1,680.00
144	12 POSITION TERMINAL BLOCK	EA	42	GE/EB25B12/CEA 200-95-580		$ 20.00	$ 840.00
150	30" X 36" JUNCTION CABINET, STAINLESS STEEL WITH BACKPLANE	EA	6	HOFFMAN/A36H3010SSLP3PT	North Coast	$ 3,643.19	$ 21,859.14
151	BACKPLANE FOR PANEL ABOVE	EA	6	HOFFMAN/A36P30	North Coast	$ 217.99	$ 1,307.94
152	ELECTRIC HEATER	EA	6	HOFFMAN/DAH1001A	North Coast	$ 384.16	$ 2,304.96
170	GROUNDING, SPLIT CROSS SPLICE, 4/0AWG, 4/0 AWG.	EA	12	DMC POWER/GC759B004-004.	Anixter	$ 103.00	$ 1,236.00
171	GROUNDING, SPLIT CROSS SPLICE, 4/0AWG, 500MCM.	EA	6	DMC POWER/GC759B004-050.	Anixter	$ 125.64	$ 753.84
172	GROUNDING, SPLIT CROSS SPLICE, 4/0AWG, ¾" GROUND ROD.	EA	2	DMC POWER/GC759B004-682.	Anixter	$ 103.00	$ 206.00
173	GROUNDING, SPLIT PARALLEL SPLICE, 4/0AWG, 4/0 AWG.	EA	12	DMC POWER/GC721B004-004.	Anixter	$ 58.85	$ 706.20
174	GROUNDING, SPLIT PARALLEL SPLICE, 4/0AWG, 500MCM.	EA	12	DMC POWER/GC721B004-050.	Anixter	$ 95.51	$ 1,146.12
175	WIRE, CU SDB #4/0 19 STR.	FT	130	CEA 200-01-180		$ 4.00	$ 520.00
176	GROUND ROD, ¾", COPPERCLAD, 8'.	EA	2	CEA 4067		$ 20.00	$ 40.00
177	PADDLE, 2 HOLE, 4/0, BRONZE	EA	30	CEA 200-52-230		$ 15.00	$ 450.00
178	BACKPLATE FOR MARSHALLING PANEL	EA	1		Greer Tank	$ 690.00	$ 690.00

TOTAL	$ 806,501.20

SPECIAL PROVISIONS

FOR

PLANT 1 BREAKER CHANGEOUT

W.O. P1700073

March 23, 2023

TABLE OF CONTENTS

SPECIAL PROVISIONS

These Special Provisions supplement the provisions of the Chugach Electric Association, Inc.'s (Chugach's) 2022-2023 Outside Electrical Line Construction Contract (OELCC) and the Technical Specifications.

SECTION 1

SUMMARY OF WORK

1.1 SECTION INCLUDES

A. Description of project

B. Contractor use of premises

C. Permits and Licenses

D. Supplementary Instructions to Bidders

1.2 DESCRIPTION OF THE PROJECT

This project replaces (6) 115kV Breakers and upgrades the station service at Chugach's Plant 1 115kV Switchyard located at 821 E 1st Avenue in Anchorage, Alaska. The project consists of the following work.

A. Retiring (6) 115kV oil breakers in the Plant 1 115kV Switchyard and installing (6) 138kV SF6 gas breakers in their place. The breakers will be anchored, grounded, and reconnected to the 115kV disconnect switches on either side using double 795AAC jumpers.

B. Power, control, and signal conduits will be extended from the existing handhole locations into a new junction cabinet for each breaker, where existing power, control and signal cables will be terminated. These same circuits will be extended in new conduits to the new breaker control cabinets and terminated accordingly. The junction cabinet will require installing a new backplate along with the heater, terminal blocks, and Panduit wiring duct.

C. A marshalling panel will be relocated in the switchyard control enclosure to serve as a termination point for additional power, control, and signal cables. The marshalling panel will require installing a new backplate with the needed terminal blocks and Panduit wiring duct.

D. Additional new power, control and signal cables will be installed from the marshalling panel in the switchyard control enclosure to the new breaker control cabinets via the new breaker junction cabinets utilizing both existing and new conduits.

E. The existing AC station service will be retired including the AC panels, a transfer switch, CT cabinet, meterbase, disconnect switch, and 50kVA padmount transformer and associated conduits. A new 100kVA 12.47kV primary, 120/240V secondary, will be placed on the

existing pad of the 50kVA padmount transformer. A new 4" secondary conduit with 500kcm copper triplex cable will extend from the new padmount to the control enclosure. A new transfer switch on the outside of the control enclosure, and a new AC panel on the inside of the control enclosure will complete one side of the new station service.

F. A new alternate feed to the station service equipment will be constructed by installing a feed from the Plant 1 34.5kV switchyard. This work will consist of installing a new 34.5kV disconnect on the existing lattice structure with riser to a new 100kVA 34.5kV primary, 120/240V secondary padmount transformer and pad. A new 4" secondary conduit with 500kcm copper triplex cable will extend from the new padmount to the control enclosure via the transfer switch.

G. Construction at Plant 1 Switchyard will be performed at an energized site. This project will install all jumpers that will ultimately energize the substation with voltages of 115 kV.

H. The Contractor shall provide a temporary station service panel board. Temporary station service is available at the Contractor's expense from an existing 120/240V feed from the Plant.

1.3 WORK

A. The Work consists of all obligations, duties, and responsibilities necessary to the successful completion of the Contract assigned to or undertaken by the Contractor under the Contract Documents, including all labor, materials, equipment, and other incidental operations to provide a complete facility and the furnishing thereof.

1.4 CONTRACTOR USE OF PREMISES

A. Limit the use of the premises to Work, storage of project materials and equipment and access.

B. Coordinate use of premises under direction of Chugach.

C. Assume full responsibility for protection and safekeeping of products under this Contract.

D. Obtain and pay for use of additional storage and Work areas needed for operations under this Contract.

E. No sanitary facilities or utilities are available at the site. Contractor shall furnish all temporary utilities and sanitary facilities at the site for construction purposes and comply with all local, state, and federal codes, regulations, and laws. No additional compensation will be made for costs associated with the forgoing.

F. Install and maintain all temporary erosion and pollution control measures and other best management practices (BMPs) as required by the SWPPP. Measures other than those specifically identified as paid for in a specific Bid Unit are considered incidental to the cost the affected unit. No additional compensation will be paid for SWPPP related activities.

G. Install and maintain silt fence and other best management practices (BMPs) required in all areas affected by any construction activity. Cost of providing all measures required for SWPPP, measures other than those specifically identified as paid for in a specific Bid Unit are considered incidental to the cost the affected unit. No additional compensation will be paid for SWPPP related activities.

H. Ingress and Egress

1. Should additional use of private property be desired by the Contractor for stockpiling material, parking, field office location, or other construction operations, permission must be granted in a written agreement between the property owner and the Contractor that holds Chugach Electric Association, Inc. harmless from any act of the Contractor.

1.5 PERMITS AND LICENSES

A. Except as otherwise provided in the Contract Documents, the Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the Work. Copies of all permit-related correspondence as well as the permits are to be transmitted to Chugach.

1.6 CONTAMINATED SOILS AND CONTRACTORS DISCHARGE RESPONSE PLAN

A. The soils on this site have been identified as a potential contamination site. Therefore, Chugach has contracted SLR Consulting to complete soil testing to determine if there is contamination on site where excavation is taking place. Because of the handling of the contaminated soils, any soils outside of the substation fence or excess soils within the substation will need to be stockpiled in a Chugach supplied container for further testing and transport. **A 12" bucket is required for trenching, as to minimize the handling of any contaminated soils.** The Contractor will not be responsible for further handling or disposal of excess soils, apart from loading of the excess soils into the supplied container(s).

1.7 SUPPLEMENTARY INSTRUCTIONS TO BIDDERS

A. Substitutions and Product Options:

1. At time of Bidding, unless otherwise specified in the Specifications, Bidder may, on an "approved equal" or substitution-basis, propose other equipment which he considers comparable with or superior to the specified items. In the absence of a listing of such equipment, it will be assumed that the Bidder intends to furnish the items as specified.

2. Bidder shall provide sufficient information and data necessary for a full evaluation of any equipment proposed on an "approved equal" or substitution-basis. At a minimum, information shall include complete description, physical dimensions, manufacturer's name and model number, price, time for delivery, and a specific listing of any characteristics which differ from those specified and could require engineering

changes to equipment, buildings, structures, and services. Failure to supply adequate or accurate information may result in rejection of Bidder's Bid.

3. The determination of the suitability of "approved equals" or substitutions for the service intended, and final acceptance thereof, shall be by Chugach. The successful Bidder shall be liable for the cost of any subsequent engineering changes which are clearly attributable to negligence on the part of the Contractor to furnish proper information with his Bid.

4. If any revisions to Drawings or Specifications are required to conform equipment, materials, or Work to national, state, and local laws, codes, ordinances, and regulations, Bidder shall give notice when submitting its Bid and include a statement listing the additions to or deductions from the Bid Price required by the revisions.

5. If Bidder fails to give notice, Bidder shall provide the equipment, materials, and Work as intended by the above without extra cost to Chugach.

B. Surveys: All surveys shall be performed as specified in Section 3 of these Special Provisions.

END OF SECTION

SECTION 2

MEASUREMENT AND PAYMENT

2.1 SECTION INCLUDES

A. Measurement Methods

B. Measurement by Weight

C. Lump-Sum Measurement

2.2 MEASUREMENT METHODS

A. Measurement methods specified in the Bid Schedule of the Contract shall govern if they differ from methods specified in this Section.

B. The Contractor shall compute all quantities and submit calculations for approval by Chugach. Where necessary, such computations shall be based upon surveys performed by the Contractor as specified by the Special Provisions in Section 3.3 Field Engineering.

C. Payment will be full compensation for furnishing all labor, materials, tools, equipment, transportation, services, and incidentals, as specified and for performing all work necessary for completing the erection or installation of the item or work classification.

D. Full compensation for all expense involved in conforming to the requirements for measuring materials shall be considered as included in the prices paid for the materials being measured, and no additional compensation will be made, therefore.

E. All costs in connection with the Work specified herein will be considered to be included with the related item of Work in the Bid Schedule, or incidental to the Project.

F. Measurement Standards: All Work to be paid for at a Contract price per unit of measurement shall be measured by Chugach in accordance with United States Standard Measures.

2.3 MEASUREMENT BY WEIGHT

A. Material to be measured and paid for by weight and not measured by handbook weights, shall be weighed on accurate, State of Alaska approved scales, furnished by and at the expense of the Contractor. A ton is defined as 2,000 pounds avoirdupois.

2.4 LUMP-SUM MEASUREMENT

A. Lump-sum measurement shall be for the entire item, unit of Work, structure, or combination thereof, as listed in the Bid Schedule.

B. If the Contractor requests progress payments for lump-sum items or amounts in the Bid Schedule, such progress payments shall only be allowed if approved by Chugach in writing.

Progress payments will be made in accordance with a well-balanced, detailed program of payment- apportioning, prepared by the Contractor and submitted to Chugach for approval.

C. Such program for each applicable lump-sum item shall show estimated quantities and unit prices therefore as allocated by the Contractor to the different features of the Work and major subdivisions thereof. The summation of extensions of quantities and unit prices and related costs shall total, in each case, the exact amount to be paid under the lump-sum Contract Price for the item.

D. Such programs will be used for computing progress payments as provided herein but will not be used to determine the amount of the Final Payment for the Work of this Contract. Final Payment will be based on actual percentage of Work completed by the Contractor.

END OF SECTION

SECTION 3

COORDINATION AND FIELD ENGINEERING

3.1 SECTION INCLUDES

A. Coordination

B. Field Engineering

C. Project Documents

3.2 COORDINATION

A. Contractor shall coordinate scheduling, submittals, and Work of the various activities with Chugach to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Station service work shall be coordinated such that any outage to the battery charger in the switchyard control enclosure is minimized to less than 4 hours. Chugach anticipates that a temporary power service will be required. This should be planned and coordinated closely with Chugach. The cost of providing temporary power is incidental to the contract.

C. Two high voltage breakers will be deenergized, isolated, and identified for replacement every 30 days. The Contractor will have 20 of those days to complete their work on those two breakers including retirement and installation. Chugach will then have 10 days to test, commission, and energize the equipment. The process will then repeat itself for 2 additional 30 day periods. Outages must be scheduled a minimum of five (5) Chugach working days in advance of any outage and be approved by Chugach. Outage requests shall be entered through the computerized “Dispatch Outage Application” (DOA). Outages will be granted based on system constraints.

D. All work within Plant 1 Switchyard Substation shall be coordinated with Chugach's Power Control Center, Plant 1, and Chugach’s Project Engineer.

E. Chugach's system operation may require other crafts to perform work at or near this project in the station. Contractor shall coordinate activities with Chugach's site representative to avoid delays and interference.

F. Contractor is responsible for coordinating with other entities for locates.

3.3 FIELD ENGINEERING

A. The Contractor shall use a Land Survey registered in the State of Alaska and acceptable to Chugach to do survey work which includes establishing elevations, lines, and levels, utilizing recognized engineering survey practices.

B. The Contractor shall furnish all labor, equipment, materials, and services to perform all surveying for the construction survey and post-construction as-built survey of the Work installed by the Contractor.

C. The Contractor shall locate and protect survey control and reference points.

D. Activities of the Surveyor are to be restricted to within the Chugach property boundary or public right-of-way. Obtain written permission for ingress or egress to Chugach property or public right-of-way where access to Chugach property or public right-of-way is across private property. Obtain written permission for use of private property by the Surveyor for parking or other work performed by the Surveyor that is not completely within the Chugach property or public right-of-way. Permission must be granted in a written agreement between the property owner and the Surveyor. Chugach Electric Association, Inc. shall be held harmless from any act of the Surveyor.

E. Copies of all field notes produced by the Surveyor shall be provided to Chugach.

F. An as-built survey of the substation area shall be completed. The survey shall including location and elevation of each concrete pad and routing of each underground conduit. Horizontal and vertical control tables shall be included in the as-built survey include northing, easting, and elevation tables. The survey shall be completed and certified by the Land Surveyor. The Land Surveyor shall verify that the elevations and locations of the Work are in conformance with the Contract Documents. Survey should comply with the CAD/GIS Spatial Data Standards in Appendix D. Vertical Control shall use Anchorage Bowl 2000.

G. In accordance with the CAD / GIS – Spatial Data Standards (Appendix D) if existing not located, three permanent monuments shall be installed. The permanent monuments shall be brass caps installed in inter-visible equipment foundations located at opposite sides of the substation, near the perimeter. Monument sites shall be submitted to Chugach for approval.

H. Accuracy of Data

1. All horizontal control surveys shall be a minimum of Third Order, Class I accuracy, (1:10,000), as defined by U.S. Department of Commerce, National Oceanic and Atmospheric Administration.

2. All horizontal control surveys required for the Work shall be based upon NAD83 CORRS, with final coordinates in NAD83 feet and the appropriate zone.

3. Vertical coordinates shall be based on MOA vertical datum.

4. All distances shall be recorded to the nearest hundredth of a foot. All angles shall be recorded in degrees, minutes and seconds.

5. All survey work and deliverables shall conform to Chugach CAD/GIS Spatial Data Standards (Appendix D).

I. Field Notes

1. Field notes of all horizontal and vertical control surveys shall be recorded in a clear and legible manner in notebooks and shall be fully indexed.

2. The notes must be uniform in character and interpretable and usable with ease by anyone having knowledge of surveying.

3. The notes shall contain descriptions and sketches of existing control used for origin and closure and the control monuments established by this survey.

4. All field notes shall be reduced by the Surveyor.

5. Copies of all field notes shall be provided to Chugach.

J. Construction Survey

1. It is the intent of Chugach to construct the substation facilities within the Chugach property as shown on Drawings provided for this project.

2. The Surveyor shall establish centerline and grade for new construction using information from drawings provided for the project. The Contractor shall immediately notify Chugach of any discrepancies that occur during the survey process. Structure centerlines and elevations shall not deviate from their design location.

3. Reference stakes shall be provided as required. Remove temporary reference points when no longer needed.

K. Post-Construction As-Built Survey

1. After the substation facilities are constructed, an as-built survey shall be completed. The as-built survey shall be directly related to the centerlines established during the construction survey. All new facilities constructed (above and below grade) shall be located.

2. Deliverable Products

a. The as built location survey drawings shall be produced using AutoCAD Release 2019 or higher. The drawings shall be prepared per Chugach Drawing Standards provided in (Appendix D).

b. The basis of horizontal and vertical control shall be shown on the drawing or referenced and described in appropriate notes.

c. The drawings shall be constructed by the Surveyor in accordance with the following requirements:

(1) All line work and lettering must be of professional quality and all line widths and lettering sizes must be of such size that all information can be clearly shown without overlap or confusion.

(2) When more than one sheet is required, an index sheet must be added showing the entire parcel, with the sheets in numerical order, and each sheet showing the sheet number and total number. When more

than one sheet is submitted, only the last sheet needs to have the approval certificates, but all sheets must be the same size.

(3) The drawings must be in an appropriate engineering type scale of one inch representing a multiple of 100 feet.

(4) Details, as necessary, must be shown at an appropriate indicated scale.

(5) The drawings must have a vicinity map in the upper right-hand corner. The vicinity map shall be at least four inches on each side with a scale of one inch representing one mile, showing sections, township and ranges, boundaries such as national forest or municipal boundaries, and other prominent physical or natural features such as roads, lakes, or rivers. The source of the base map must also be indicated.

(6) Nomenclature of the survey need appear in the block only, unless the division specifically states otherwise.

(7) The basis of bearings must be indicated. Bearings shown must be true bearing as oriented to the basis of bearing, and distances must be in the foot unit reduced to the true horizontal equivalent.

(8) Bearings and distances must be shown within the accuracy commensurate with the class of survey being represented, boundary line distances must be shown from monument to monument.

d. In addition to a signed, stamped paper copy of the as-built drawing, an email copy will be submitted to Chugach, or file uploaded to Chugach's Sharefile folder.

L. Geotechnical and subsurface site conditions of the Plant 1 Substation Switchyard site as it presently exists are not available. Geotechnical investigations can be performed by the Contractor if so desired with proper coordination. No additional compensation shall be made for such investigations.

3.4 PROJECT RECORD DOCUMENTS

A. As-Built Drawings, Field Notes and Surveyor's Certificate

1. Maintain on the Site two separate sets of marked-up full-scale Contract Drawings indicating as-built conditions. These drawings shall be always maintained in a current condition until completion of the Work and shall be available for review by Chugach at all times. All variations from the Contract Drawings, for whatever reason, including those occasioned by modifications, optional materials, and the required coordination between trades shall be indicated. These variations shall be shown in the same general detail utilized in the Contract Drawings. Upon completion of the Work, the marked-up drawings shall be furnished to Chugach.

2. Store Record Documents separate from documents used for construction.

3. Record information concurrent with construction progress.
4. Record Documents and Shop Drawings shall be legibly marked to record actual construction including:
    a. Measured depths of foundations in relation to finish floor datum.
    b. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
    c. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
    d. Field changes of dimension and detail.
    e. Details not on original Contract Drawings.
5. Submit as-built drawings, field notes and Surveyor's certified as built not later than twenty (20) days after completion of construction.

B. Test and Inspection Reports
1. Submit test and inspection reports per the following schedule and as specified elsewhere in the Technical Specifications
    a. Compaction test reports – Submit the day after test is completed.
    b. Equipment test reports and as-builts – Submit per Technical Specification.
    c. Backfill and other imported material to site – material ticket shall be provided day that material is delivered to site.

END OF SECTION

SECTION 4

SUBMITTALS

4.1 SECTION INCLUDES

A. Submittal Procedures

B. Construction Progress Schedules

C. Shop Drawings

D. Product Data

E. Samples

F. Manufacturers' Instructions

G. Manufacturers' Certificates

4.2 SUBMITTAL PROCEDURES

A. The Contractor shall submit pertinent data as required in other parts of these Contract Documents for Chugach's approval:

1. Transmit each submittal with Chugach accepted form.
2. Sequentially number the transmittal forms. Resubmittals are to have the original submittal number with an alphabetic suffix.
3. Identify Project, Contractor, Subcontractor or Supplier; pertinent drawing sheet and detail number(s), and Specification section number, as appropriate.
4. Apply Contractor's stamp, signed or initialed, certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittals will not be reviewed by Chugach until they have been reviewed by the Contractor.
5. Schedule submittals to expedite the Project and deliver to Chugach. Coordinate submission of related items. Allow 14 calendar days for Chugach's review.
6. If substitutions become necessary after Contract award and initial approval of Contractor furnished materials, the Contractor shall submit all information as required in the Bid and include a detailed explanation as to causes for the substitution.
7. Provide space on submittals for Contractor's and Chugach's review stamps.
8. Revise and resubmit submittals as required; identify all changes made since previous submittal.
9. Distribute copies of approved submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

10. No material and/or procedure requiring Chugach's approval shall be used or implemented until such approval has been given.

4.3 CONSTRUCTION PROGRESS SCHEDULES

A. A schedule shall be submitted with the Bid and include the planned duration of the following major construction groups:

1. Pair 1 Breaker Outages
2. Pair 1 Breaker Replacement
3. Pair 1 Contractor Testing
4. Pair 1 Chugach Testing / Commissioning
5. Pair 1 Breaker Energization
6. Pair 2 Breaker Outages
7. Pair 2 Breaker Replacement
8. Pair 2 Contractor Testing
9. Pair 2 Chugach Testing / Commissioning
10. Pair 2 Breaker Energization
11. Pair 3 Breaker Outages
12. Pair 3 Breaker Replacement
13. Pair 3 Contractor Testing
14. Pair 3 Chugach Testing / Commissioning
15. Pair 3 Breaker Energization
16. Station Service- Outages, Installation, Commissioning, Energization

B. The schedule shall include milestone dates, time allowances for Chugach commissioning/testing, manpower loading, and cash flow. (A working day is defined as Monday through Friday 7 AM to 3:30 PM)

C. Within five (5) working days of award, the Contractor shall submit one (1) hard copy and one (1) electronic copy of an updated construction schedule for approval by Chugach. The construction schedule shall be updated to include cash flow on a weekly basis for each individual Bid Unit and planned percent complete by task and overall project. The construction schedule shall be submitted in MS Project.

D. The construction schedule shall be updated with actual percent complete by task and manpower and one electronic copy submitted with all invoices.

E. The basic construction schedule (data on planned performance) shall not be changed without Chugach's concurrence.

F. The outage window coordinated with Chugach Power Dispatch is tentatively between May 1st and August 15th.

4.4 SHOP DRAWINGS

The Contractor shall:

A. Submit electronic copies of shop drawings, if applicable.

B. After review by Contractor, distribute in accordance with Submittal Procedures above and upon completion of Project, provide copies for Record Documents described in Special Provisions, Section 8 - Contractor Closeout.

4.5 PRODUCT DATA

The Contractor shall:

A. Submit the number of product data copies which the Contractor requires, plus an electronic copy which will be retained by Chugach.

B. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information unique to the Project.

C. After review, distribute in accordance with Submittal Procedures above and provide copies for Record Documents described in Special Provisions, Section 8 - Contractor Closeout.

4.6 SAMPLES

The Contractor shall:

A. Submit samples to illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing Work.

B. Include identification on each sample with full product information.

C. Submit the number or samples specified in individual Specification sections; one of which will be retained by Chugach. Reviewed samples which may be used in the Work are indicated in individual Specification sections.

4.7 MANUFACTURERS INSTRUCTIONS

The Contractor shall:

A. When specified in individual Specification sections, submit manufacturers printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for product data.

B. Identify conflicts between manufacturers' instructions and Contract Documents. Notify Chugach in a timely manner to allow resolution of the conflicts without impact on the project completion.

4.8 MANUFACTURERS CERTIFICATES

The Contractor shall:

A. When noted in individual Specification Sections, submit manufacturers certificate in quantities specified for product data.

B. Indicate material or product as it conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product but must be acceptable to Chugach.

END OF SECTION

SECTION 5

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

5.1 SECTION INCLUDES

A. Temporary Utilities

B. Temporary Controls

C. Construction Facilities

D. Staging Area

5.2 TEMPORARY UTILITIES

A. Temporary construction power is available from a distribution circuit coming from inside the Power Plant. Contractor is responsible for paying all costs associated with the temporary service. The cost for temporary construction power is incidental to the effected Bid Unit. No additional compensation shall be paid for temporary power. Any outage to the DC charger in switchyard control enclosure is to be no more than 4 hours and scheduled with Plant 1 and Project Engineer.

B. Temporary Lighting

1. The Contractor shall provide and maintain adequate lighting for construction operations at all times.

C. Temporary Electrical Service for Heaters

1. The Contractor shall provide temporary electrical service for all equipment containing heaters.

D. Site Office and Telephone Service

1. Contractor may provide, maintain, and heat an office for its use at the jobsite. Cell phone communication will be acceptable. Chugach or its representative shall have access to this office. Said office shall have a workspace set aside for Chugach or Chugach's representative.

E. Water Service

1. The Contractor shall obtain potable water as needed for the Work.

F. Temporary Sanitary Facilities

1. The Contractor shall provide sanitary facilities at the site as required by law or regulation.

G. Barriers

The Contractor shall:

1. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
2. Protect stored materials, site and structures from damage.

5.3 TEMPORARY CONTROLS

A. Water Control

1. Temporary erosion and pollution control measures are the responsibility of the Contractor. The Contractor shall comply with all municipal, state and federal laws governing storm water pollution control. The Contractor shall provide all temporary erosion and sedimentation control measures in accordance with the SWPPP in Appendix B to prevent soil erosion and discharge of soil bearing water runoff to adjacent properties.
2. The Contractor shall maintain excavations free of water. Provide, operate and maintain pumping equipment as required. Costs for dewatering and disposal of water removed from all excavations are incidental to the cost of the affected unit. No additional compensation will be paid for dewatering any excavation.
3. The Contractor shall protect site from puddling or running water.

B. Traffic Control

1. The Contractor is responsible for providing all work zone safety signing, arranging road closures with the State of Alaska Department of Transportation & Public Facilities (DOT/PF) or Municipality of Anchorage (MOA) and Alaska Railroad (AR) as applicable and obtaining approval of its Traffic Control Plans (TCPs). The Contractor shall provide all permits, labor, equipment and materials necessary for work zone safety signing and implementation of its Traffic Control Plans (TCPs). Costs for traffic control are incidental to the cost of the affected unit. No additional compensation will be paid for traffic control.
2. Work shall be conducted so as to cause minimum inconvenience to adjacent property owners or tenants. Contractor shall provide written notice no later than 48 hours prior to any restriction in access. Access shall not be blocked for more than three (3) hours.

C. Dust and Mud Control

1. Provide temporary tracking mats to control dust and tracking of dirt and mud onto paved areas and roadways adjacent to the project during construction operations. Costs for dust and mud control are incidental to the cost of the affected unit. No additional compensation will be paid for dust and mud control.

5.4 CONSTRUCTION FACILITIES

A. Protection of Installed Work. The Contractor shall:

1. Protect installed Work and provide special protection where specified in individual specification sections.
2. Provide temporary and removable protection for installed products. Control activity in immediate work area to minimize damage.

B. Security

1. Provide security and facilities to protect Work, from unauthorized entry, vandalism, or theft. The permanent fence around the substation shall be maintained; if necessary, a temporary security fence may be installed immediately after BMPs are installed and prior to any other work in order to limit access to qualified personnel. If necessary, a temporary security fence is incidental to the work and no additional compensation shall be paid for the fence.

C. Parking

1. All parking shall be in designated areas and not on road right-of-ways.

D. Cleaning

1. Maintain areas free of waste materials, debris, and rubbish. Maintain Site in a clean and orderly condition.
2. Remove waste materials, debris, and rubbish from site weekly and dispose off-site in compliance with all local, State and Federal regulations.

E. Removal of Utilities, Facilities and Controls

1. Remove temporary above grade or buried utilities, equipment, facilities, materials prior to final inspection.
2. Clean and repair damage caused by installation or use of temporary Work.

END OF SECTION

SECTION 6

MATERIAL AND EQUIPMENT

6.1 SECTION INCLUDES

A. Material and equipment quantities

B. Products

C. Transportation and Handling

D. Storage and Protection

E. Owner Furnished Material

6.2 MATERIAL AND EQUIPMENT QUANTITIES

A. Material and equipment quantities shown on Drawings are the Engineer's best estimate and shall be verified by the Contractor. Discrepancies shall be brought to Chugach's attention and conflicts resolved in a timely manner so to not interfere with scheduled completion of the Work.

6.3 PRODUCTS

A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Product does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components authorized for reuse.

B. The Contractor shall not reuse materials except as specifically permitted by the Contract Documents.

6.4 TRANSPORTATION AND HANDLING

The Contractor shall:

A. Furnish the necessary labor and equipment to load, haul to the jobsite, and offload all materials for the project. **A 12" bucket is required for trenching, as to minimize the handling of any contaminated soils.**

B. Exercise due care in the handling of all materials. Transport and handle products in accordance with manufacturer's instructions.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

6.5 STORAGE AND PROTECTION

The Contractor shall:

A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate-controlled enclosures.

B. For exterior storage of products, place on sloped supports, above ground.

C. Provide off-site storage and protection when Site does not permit on-site storage or protection.

D. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.

E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

F. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

G. Arrange storage of products to permit access for inspection. Periodically inspect to ensure products are undamaged and are maintained under specified conditions.

H. The Contractor is responsible for the safeguard of the Site from project start through project finish. If at any time security personnel are deemed required by the Contractor, such security personnel shall be provided to safeguard the Site. Costs for Site security are incidental to the cost of the project. No additional compensation will be paid.

6.6 OWNER FURNISHED MATERIAL

A. Material on the Owner Furnished Material (OFM) list will be the ONLY material furnished by Chugach.

END OF SECTION

SECTION 7

CHUGACH-FURNISHED MATERIAL

7.1 SECTION INCLUDES

A. Chugach-Furnished Material

B. Transfer of Material

C. Damage to Chugach-Furnished Material

D. Installation of Chugach-Furnished Material

E. Manufacturer's Representative

7.2 CHUGACH-FURNISHED MATERIAL

A. All Chugach furnished material is listed in the "List of Owner-Furnished Materials." If material does not appear on this list, the Contractor shall provide it.

B. The costs associated with the Chugach-furnished material listed represent original costs to Chugach and may or may not be replacement costs.

C. The Contractor shall include the Chugach-furnished materials for this project in his insurance posted for the work.

7.3 TRANSFER OF MATERIAL

A. Coordinate with Chugach for transfer and transportation of Chugach-furnished materials and equipment. Chugach furnished materials and equipment shall be located at Chugach's North Campus Operations Warehouse at 1201 East 1st Avenue with the breakers being stored at Plant 1 outside the substation fence at 821 E 1st Ave. Anchorage, Alaska. The Contractor shall be responsible for loading all Chugach furnished material.

B. Chugach-furnished materials and equipment may have been previously unpackaged for inspection. The Contractor shall repackage the material and equipment as necessary for transport and storage subject to the approval of Chugach.

C. After the acceptance of Chugach-furnished items, the Contractor shall place them at the point of installation or in areas as approved by Chugach. Chugach may direct that certain items be stored in heated storage buildings. The Contractor is responsible for transporting Chugach- furnished material from the specified storage location to the jobsite. The Contractor is responsible for loading all Chugach furnished materials at their storage location and offloading Chugach-furnished material at the jobsite.

D. After acceptance, Chugach-furnished items are the Contractor's responsibility. The Contractor shall appropriately store and protect all Chugach-furnished items upon acceptance.

E. Maintain temperature within enclosures above the dew point of the surrounding air; regularly check temperatures within the enclosures and heaters to ensure proper operation.

F. Spare Parts and Special Tools: Place spare parts and special tools together with any unused materials and equipment in storage at the Jobsite upon completion of the Work as directed by Chugach.

7.4 DAMAGE TO CHUGACH-FURNISHED MATERIAL

A. The Contractor shall repair or replace any Chugach-furnished items damaged by the Contractor's handling and storage.

7.5 INSTALLATION OF CHUGACH-FURNISHED MATERIAL

A. Except as otherwise specified, installation Work shall be the responsibility of the Contractor and all mistakes in installation and damage shall be corrected by the Contractor at no cost to Chugach.

B. The Contractor will not be held liable for faulty manufacture of Chugach- furnished items or for mistakes in the manufacturer's drawings.

C. Supply and fix all ancillary conduit, bolts, anchors, cabling, supports, and line required to place all Chugach-furnished items in operation.

7.6 MANUFACTURER'S DRAWINGS

A. Drawings approved by Chugach will be given to the Contractor for all equipment furnished by other contracts that is to be installed and connected by this contract. These drawings shall be used for construction and are provided as reference drawings for theproject.

B. Drawings and specifications for equipment furnished by Chugach under other contracts for installation under this contract will be available in the office of Chugach for inspection before bidding.

END OF SECTION

SECTION 8

CONTRACT CLOSEOUT

8.1 SECTION INCLUDES

A. Closeout Procedures

B. Closeout Documents

C. Final Cleanup

8.2 CLOSEOUT PROCEDURES

A. Provide notice and accompany Chugach and its representative(s) for final completion inspection per the OELCC.

8.3 DOCUMENTS

A. Provide and sign all documents and as-built drawings per the OELCC and as specified in the Contract Documents. Testing forms found in Appendix E shall be used to document Hi-Pot Testing.

8.4 FINAL CLEANUP

A. The Contractor shall maintain the site in a clean and orderly condition. All equipment, packaging materials, temporary facilities, etc., shall be removed within ten (10) working days of construction completion.

END OF SECTION

TECHNICAL SPECIFICATIONS

FOR

PLANT 1 BREAKER CHANGEOUT

W.O. P1700073

March 23, 2023

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DIVISION 02 – EXISTING CONDITIONS

SECTION 024155 - MISCELLANEOUS DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Provisions apply to this Section.

1.2 SUMMARY

A. The Contractor shall supply all labor, materials, equipment, tools and supervision necessary to complete miscellaneous demolition at existing substation site including removing and disposing of structures and debris and site restoration.

B. Items of demolition work associated with this section include the following:

1. Remove and dispose of designated items as shown on drawings.

1.3 CERTIFICATION REQUIREMENTS

A. Conform to applicable local, State, and Federal requirements.

B. Conform to applicable requirements for hauling and disposal of debris to Contractor-furnished disposal site.

1.4 COORDINATION REQUIREMENTS

A. Traffic: Conduct demolition operations to ensure minimum interference with roads, streets, bike paths, walks and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, bike paths or other occupied or used facilities without prior written permission from authorities having jurisdiction.

B. The Contractor and its subcontractors shall minimize tracking soil onto adjacent sidewalks, trails, and streets. All tracked soil material shall be cleaned up at the end of each workday.

C. Locate and protect all utilities.

D. Coordinate all work with utility.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove improvements, or obstructions, as required, to the extent necessary for the execution of the work.

3.2 PROTECTION

A. Protect existing shrubs and vegetation adjacent to and outside of construction limits of work.

B. Locate, identify, and protect all existing facilities from damage.

C. Protect survey benchmarks, property corners, existing structures, and improvements to remain from damage or displacement.

D. Provide continuous vehicle access and egress.

3.3 DEMOLITION

A. Verify all existing utilities, site conditions, information, and dimensions.

B. Provide, erect, and maintain temporary barriers, security devices, and temporary support structures as necessary to protect and support existing items which are not indicated to be removed.

C. Notify Chugach's Representative immediately in the event that hazardous or contaminated materials are encountered or suspected. Conform to procedures applicable to local, State, and Federal regulations when handling, transporting, and disposing of hazardous or contaminated materials.

D. Identify and indicate all utility locations on Project Record Documents.

E. Remove materials to be re-installed or returned to Chugach in a manner to prevent damage.

F. Remove demolished materials, rubbish, and debris from site as work progresses. Upon completion of work, leave areas of work in clean condition. Local, State, and Federal regulations regarding hauling and disposal shall apply.

G. Do not burn or bury materials on site.

3.4 DISPOSAL OF WASTE MATERIAL

A. Remove waste materials and excess excavated material to a contractor-furnished disposal site in compliance with all applicable local, State, and Federal requirements.

3.5 SALVAGED MATERIAL

A. All material and equipment designated for removal, not designated to be reused or relocated in other Sections or on the Drawings, will become the property of the Contractor on the date that it is removed.

3.6 USE OF EXPLOSIVES

A. Use of explosives will not be permitted.

END OF SECTION 024155

DIVISION 26 – ELECTRICAL

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Provisions, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Electrical equipment coordination and installation.
2. Sleeves for raceways and cables.
3. Sleeve seals.
4. Common electrical installation requirements.

1.3 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

1.4 REFERENCES

The latest and applicable sections of the following standards shall be used in the performance of the work:

A. NESC – National Electric Safety Code

B. NEC – National Electric Code

C. IEEE – Institute of Electrical and Electronics Engineers

D. RUS Bul. 1724E-300 (Design Guide for Rural Substations)

E. RUS Pub. 202-1 (List of Materials)

F. AEIC – Association of Edison Illuminating Companies

G. NEMA- National Electrical Manufacturer's Association

H. NECA- National Electrical Contractors Association

I. NETA – InterNational Electrical Testing Association

1.5 SUBMITTALS

A. As required by Special Provisions and as outlined here.

B. Shop drawings and product data for all Contractor furnished equipment and materials.

C. Manufacturers' test reports.

D. Equipment manuals and installation manuals.

E. Approval of submittals required when materials substitutions are made.

1.6 PROJECT RECORD DOCUMENTS

A. Maintain accurate information of all installations on drawings, product information, test reports and instruction manuals and as required by Special Provisions.

1.7 QUALITY ASSURANCE

A. Use qualified crafts, trained in the specific task(s) to be performed. Certify special qualifications where required.

B. Follow recommendations and instructions of equipment manufacturer in addition to requirements of drawings and specifications in handling and erection of equipment.

1.8 FIELD MEASUREMENTS

A. Verify that all field measurements are as indicated on the drawings.

B. Determine required location, arrangement and quantities of equipment and materials from drawings.

1.9 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.

2. To provide for ease of disconnecting the equipment with minimum interference to other installations.

3. To allow for piping and conduit installed at required slope.

4. Connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, walls, and other structural components as they are constructed.

C. Coordinate timing of installations with other trades and Chugach's personnel working on other projects in the station.

D. Coordinate installations of Chugach-Furnished materials with Chugach personnel.

PART 2 - PRODUCTS

2.1 CONTRACTOR-FURNISHED EQUIPMENT AND MATERIALS

A. Unless otherwise specified, the Contractor shall furnish all fittings, hangers, conduit, anchors, junction boxes, mounting brackets, cable supports, terminal board jumper wires, wire terminals, solderless lugs, connectors, identification tags, identification signs, insulating tape, insulating compounds, grounding system hardware, and all other electrical accessories, hardware, or materials required to satisfactorily install and place into service all equipment and material specified or shown on the drawings, or supplied by Chugach.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Beginning of the installation means acceptance of existing conditions.

3.2 PREPARATION

A. Before assembly and erection thoroughly clean equipment of all protective coatings and foreign materials.

B. Verify all equipment elevations prior to placement.

C. Schedule testing services and other inspections in a timely manner.

3.3 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. All electrical installations shall be in accordance with the applicable standards, manufacturer's instructions specified herein and any requirements of the local regulatory or code enforcing agencies, unless otherwise specified herein. The Contractor shall place the equipment accurately in position, level the equipment, assemble all equipment which requires such, including wire connections where required. Also, the Contractor shall remove, modify and reinstall equipment where required and adjust and make ready for service the electrical equipment and material required by these Specifications or as shown on the drawings. After the installation is complete, the Contractor shall clean each piece of equipment. All work shall be done in an orderly and skillful manner and shall present a neat appearance when completed.

B. Construction installation quality and workmanship shall comply with NECA 1.

C. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange, and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

3.4 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete walls, or fire-rated floor and wall assemblies.

B. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

C. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

D. Cut sleeves to length for mounting flush with both surfaces of walls.

E. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies.

F. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.

G. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials.

H. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.

I. Above ground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

J. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.5 SLEEVE-SEAL INSTALLATION

A. Install and seal underground, exterior wall penetrations.

B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.6 TESTS

A. All materials and equipment installed and/or connected by the Contractor shall be thoroughly checked, tested and made completely ready for in-service commercial operation. Refer to specifications Section 260550, “Field Testing”, for test requirements.

3.7 PROTECTION

A. Maintain safe clearances from all existing installations not part of this project.

B. Safeguard all existing facilities.

END OF SECTION 260500

SECTION 260513 - CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers the furnishing and installation of all wire and cable, required to complete the installation of equipment as shown on the Drawings, and as specified herein with terminations and connections required to provide functioning power and control systems as required.

B. This Section includes building wires and cables and associated connectors, splices, and terminations for wiring systems rated 600 V and less.

C. This section also includes high voltage cable installation, cable terminations, splices and wiring connectors and connections.

D. This section covers the termination and installation requirements for relaying, control and indication cables in the field equipment and control room.

1.2 REFERENCES

References listed in Section 260500 shall apply in conjunction with the following:

A. NEMA WC7 – Cross-Linked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and distribution of Electrical Energy.

B. IEEE Standard 400 – IEEE Guide for Field Testing and Evaluation of the Insulation of Shielded Power Cable Systems Rated 5 kV and above.

1.3 SUBMITTALS

A. Product Data: For each type of product supplied.

B. Approval of submittals required when materials substitutions are made.

1.4 QUALIFICATIONS

A. Manufacturer: As approved by Chugach.

B. Construction Personnel: Foreman responsible for termination and installation of all cables in the station equipment and control building shall have completed such work in the past for an electric utility, inspected and reviewed with

Chugach personnel similar Chugach installations for workmanship requirements, and be acceptable to Chugach.

1.5 PROJECT RECORD DOCUMENTS

A. Submit As-built Drawings as specified in the Special Provisions.

B. Accurately record actual sizes and locations of direct buried cables on the drawings.

C. Accurately record any deviation from project drawings.

1.6 QUALITY ASSURANCE

A. Handle wire and cable in accordance with the manufacturer's instructions.

B. Do not exceed minimum bending radii for cables and wires or exceed pulling tensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

D. Comply with NFPA 70.

1.7 FIELD MEASUREMENTS

A. Cable lengths shown on the cable schedule are estimates only. Contractor is responsible for verification of the exact lengths necessary.

B. Determine required separation between cables and other work.

C. Determine cable routing to avoid interference with other work.

1.8 COORDINATION

A. Schedule cable and wire installation in conjunction with equipment and raceway placement.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements and approved by Chugach.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for type XHHW-2.

D. Overhead and Underground conductors: See Owner furnished material list for Chugach supplied conductors. Contractor to supply all other Conductors and Cables.

E. General Purpose Wiring

1. General purpose wiring circuits shall be 600V UL type XHHW-LS 90°C, with low-smoke zero halogen (LS-ZH) insulation, flexible strand, with copper conductor. An example of acceptable wire would be Houston Wire and Cable type HW010. The Contractor shall submit wire types to be used for Chugach approval.

F. Switchboard Wiring

1. All switchboard wire shall be 600V UL type SIS 90°C, with gray XLP VW-1 insulation, flexible strand, with tinned copper conductor. An example of acceptable switchboard wire would be Houston Wire and Cable type HW052. The Contractor shall submit wire types to be used for Chugach approval.

2. Intra-panel current transformer circuits shall be #10 SIS wire. Intra-panel potential transformer circuits shall be #12 SIS wire. All other wire shall be #14 SIS except where specified.

G. Control Cable

1. Control cable/wiring installed in trays or raceways shall be indoor/outdoor low-smoke zero halogen (LS-ZH) jacketed non-PVC flame retardant 600V UL type TC (tray cable) color coded by ICEA method 1 Table E-2 or Chugach approved equivalent. An example of an acceptable control cable would be Houston Wire and Cable type HW170. The Contractor shall submit cable types to be used for Chugach approval.

H. Instrumentation Cable

1. Instrumentation cable/wiring installed in trays or raceways shall be indoor/outdoor low-smoke zero halogen (LS-ZH) jacketed non-PVC flame retardant 600V UL type TC (tray cable) color coded by ICEA

method 9 or Chugach approved equivalent. An example of an acceptable instrumentation cable would be Houston Wire and Cable type HW120. The Contractor shall submit cable types to be used for Chugach approval.

I. Power Cable

1. Power cable/wiring installed in trays or raceways shall be indoor/outdoor low-smoke zero halogen (LS-ZH) jacketed non-PVC flame retardant 600V UL type TC (tray cable) color coded by ICEA method E-1 or Chugach approved equivalent. An example of an acceptable power cable would be Houston Wire and Cable type HW170 or HW172. The Contractor shall submit cable types to be used for Chugach approval.

2.2 CONNECTORS

A. Solderless pressure connectors

B. Compression connectors: Ring-type lugs

C. Description: Factory-fabricated connectors of size, ampacity rating, material, type, and class for application and service indicated.

D. All terminals for #10 wire and smaller shall be made with the terminals shown in Table I or as specified on the drawings. All terminals for wire larger than #10 shall be made with terminals shown on Drawings. Burndy terminations shall be double crimped with a Burndy MR8-9Q tool. No substitutions will be permitted.

Table I: Wire Terminals

Wire Range (AWG)	Stud Range	Terminal Mfg./Type
10-12	8-10	Burndy #YAV10-H
14-20	8-10	Burndy #YAV14-H
18-22	8-10	Burndy #YAV18-H

1. Contractor shall provide the correct Burndy YAV type terminals with the proper hole size for the specified screw size. Drilled out terminals are not acceptable.

2.3 TERMINATIONS (1000 V AND ABOVE)

A. Modular terminators suitable for cables described under 2.1 of this section. Manufacturer: As specified on drawings.

B. Connectors, NEMA 2 and 4 hole pads, as specified on drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 CONDUCTOR AND INSULATION APPLICATIONS

A. As indicated on the drawings.

3.4 INSTALLATION

A. Install cable and accessories in accordance with manufacturer's instructions.

B. Avoid abrasion and other damage to cables during installation.

C. Do not exceed cable pulling tensions, sidewall pressures or bending radius limitations. For Chugach supplied conductors' information on these limitations will be furnished by Chugach at the time of construction.

D. Ground cable shield only at switchgear enclosure end termination.

E. Neatly train and lace wiring inside boxes, equipment, panelboards, and cable trays.

F. Clean conductor surfaces before installing lugs and connectors.

G. Make terminations which are rated to carry the full ampacity of conductors with negligible temperature rise.

H. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

1. Use pulling lubricants where necessary.

a) Use only lubricants approved for use with cable types specified that do not leave flammable residue or support flame propagation.

b) Pulling lubricants shall not deteriorate conductor or insulation.

c) Soap/wax-based lubricants shall not be used.

d) Use Polywater J or equivalent where compatible with cable types installed as specified by the lubricant manufacturer.

2. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

I. Support cables according to Section 260500 "Common Work Results for Electrical."

J. For low-voltage cable, after the cable jacket has been stripped back to the appropriate length, each cable shall have a minimum 2-inch piece of heat shrink tubing with internal hot melt sealing compound installed. The heat shrink tubing shall be long enough and positioned so that approximately 1-inch of heat shrink tubing is positioned over the cable jacket and 1-inch of heat shrink tubing is positioned over the conductors. Heat shrink tubing shall be Thomas & Betts HS-series, heavy-wall heat-shrinkable tubing, black in color.

K. Identify and color-code conductors and cables according to Section 260553 "Electrical Identification."

L. Ensure that all control, communication, status or relaying cables and conductors have sufficient length to be re-terminated at any location within the cabinet or rack. Jacket shall be stripped and the uncovered conductors secured at no more than 6” intervals.

M. For spare conductors of multiconductor cables, sufficient length shall be secured to terminate the conductor at any location within the cabinet or rack. Ends of spare conductors shall be heat shrunk with Thomas & Betts CPO-series, thin-wall heat-shrinkable tubing that is black in color.

N. Where cable trench is used, leave a loop of minimum 3 feet of cable in the cable trench where the cable transitions to conduit.

O. Wiring at Outlets: Install conductor at each outlet per NEC. Install a separate, green, ground conductor in raceways from junction box supplying raceways to receptacle or fixture ground terminals.

3.5 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Splicing

1. No splicing allowed.

3.6 FIELD QUALITY CONTROL

A. Testing: Perform the following field quality-control testing:

1. After installing conductors and cables and before electrical circuitry has been energized, test conductors as specified in Section 260550, “Field Testing” and as specified in this section.

2. Measure tightness of bolted connections and compare torque measurements with manufacturer’s recommended values.

3. Inspect wire and cable for physical damage and proper connection.

4. Inspect shield grounding, cable supports, and terminations for proper installation.

3.7 PROTECTION

A. Protect cable ends of medium voltage cables that have not been terminated with a suitable cap designed specifically for the purpose (heat shrink, etc.), taping of cable ends is not acceptable.

END OF SECTION 260513

SECTION 260526 - GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Electrodes

B. Connectors

C. Conductors

1.2 REFERENCES

A. ANSI/IEEE C2 – National Electric Safety Code

B. ANSI/NFPA 70 National Electric Code

C. IEEE 80 – Guide for Safety in AC Substation Grounding

D. IEEE 142 – Grounding of Industrial and Commercial Power Systems

E. Motorola R56 – Standards and Guidelines for Communication Sites

1.3 SUMMARY

A. This Section includes grounding of electrical systems and equipment. Grounding requirements specified in this Section may be supplemented by special requirements of systems described in other Sections.

1.4 SUBMITTALS

A. As required by Special Provisions and as outlined here.

B. Product Data: For each type of product indicated.

1. Approval required when materials substitutions are made.

C. Product Data: For the following:

1. Ground rods

2. Grounding electrodes

3. Grounding connectors

1.5 PROJECT RECORD DOCUMENTS

A. Submit As-built Drawings as specified in Special Provisions.

B. Accurately record actual locations of electrodes and connections.

1.6 QUALITY ASSURANCE

A. Follow manufacturer's instructions in transporting, handling, assembling, and installing the equipment.

B. Employ only qualified crafts for adequate means of handling of the installation of the equipment.

1.7 COORDINATION

A. Coordinate work with site excavating, foundation installation, backfilling and final grading.

1.8 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70; for overhead-line construction and medium-voltage underground construction, comply with IEEE C2.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Materials as shown on the drawings or as approved by Chugach.

2.2 GROUNDING CONDUCTORS

A. For insulated conductors, comply with Section 260513 "Conductors and Cables."

B. Material: Copper.

C. Equipment Grounding Conductors (low-voltage): Insulated with green-colored insulation.

D. Isolated Ground Conductors: Insulated with green-colored insulation with yellow stripe. On feeders with isolated ground, use colored tape, alternating

bands of green and yellow tape to provide a minimum of three bands of green and two bands of yellow

E. Grounding Electrode Conductors: Stranded soft-drawn copper cable.

F. Underground Conductors: Bare, stranded, soft-drawn copper unless otherwise indicated.

G. Copper Bonding Conductor: As follows:

1. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG copper conductor, 1/4 inch (6.4 mm) in diameter.

2. Bonding Conductor: No. 4 or No. 10 AWG, stranded copper conductor.

3. Bonding Jumper: Bare copper tape, braided bare copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

4. Tinned Bonding Jumper: Tinned-copper tape, braided copper conductors, terminated with copper ferrules; 1-5/8 inches (42 mm) wide and 1/16 inch (1.5 mm) thick.

H. Grounding Bus: Bare, annealed copper bars of rectangular cross section (with insulators at required locations).

2.3 CONNECTOR PRODUCTS

A. Provide swaged connections as shown on the drawings.

B. Comply with IEEE 837 and UL 467; listed for use for specific types, sizes, and combinations of conductors and connected items.

C. Bolted Connectors: Bolted-pressure-type connectors, or compression type.

D. Welded Connectors: Not used, unless specifically approved by Chugach. Contractor shall submit written request for use.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Sectional type; copper-clad.

1. Size: 3/4 inch diameter by 8 feet rods coupled with fittings authorized by the rod manufacturer.

2.5 CONNECTORS

A. Material: Bronze or copper.

B. Below Grade: Swaged or Exothermic.

C. Above Grade: Mechanical, Compression, or Swaged as specified on the drawings.

2.6 WIRE

A. Material: Stranded copper.

B. Horizontal electrodes: #4/0 AWG copper, minimum.

C. Grounding conductors for equipment shall be soft drawn copper and shall be sized no smaller than the following:

1.	Switches & Grounding Platforms	#4/0
2.	Steel Structures	#4/0
3.	Switchgear Enclosure	#4/0
4.	Ground Grid	#4/0
5.	Conduit Grounds	#2
6.	12.47 kV Feeder Neutral	#4/0

All other grounds that may be necessary shall be size in accordance with NFPA 70.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site is acceptable for installation of grounding system.

B. Commencement of work signifies acceptance of conditions.

3.2 APPLICATION

A. In raceways, use insulated equipment grounding conductors.

B. Equipment Grounding Conductor Terminations: Use bolted pressure connections to attach to equipment.

C. Underground connections shall be swaged or Exothermic type.

1. Bolted connectors shall not be utilized in below grade applications.

3.3 EQUIPMENT GROUNDING CONDUCTORS

A. Comply with NFPA 70, Article 250, for types, sizes, and quantities of control house equipment grounding conductors, unless specific types, larger sizes, or more conductors than required by NFPA 70 are indicated on the drawings.

B. Install equipment grounding conductors in all feeder and branch circuits.

3.4 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Coordinate ground grid installation with foundation, conduit and final grading.

C. Install rod electrodes in vertical position with bottom at least 10 feet deep.

D. Install interconnecting horizontal electrodes 24" min below finished grade.

E. All electrical equipment enclosures, equipment, and all metallic parts of the installation, including structures, pipe, conduit, wireways, frames, and metalwork, shall be grounded and connected to the nearest ground cable, even if such connection is not shown on Drawings.

F. All recloser and breaker frames shall be grounded and connected to the ground grid in at least two places.

G. The electrical continuity of wireways, pipes, rails and enclosures shall be maintained by bonding. Bonding of electrical raceway and enclosures shall assure electrical continuity and the capacity to conduct safely any fault current that could be imposed. Bonding shall comply fully with Article 250 of NFPA 70.

H. Paint, scale, rust, corrosion, or other foreign matter shall be removed from the points of contact on metal surfaces before ground connections are made.

I. Precautions shall be taken to assure that no damage is done to grounding conductors or connections during construction. All existing grounding conductors damaged during construction work shall be replaced or repaired to comply with this section.

J. Exposed grounding conductors shall be supported on surfaces of the structures and on equipment with non-corrosive hardware, such as Everdur or equal, at not less than four foot intervals. Ground grid risers shall be visible for inspection

K. Make ground tap connections to equipment at the points provided on the equipment for grounding in accordance with the equipment manufacturer's recommendations. Connections from ground conductors to the ground buses of switchgear, and/or panel boards shall be made by means of an acceptable swaged fitting.

L. All other electrical power equipment shall be provided with a grounded, identified grounding conductor. Power and control circuits will contain a grounding conductor.

3.5 CONNECTIONS

A. General: Make connections so galvanic action or electrolysis possibility is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer to order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

4. Make aluminum-to-galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

B. Exothermic-Welded Connections: Install per the manufacturer's recommendations, only at Chugach's approval and notifying Chugach's Project Engineer.

C. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values.

D. Compression-Type Connections: Use hydraulic compression tools to provide correct circumferential pressure for compression connectors. Use tools and dies recommended by connector manufacturer. Provide embossing die code or other standard method to make a visible indication that a connector has been adequately compressed on grounding conductor.

E. Connections shall not be painted.

3.6 UNDERGROUND STRUCTURE GROUNDING

A. Manholes, handholes, trenches and vaults: Provide two connections to the ground grid at each type of underground structure.

B. Connections to components: Connect exposed-metal parts, such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole, handhole, trench or vault to ground rod or grounding conductor. Make connections with No. 4/0 AWG minimum, stranded, soft-drawn copper conductor. Train conductors' level or plumb around corners and fasten structure walls. Connect cable shields as recommended by manufacturer of splicing and termination kits.

C. Pad-Mounted Transformers and Switches: Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to ground grid in at least two places.

3.7 SERVICE GROUNDING

A. Provide neutral grounding as shown on the Drawings.

3.8 FIELD QUALITY CONTROL

A. Inspect all connections for tightness.

B. Any connection determined to be defective by Chugach shall be cut out and a new connection installed.

C. Testing: Perform tests as specified in Section 260550, "Field Testing".

END OF SECTION 260526

SECTION 260533 - RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Provisions, apply to this Section.

1.2 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

A. FMC: Flexible Metal Conduit.

B. LFMC: Liquidtight Flexible Metal Conduit.

C. LFNC: Liquidtight Flexible Nonmetallic Conduit.

D. RNC: Rigid Nonmetallic Conduit.

E. HDPE: High Density Polyethylene Conduit.

F. RGS or GRSC: Rigid Galvanized Steel Conduit.

1.4 SUBMITTALS

A. Submit the following in accordance with Special Provisions:

1. Product Data: For raceways and fittings, enclosures, and cabinets.

a. Approval of submittals required when materials substitutions are made.

1.5 PROJECT RECORD DOCUMENTS

A. Submit As-built Drawings as specified in Special Provisions.

B. Accurately record actual sizes, locations, and depths of conduits on the drawings.

C. Accurately record any deviation from project drawings.

1.6 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. Comply with NFPA 70.

C. Comply with NECA 1.

1.7 COORDINATION

A. Coordinate layout and installation of surface mount raceways, boxes, enclosures, cabinets, and suspension systems with other construction.

B. Coordinate layout and installation of underground conduits as shown on the drawings and to avoid intersection with other conduits and underground structures while maintaining specified conduit clearances and burial depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. As specified on the drawings and as approved by Chugach.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit, Zinc Coated (RGS): ANSI C80.1.

B. LFMC: Flexible steel conduit with PVC jacket.

C. FMC: Zinc-coated steel or aluminum.

D. Fittings for Conduit (Including all Types and Flexible and Liquidtight): NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.

2.3 NONMETALLIC CONDUIT AND TUBING

A. RNC:

1. PVC: NEMA TC 2.

2. PVC fittings: NEMA TC 3.

3. FIBERGLASS: NEMA TC 14.

4. HDPE: NEMA TC 7.

2.4 CONDUIT ADHESIVES

A. Bonduit by American Polywater Corporation.

2.5 BOXES, ENCLOSURES, AND CABINETS

A. Sheet Metal Outlet and Device Boxes: NEMA OS 1.

B. Cast-Metal Outlet and Device Boxes: NEMA FB 1. Cast aluminum with factory finish and gasketed covers.

C. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

D. Cast-Metal Pull and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.

E. Hinged-Cover and clamp cover Enclosures: Types and sizes and accessories as shown on drawings.

1. Interior Dry Locations: NEMA 250, Type 1, galvanized steel box with factory finish.

2. Exterior Cabinets: NEMA 250, Type 4 stainless steel.

F. Cabinets: Types and sizes and accessories as shown on drawings.

1. Interior Dry Locations: NEMA 250, Type 1, galvanized steel box with factory finish.

2. Exterior Cabinets: NEMA 250, Type 4 stainless steel.

2.6 FACTORY FINISHES

A. Finish: Enclosure or cabinet components, except for stainless, shall be finished with the manufacturer's standard gray standard rust proof enamel applied to factory-assembled enclosures, and cabinets before shipping.

2.7 ACCESSORIES:

A. Warning Tape: Underground-line warning tape specified in Division 26 Section 260533 "Identification for Electrical Systems."

B. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as 35 deg F. Capable of withstanding temperature of 300 deg F without slump and shall not have any permanent property changes when exposed to temperatures below 35F, recovering original workability characteristics above 35F. Compound shall adhere to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors where conduits are not specified on the conduit schedule:

1. Exposed: RGS.

2. Concealed: RGS.

3. Underground: RGS. HDPE schedule 40 shall be used for all conduits 4" diameter and greater unless otherwise noted on the drawings.

4. Connection to Vibrating or Moving Equipment (Including Transformers, circuit breakers and all outdoor equipment subject to seismic and/or frost jacking movements): LFMC

5. Boxes and Enclosures: NEMA 250, Type 4 stainless steel.

B. Indoors where conduits are not specified on the conduit schedule:

1. Exposed, Concealed, Dry, Damp or Wet Locations: RGS.

2. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC; except use LFMC in damp or wet locations.

3. Boxes and Enclosures: NEMA 250, Type 1, except as follows:

a. Damp or Wet Locations: NEMA 250, Type 4, stainless steel.

C. Minimum Raceway Size: 3/4-inch trade size (DN 21).

D. Where conduits sizes are not specified, conform to requirements of NFPA 70 for conduits sizing.

E. Raceway Fittings: Compatible with raceways and suitable for use and location.

F. Conduit Elbows

1. Rigid galvanized steel Conduit: Use threaded rigid galvanized steel conduit fittings and factory elbows unless otherwise indicated.

3.2 INSTALLATION

A. Complete raceway installation before starting conductor installation.

B. Seal and bond conduits with approved adhesives.

C. Support raceways as specified and in conformance with NFPA 70.

D. Install temporary closures to prevent foreign matter from entering raceways.

E. Protect stub-ups from damage where conduits rise through floor slabs and in the field.

F. Install conduits so curved portions of bends are not visible above the finished slab or outdoor grade.

G. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and keep straight legs of offsets parallel, unless otherwise indicated. Each riser from the ground level to an outdoor piece of equipment shall include an offset equal to the diameter of the raceway between the end of the RGS conduit and the LFMC conduit.

H. Underground Conduits

1. Provide trenching and backfill as specified in section 312000 “Earthwork”.

2. Provide conduit depths, trench preparation, and backfill as shown on the drawings.

3. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line as shown in trench details. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

4. Where connected to Vibrating or Moving Equipment (Including Transformers, circuit breakers and all outdoor equipment subject to

seismic and/or frost jacking movements) the rigid section of conduit shall be physically anchored to the device foundation prior to transition to flexible conduit.

I. Raceways Embedded in Slabs: As indicated on the drawings.

J. Install exposed raceways parallel or at right angles to nearby surfaces or structural members and follow surface contours as much as possible.

1. Run parallel or banked raceways together on common supports.

2. Make parallel bends in parallel or banked runs. Use factory elbows only where elbows can be installed parallel; otherwise, provide field bends for parallel raceways.

K. Join raceways with fittings designed and approved for that purpose and make joints tight.

1. Use insulating bushings to protect conductors.

L. Terminations:

1. Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against box. Use two locknuts, one inside and one outside box.

2. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into hub so end bears against wire protection shoulder. Where chase nipples are used, align raceways so coupling is square to box; tighten chase nipple so no threads are exposed.

M. Install and leave pull cords in all raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire.

N. Stub-up Connections: Extend conduits through concrete floor and outdoor pad for connection to freestanding equipment. Install with an adjustable top or coupling threaded inside for plugs set flush with finished floor. Extend conductors to equipment with rigid steel conduit; Install screwdriver-operated, threaded plugs flush with floor for future equipment connections.

O. Flexible Connections: Use maximum of 72 inches of flexible conduit for equipment subject to vibration, noise transmission, or movement; and for all

motors. Use LFMC in damp or wet locations. Install separate ground conductor across flexible connections.

P. Install hinged-cover enclosures and cabinets plumb. Support at each corner.

3.3 PROTECTION

A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.

1. "Devcon" or equivalent zinc rich paint, or approved equal, shall be used to touch up damaged galvanizing and applied to exposed threads at all galvanized conduit couplings and connectors. Touch up may be done by either a spray or brush application.

2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

3.4 CLEANING

A. After completing installation of exposed, factory-finished raceways and boxes, inspect exposed finishes and repair damaged finishes.

END OF SECTION 260533

SECTION 260550 - FIELD TESTING

PART 1 - GENERAL

This specification covers the field testing of the substation equipment and electrical systems installed or constructed by the Contractor. It is the intent of this specification that field testing be extensive and complete, as specified, to provide positive assurance of correct installation and operation of equipment.

1.1 SUMMARY

A. This specification includes, but is not limited to, the following:

1. Testing of all wire, cable, electrical equipment and systems installed or connected by the Contractor to assure proper installation, adjustment, setting, connection, and functioning in accordance with the drawings, these specifications and the manufacturer's recommendations. High Voltage Breaker Testing is not included as part of this work.

2. Furnishing of qualified personnel and labor required for, and incidental to testing.

3. Furnishing all test equipment required to perform all tests, including special equipment as required, and qualified operators for testing equipment.

4. This specification includes all testing required during installation and prior to energization of substation equipment and electrical systems installed or constructed by the Contractor. The scope of work does not include testing of equipment or systems off-site. The Contractor shall cooperate with and coordinate with Chugach for testing of systems and equipment that interface with Chugach's facilities that may be required to confirm phasing, rotation or other electrical characteristics.

1.2 DEFINITIONS

A. ATS: Acceptance Testing Specifications.

1.3 REFERENCES

The latest and applicable sections of the following standards are to be used in the performance of the work:

A. NESC – National Electric Safety Code

B. NEC – National Electric Code

C. IEEE – Institute of Electrical and Electronics Engineers

D. REA Bul. 1724E-300 (Design Guide for Rural Substations)

E. REA Pub. 202-1 (List of Materials)

F. AEIC – Association of Edison Illuminating Companies

G. NEMA – National Electrical Manufacturer's Association

H. NECA – National Electrical Contractors Association

I. NETA – International Electrical Testing Association

J. ANSI – American National Standards Institute

1.4 SUBMITTALS

A. Testing plan and schedule for all conductors and equipment.

B. Certified test equipment calibration reports.

C. Test Reports:

1. The Contractor shall submit reports for all tests performed.

2. The Contractor shall maintain a written and electronic record of all tests showing date, personnel making test, equipment or material tests performed, and results. A copy of these reports shall be submitted to Chugach on a weekly basis.

3. Submit two written copies and one electronic copy of the final test reports, as specified.

4. The Contractor may use his standard report forms subject to the approval of Chugach.

5. Electronic documents shall be submitted in Microsoft Office 365 or newer, or in searchable unsecured PDF.

1.5 QUALITY ASSURANCE

A. The Contractor shall submit to Chugach a proposed testing plan. This plan will detail at a minimum the following:

1. Specific tests to be performed on each piece of equipment, cable, or system.

2. Testing procedures to be followed for each type of test.

3. List references and standards which require a specified test.

4. Provide a list of the manufacturers recommended tests and procedures.

5. List of testing equipment to be used and calibration certificates for proposed testing equipment

6. List of personnel responsible for performing tests and their qualifications. Provide certifications and proof of training applicable to the tests and equipment to be provided under this contract. Provide resumes which show testing and commissioning experience.

7. Testing schedule based on the project schedules.

B. Follow recommendations and instructions of equipment manufacturer and NETA ATS in addition to requirements of drawings and specifications in testing of equipment.

1.6 COORDINATION

A. Coordinate tests with completion of equipment or system installation and with the completion of auxiliary or related equipment that may be affected by tests. Schedule testing and provide notification of testing to Chugach so as not to delay construction or system energization.

B. Notify Chugach prior to commencement of all testing.

1.7 EXAMINATION

A. Verify that field conditions are acceptable and are ready to be tested.

1.8 TESTS

The types of tests to be performed under this specification shall include, but are not limited to, the following:

A. Power and control cable: All power and control cables installed by the Contractor shall receive a Megger test. Megger all 600-volt power and control cable with a 1000 volt megger for one minute. Values at the end of one minute must be as follows:

Conductor Capacity Amps	Minimum Resistance Ohms
0 – 24	1,000,000
25 – 50	250,000
51 – 100	100,000
101 – 200	50,000
201 – 400	25,000
501-800	12,000
Over 800	5,000

B. Instrument cable: All instrument cables installed by contractor shall be Megger tested. Megger at 500 volts for one minute each conductor of a multi-conductor cable to all other conductors and the shield. Devices that can be damaged by megger testing shall be removed from the circuit prior to testing. Megger wire and cable after installation and termination, not on the cable reel.

C. High Potential Tests. High potential tests shall be performed in accordance with the following: Observe all precautions to insure the safety of all personnel associated with and near the area of the test. Perform a visual inspection of equipment to be tested prior to the commencement of the test for dirt and moisture accumulation and to assure work is complete. Record air temperature, barometric pressure, and humidity prior to the test. Perform megger test prior to high potential test.

D. Power Cable. Medium voltage power cable for a new installation shall be performed as an acceptance test and shall be tested in accordance with IEEE Std. 400. In no case shall the cable manufacturer's maximum recommended test voltage be exceeded. Test Cable for 15 minutes with a dc test set only, from conductor to shield or armor with shield or armor grounded. Perform test with cable installed in permanent location, properly terminated, disconnected from equipment. Direct-buried cable shall be tested when the cable has a minimum 1-foot compacted permanent cover over the cable.

E. Low Voltage Power, station service, HVAC and lights. Station luminaires and switching shall be tested to ensure proper operation and directional aiming.

F. Continuity Tests – All power and control cables shall be tested for continuity between each termination point.

G. Phase Relationships tests: Connections to all equipment shall be checked and verified by the Contractor. Any device which could be damaged by the application of a voltage of reversed phase shall be disconnected prior to the check. Contractor shall be responsible for maintaining the phasing as shown on the Drawings.

1.9 TESTING EQUIPMENT

A. The Contractor shall provide all testing equipment required to perform tests.

B. Test Equipment Suitability and Calibration: Comply with NETA ATS, "Suitability of Test Equipment" and "Test Instrument Calibration."

1.10 PERFORMANCE OF TESTS

A. Testing requirements shall include all tests for the high and low voltage power cable and instrumentation cable unless specifically waived by Chugach.

B. Additional tests shall be performed, as deemed necessary by Chugach, because of field conditions or to determine that equipment material and systems meet the requirements of the contract documents. The Contractor shall be responsible for all damage to equipment or material due to improper test procedures or test apparatus handling.

C. After completing testing and checkout of equipment, wiring, control schemes, and other items associated with individual systems, and believing a system to be ready for operation, the Contractor shall notify Chugach, who may elect to witness a final operational test of each individual system.

D. Test procedures, equipment, temporary circuits, etc., shall be designed and utilized to minimize danger to testing technicians and surrounding personnel; Furnish and use safety devices such as rubber gloves and blankets, provide protective screens and barriers, yellow tape, and danger signs, to adequately protect and warn all personnel in the vicinity of the tests.

1.11 EQUIPMENT TESTS

Equipment tests shall be performed in accordance with the following:

A. Miscellaneous Equipment.

1. Coordinate electrical testing of electrical, mechanical, and architectural items, so equipment and systems that are functionally interdependent are tested to demonstrate successful interoperability.

2. The Contractor shall perform tests on all equipment and systems installed by the Contractor.

B. Auxiliary System Energization. The auxiliary systems shall include the substation ac service power and the dc control power. Chugach shall be advised two weeks prior to the energization of this equipment. This equipment may be energized from a backup or emergency source upon the concurrence of Chugach. The Contractor will be required to have concluded all testing and checkout of equipment prior to energization. Preliminary test reports are required to be submitted to Chugach prior to the energization of the equipment.

1. The following procedure shall be followed when placing an auxiliary system in-service:

a. Check all circuit connections and phase relationships immediately prior to energization.

b. Megger all circuits phase-to-phase, phase-to-ground, wire-to-wire or wire-to-ground immediately preceding energization to assure temporary grounds have been removed.

c. Disconnect all solid state equipment and ground fault circuit interrupters before making cable tests. Contractor responsible for damage to any such equipment caused by cable tests.

d. Energize equipment one stage, section, circuit, or piece at a time to minimize damage upon equipment failure and to aid in locating trouble areas.

e. The Contractor shall be responsible for implementing the tagging procedure upon energization of equipment. He shall also verify that proper voltage levels, current levels, phasing and rotation have been achieved after each energization step. If necessary, corrections shall be made before proceeding to the next step.

f. All measurements and tests shall be recorded. All cables tested and installed by the Contractor shall be noted on a set of Contractor mark-ups. The mark-ups shall clearly note the cables and conductors the Contractor has tested for continuity and megger. The date and testing person shall be clearly recorded on the mark-ups.

C. Power Cable Tests. The following tests and checks shall be performed on all 15 kV and 35kV power cables installed under this contract.

1. Hi-Pot and Insulation Resistance test

END OF SECTION 260550

SECTION 260553 - ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Identification for conductors and communication and control cable.
2. Underground-line warning tape.
3. Warning labels and signs.
4. Instruction signs.
5. Equipment identification labels.
6. Miscellaneous identification products.

1.2 SUBMITTALS

A. Product Data: For each electrical identification product indicated.

B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

D. Approval of submittals required when materials substitutions are made.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and ANSI C2.

B. Comply with NFPA 70.

C. Comply with NESC

D. Comply with OSHA 29 CFR 1910.145.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required

by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 - PRODUCTS

2.1 CONDUCTOR, COMMUNICATION AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.

B. Heat Shrink Wire Markers: Provide polyolefin heat shrink tubing makers. Printing shall be by thermal transfer with black characters/lettering on a white background. Heat shrink tubing shall be compatible with printing device used. Provide heat shrink labels from the following manufacturers:

1. Brady B-342 permasleeve markers.

2. Substitutions will be permitted at Chugach's discretion. Contractor shall provide a written request for wire label substitution. Chugach may request physical samples be submitted to approve a wire label substitution.

C. Cable Tags:

1. Provide Brady flame-retardant type B-145 polyethylene tag material with a grey background and black printed lettering. Cable tags shall be two-sided, oval-shaped measuring 1.75"W x 1.00"H. Cable tags shall be attached using Brady 81761 cable tag fasteners. Cable Number and To/From information shall be printed on both sides of the cable tag.

2. Substitutions for this tag type will be permitted at Chugach's discretion. Contractor shall provide a written request for cable tag substitution. Chugach may request physical samples be submitted to approve a cable tag substitution.

2.2 UNDERGROUND-LINE WARNING TAPE

A. Description: Permanent, bright-colored, continuous-printed, polyethylene tape.

1. Not less than 6 inches (150 mm) wide by 4 mils (0.102 mm) thick.

2. Compounded for permanent direct-burial service.

3. Embedded continuous metallic strip or core.

4. Printed legend shall indicate type of underground line.

2.3 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.

C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 7 by 10 inches (180 by 250 mm).

D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch (1-mm) galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch (6.4-mm) grommets in corners for mounting. Nominal size, 10 by 14 inches (250 by 360 mm).

E. Warning label and sign shall include, but are not limited to, the following legends:

1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."

2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."

2.4 INSTRUCTION SIGNS

A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch (1.6 mm) thick for signs up to 20 sq. in. (129 sq. cm) and 1/8 inch (3.2 mm) thick for larger sizes.

1. Engraved legend with black letters on white face

2. Punched or drilled for mechanical fasteners.

3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.5 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch (10 mm). Overlay shall provide a weatherproof and ultraviolet-resistant seal for label.

B. Stenciled Legend: In non-fading, waterproof, black ink or paint. Minimum letter height shall be 2 inch (25 mm).

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.

1. Minimum Width: 3/16 inch (5 mm).

2. Tensile Strength: 50 lb (22.6 kg), minimum.

3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).

4. Color: Black, except where used for color-coding.

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

A. All wires and cables installed by the contractor be labeled at their terminations as shown on the drawings and as approved by Chugach.

B. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use heat shrink markers. Identify each ungrounded conductor according to source and circuit number.

C. Wiring Devices: write panel and circuit number in inside on back side of cover-plate with indelible marker. Identify each ungrounded conductor according to source and circuit number with heat shrink markers.

D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

2. Use system of cable tags and heat shrink markers that is uniform and consistent with drawings or the system used by manufacturer for factory-installed connections.

3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.

E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable. Install underground-line warning tape for both direct-buried cables and cables in raceway or conduit systems. Install warning tape as shown on underground conduit details on drawings.

F. Equipment Identification Labels: On each unit of equipment, install unique designation label as shown on the nameplate drawings or provide label consistent with equipment designations on drawings or wiring schematics.

1. Labeling Instructions:

a. Outdoor Equipment: Engraved, laminated acrylic or melamine label.

b. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.

2. Equipment to Be Labeled:

a. Enclosures.

b. Access doors and panels for concealed electrical items.

c. Phasing on Transmission and Distribution Circuits.

3.2 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Heat shrink wire markers: Markers shall not be heat shrunk onto the wires. The markers shall be visible in the as-left condition.

D. Apply identification devices to surfaces that require finish after completing finish work.

E. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

F. Retain paragraph below for non-adhesive signs or labels.

G. Attach non-adhesive signs and plastic labels with screws and auxiliary hardware appropriate to the location and substrate.

1. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side.

H. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

END OF SECTION 260553

SECTION 261200 - TRANSFORMERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Station Service Transformer (Main & Alternate)

B. Auxiliary Equipment and Interconnections

1.2 DESCRIPTION OF THE WORK

A. This section covers installing the main and alternate station service transformers. Work also includes making all connections necessary to other equipment to provide a functioning electrical installation. Major equipment to be installed under this section includes:

1. 100 kVA Single Phase 12.47kV:120/240 V GRD Y transformer

2. 100kVA Single Phase 34.5kV:120/240 V GRD Y transformer

1.3 PROJECT RECORD DOCUMENTS

A. As-built Drawings as specified in Special Provisions.

1.4 QUALITY ASSURANCE

A. Follow manufacturer's instructions in transporting, handling and installing the equipment.

B. Employ only qualified crafts.

C. Provide adequate means of handling of the installation of the equipment.

PART 2 - PRODUCTS

1.1 TRANSFORMERS

A. Transformers listed under description of work are Chugach furnished. Product information is included on the project Drawings.

1.2 CONTRACTOR FURNISHED MATERIAL

A. Contactor shall supply and install all additional materials for complete installation of transformers.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Visually inspect equipment for physical damage.

B. Verify dimensions as shown on the Drawings.

C. Assure work of other trades is complete and site is ready to receive the equipment.

3.2 PREPARATION

A. Clean placement surfaces of debris.

B. Remove protective coverings.

C. Clean all insulators.

D. Contractor shall verify allowed angle from vertical for oil filled devices. Contractor shall not exceed allowed angles during transport and placement of oil filled devices.

3.3 INSTALLATION

A. Station Service Transformers

1. Install transformer on foundation as indicated on the project Drawings.

2. Install all high and low voltage cables and connections and grounding connections.

3.4 TOLERANCES

A. Alignment 1/16 inches horizontal, 1/16 inches vertical.

3.5 TESTS

A. Chugach to test and commission equipment. No tests required.

3.6 PROTECTION

A. Assure adequate protection from the environment until all covers, valves etc. are installed and functioning.

END OF SECTION 261200

SECTION 261220 - BUSWORK, CONDUCTORS AND FITTINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Flexible bus

B. Swaged, Bolted, and Compression Connections

1.2 DESCRIPTION OF THE WORK

A. This Section covers the material and installation of cable jumper, fittings and all hardware required to form a complete system of current carrying paths connecting the equipment as shown on the Drawings.

1.3 QUALITY ASSURANCE

A. Use qualified crafts, trained in the specific task(s) to be performed.

B. Provide complete details of swaged procedures.

C. Operate swaged connection press in accordance with manufacturer's instructions.

1.4 FIELD MEASUREMENTS

A. Verify that all field measurements are as indicated on the Drawings.

B. Determine required location, arrangement and quantities of materials from the Drawings.

1.5 COORDINATION

A. Coordinate timing of installations with other trades.

1.6 TOOLS

A. Contractor shall provide a swaged press for use to construct bus for this project.

PART 2 - PRODUCTS

2.1 CONNECTIONS

A. Bolted Connectors: As indicated on the drawings or approved equal.

B. Compression Connectors:

1. As indicated on the drawings or approved equal.

2. Swaged for tubular, strain, and jumper bus conductors.

C. Fasteners: All bolts, washers, and lock washers for bus connections shall be Grade 8 Cad Plated or Stainless Steel (300 series CRES) and provided by Contractor. All nuts shall be silicone bronze. Aluminum is not acceptable. All conductors at joints and fittings shall be clean and free of foreign matter. Excluding DMC Power swaged connections, an oxide-inhibiting compound (Burndy "Penatrox A" or an approved equal) shall be used at all connections involving aluminum conductor and fittings.

D. Swaged compression type as shown on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Verify all dimensions prior to cutting bus section.

3.2 PREPARATION

A. Before assembly and erection thoroughly clean equipment of all protective coatings and foreign materials.

B. Aluminum to aluminum connections shall be prepared by covering the contact surfaces with “Penetrox A”. Then the surface shall be thoroughly cleaned with fine steel wool and bolted together without removing the compound from the contact surfaces. When making aluminum-copper connections place the aluminum above the copper.

C. Aluminum to aluminum connections made with DMC Power swaged connectors do not require contact surfaces to be prepared with any compounds. Follow manufacturer’s instructions for surface preparation.

D. Copper to copper connections shall be prepared by rubbing the tinned contact surfaces lightly with fine steel wool, covering them with “Penetrox A” and bolting together without removing the compound from the contact surfaces. If the copper terminals are not tinned, surfaces shall be prepared by cleaning with emery cloth down to bright metal and tinning before applying “Penetrox A”.

3.3 INSTALLATION

A. Install cable jumpers, fittings, and all connectors in complete conformance with manufacturers' recommendations.

B. Swaged and Compression Connections

1. Install per manufacturer's recommendations.

2. Minimum distance between two swaged fittings is 6 inches.

C. Bolted Connections

1. Use corrosion inhibiting compound (Penetrox-A) for all connections, except where using DMC Power swaged connectors.

2. Use torque wrenches in accordance with manufacturer's recommendations for bolt installations.

3. Remove excess compound.

4. All bolts, washers, and lock washers for bus connections shall be Grade 8 Cad Plated or Stainless Steel (300 series CRES) and provided by Contractor. All nuts shall be silicone bronze. Aluminum is not acceptable. All conductors at joints and fittings shall be clean and free of foreign matter. Excluding DMC Power swaged connections, an oxide-inhibiting compound (Burndy "Penatrox A" or an approved equal) shall be used at all connections involving aluminum conductor and fittings.

5. Bolts installed vertically shall have the bolt head oriented gravitationally down (nut on top).

6. No more than three and no less than one thread shall be showing when the nut is attached and tightened to the correct torque value.

D. Compression Connections for Flexible Conductors

1. Install connectors with properly sized dyes in accordance with the manufacturer's instructions. All required dies and equipment is to be furnished by the Contractor.

2. Apply oxide inhibiting compound compatible with the connections and surface conditions involved.

3. Where inverted connections are required provide swaged connections with weep hole. Inverted compression type connectors are not acceptable.

E. Jumper Loops and Strings

1. Flexible jumpers and flexible vertical cable taps shall be installed of such length and form as to maintain maximum clearance for surrounding objects and to give assurance that such contour will be stable. Cable for the jumper buses shall be the type and size shown on the Drawings. Jumper buses shall be smoothly formed, and adjacent runs shall be similarly and symmetrically shaped to provide a uniform and aesthetically pleasing appearance throughout.

2. Stranded conductor shall be installed without twists, kinks, or "bird-caging" and shall be handled to avoid abrasions or other damage. No splices shall be allowed in overhead strain buses.

3.4 FIELD QUALITY CONTROL

A. Chugach's Representative may inspect all swaged, compression, and bolted connections. Contractor shall assist by providing equipment and operators to access locations.

B. Radiographic tests may be performed by Chugach. Contractor shall provide assistance in performing such tests.

3.5 PROTECTION

A. Maintain safe clearances from all existing installations not part of this project.

B. Safeguard all existing facilities.

END OF SECTION 261220

SECTION 261305 - POWER CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. SF_6 Circuit Breakers

B. Auxiliary Equipment and Interconnections

1.2 DESCRIPTION OF THE WORK

A. This section covers moving and installing power circuit breakers with SF_6 insulation and all connections to other equipment necessary to provide a functioning electrical installation. Major equipment to be installed under this section includes:

1. Circuit Breakers: 138 kV.

1.3 SUBMITTALS: None.

1.4 PROJECT RECORD DOCUMENTS

A. As-built Drawings

B. Operating and installation manuals

C. Test reports

1.5 QUALITY ASSURANCE

A. Follow manufacturer's instructions in transporting, handling and installing the equipment.

B. Employ only qualified crafts for and adequate means of handling of the installation of the equipment.

1.6 COORDINATION

A. The equipment will be commissioned by Chugach's personnel. Coordinate all activities through Chugach's Site Representative.

PART 2 - PRODUCTS

2.1 SF_6 BREAKERS

A. All SF_6 Circuit Breakers are Chugach furnished. Product information is included on the project Drawings. Contractor to provide all equipment and

materials required for complete and functional installation and interconnection as shown on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Visually inspect equipment for physical damage.

B. Verify dimensions as shown on the Drawings.

C. Assure site is ready to receive the equipment.

3.2 PREPARATION

A. Clean placement surfaces of debris.

B. Remove protective coverings.

C. Clean insulators.

3.3 INSTALLATION

A. SF_6 Power Circuit Breakers

1. Contractor shall load, transport and offload each breaker and breaker stand.

2. Contractor shall remove breakers and breaker stands from manufacturers' crates and set on foundation in accordance with drawing.

3. The Contractor shall assemble circuit breaker support stands and place circuit breakers on stands. The breakers will be commissioned by Chugach. DO NOT OPERATE BREAKERS.

4. Install all high voltage and grounding connections.

5. Install all power and control cables.

3.4 TOLERANCES

A. Alignment: 1/4 inches horizontal, 1/4 inches vertical.

3.5 TESTS

A. As specified in Section 260550, "Field Testing".

3.6 PROTECTION

A. Assure adequate protection from the environment until all covers etc. are installed.

END OF SECTION 261305

DIVISION 31 – EARTHWORK

SECTION 312000 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Special Provisions, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Classified Fill
2. Crushed Rock Surface Course.
3. D1 Aggregate
4. Separation Geotextile.
5. Final Grading.
6. Excavating, backfilling, and compacting for foundations, pads, and other underground structures.

1.3 DEFINITIONS

A. Crushed Rock Surface Course: Crushed gravel or rock placed above subgrade on substation site. Shown as ‘Crushed Rock’ on drawings.

B. Excavation: Removal of material encountered below subgrade.

C. Backfill: Soil material used to fill an excavation.

D. Subgrade: Final surface or elevation after completing cut, or top surface of a fill or backfill that will be directly below topsoil, crushed rock surface, or leveling course.

E. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Geotextile.

B. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Particle Size Analysis according to ASTM D 422 for Classified Fill, D-1 Aggregate, and crushed rock.

2. Laboratory density according to ASTM D 1557 for Classified Fill.

C. Compaction density testing program and test equipment calibration certificate.

1.5 QUALITY CONTROL/QUALITY ASSURANCE

A. Contractor shall provide his own quality control program for field density testing, as further specified in Article 3, of this Section. Chugach may, at their option, provide additional field density testing for quality assurance.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities unless permitted in writing by Chugach and then only after arranging to provide temporary utility services according to requirements indicated.

1. Notify Chugach not less than two days in advance of proposed utility interruptions.

2. Do not proceed with utility interruptions without Chugach's written permission.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. CLASSIFIED FILL

1. Classified Fill shall consist of sand and gravel material free from lumps, frozen material, balls of clay, organic matter, or other objectionable matter, durable and sound conforming to the quality requirements of

AASHTO M-147 and shall meet the following washed sieve gradation. Municipality of Anchorage, Type II-A material qualifies as a Classified Fill.

Classified Fill	
Sieve Size	% Passing by Weight
3 inch	100
3/4 inch	50-100
#4	25-60
#10	15-50
#40	4-30
#200	0-6

B. CRUSHED ROCK

1. Crushed Rock shall consist of hard, angular crushed, washed natural stone uniform in density and quality, and free from thin and elongated pieces, friable materials and debris, dirt, and other objectionable material. At least fifty (50) percent of the coarse aggregate particles shall have two or more mechanically fractured faces. The aggregate shall meet the following washed sieve gradation as follows:

Crushed Rock	
Sieve Size	% Passing by Weight
3 inch	100
2 inch	90-100
1 inch	10-80
3/4 inch	0-15
1/2 inch	0-5

C. D1 AGGREGATE

1. D1 Aggregate - crushed stone or crushed gravel, consisting of sound tough durable pebbles or rock fragments of uniform quality, and free from clay balls, vegetable matter, or other deleterious matters. The aggregate shall meet the following washed sieve gradation as follows:

D1 Aggregate	
Sieve Size	% Passing by Weight
1 inch	100
3/4 inch	70-100
3/8 inch	50-80

#4	35-65
#8	20-50
#50	8-30
#200	0-6

D. GEOTEXTILE

1. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

2. Tensile Strength: 180 lb; ASTM D 4632.

3. Elongation: 30%; ASTM D 4632.

4. Burst Strength: 400 psi; ASTM D 3786.

5. Trapezoid Tear: 70 lb; ASTM D 4533.

6. Puncture Strength: 70 lb; ASTM D 4833.

7. Apparent Opening Size: No. 50 sieve, maximum; ASTM D 4751.

8. Permittivity: 0.02 per second, minimum; ASTM D 4491.

9. UV Stability: 70 percent after 500 hours' exposure; ASTM D 4355.

2.2 STOCKPILE MATERIAL

A. Stockpiled Material: None

PART 3 - EXECUTION

3.1 PREPARATION

A. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstruction, and deleterious materials from ground surface is Contractor’s responsibility if necessary.

3.2 EXCAVATION AND INSPECTION

A. Prior to filling or covering notify Chugach when excavations have reached required depth.

B. If Chugach determines that unsatisfactory soil is present, continue excavation as directed.

C. Where frost susceptible (silty) soils are encountered in structural areas, place geotextile between the silty soils and backfill regardless of the depth to subgrade.

D. Where native soils are left at the subgrade surface in structural areas, subsurface shall be scarified to 6 inches depth and compacted to not less than 95% of maximum dry unit weight according to ASTM D 1557.

E. Reconstruct subgrade damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Chugach.

3.3 FOUNDATION EXCAVATION

A. Foundations shall be over-excavated if silty, soft, or loose soils are encountered or as noted on the Drawings

B. Bottom of excavation for other foundations shall be scarified to a depth of 6 inches and compacted to not less than 95% of maximum dry unit weight according to ASTM D 1557.

3.4 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation with compacted Classified Fill material.

3.5 FILL AND BACKFILL

A. Place and compact backfill in excavations promptly.

B. Any excess fill needs to be placed in a Chugach supplied container located outside of the substation fence for disposal by Chugach.

C. CLASSIFIED FILL

1. Place fill and backfill in layers not more than 12 inches in loose depth for material compacted by heavy compaction equipment, and not more than 6 inches in loose depth for material compacted by hand-operated tampers. Compact Classified Fill materials to not less than 95% of maximum dry unit weight according to ASTM D 1557.

2. Uniformly moisten or aerate fill layer before compaction to within 2 percent of optimum moisture content. Remove and replace, or scarify and air dry otherwise satisfactory soil material that exceeds optimum

moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.6 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to contours indicated on the drawings.

B. Provide a smooth transition between adjacent existing grades and new grades surrounding all foundations and work areas.

C. Site Grading: Establish slope grades to pre-construction grades.

3.7 GEOTEXTILE

A. Separation Geotextile: Lay geotextile parallel to the slope at surface of subgrade. Stretch geotextile to remove any creases or wrinkles. Join edges by sewing a double-thread chain stitch or overlap a minimum of 3 feet. Sew or overlay areas torn or punctured.

3.8 CRUSHED ROCK

A. Place crushed rock surface course over separation geotextile.

B. Shape to required elevations.

C. Compact with a minimum of 6 passes of a 15-ton roller or other Chugach-approved vibrating equipment.

3.9 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions. Reshape and recompact as directed by Chugach.

END OF SECTION 312000