



**MANUAL SWITCH MONITORING
EQUIPMENT & CONSTRUCTION,
GIRDWOOD TO POTTER**

**INVITATION TO BID
17-29-206050**

OCTOBER 2, 2017

**ALASKA RAILROAD CORPORATION
327 WEST SHIP CREEK AVENUE
ANCHORAGE, ALASKA 99501**

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ALASKA RAILROAD CORPORATION
327 W. Ship Creek Avenue
Anchorage, AK 99501
Phone 907-265-2355
Fax 907-265-2439
BatesT@akrr.com

October 2, 2017

**INVITATION TO BID
17-29-206050**

**MANUAL SWITCH MONITORING EQUIPMENT & CONSTRUCTION
– GIRDWOOD TO POTTER**

Response Required: This page must be completed and returned ensuring receipt of future addenda or additional information. Please email this form to BatesT@akrr.com , or fax to (907) 265-2439. All addenda will be forwarded to the contact name and number listed below.

Firms that have not returned this cover sheet will not be informed of addendums and will only be alerted to addendums by checking with the ARRC procurement officer or by checking ARRC's internet site: www.alaskarailroad.com, select Suppliers and then Invitation to Bids. Bidders must acknowledge the receipt of all issued addendums in their proposal/bid submittal.

Company _____

Address _____

Contact _____

Phone _____ Fax _____

Email _____

Please direct all responses and/or questions concerning this ITB to Tim Bates, Alaska Railroad Corporation, Contracts, 327 Ship Creek Avenue, Second Floor, Anchorage, AK 99501, telephone number 907-265-2355, fax number 907-265-2439 or at email address BatesT@akrr.com.

www.AlaskaRailroad.com

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THIS IS NOT AN ORDER INVITATION TO BID NUMBER: 17-29-206050
DATE OF INVITATION TO BID: October 2, 2017

INVITATION TO BID
ALASKA RAILROAD CORPORATION
CONTRACTS SECTION
POST OFFICE BOX 107500
ANCHORAGE, ALASKA 99510-7500
ATTENTION: TIM BATES (907) 265-2355
FAX NUMBER (907) 265-2439
BatesT@akrr.com

ALASKA RAILROAD CORPORATION
MANUAL SWITCH MONITORING EQUIPMENT & CONSTRUCTION
– GIRDWOOD TO POTTER

SEALED BIDS WILL BE RECEIVED **UNTIL 3:00 PM LOCAL TIME ON TUESDAY, OCTOBER 26, 2017** AT WHICH TIME BIDS WILL BE PUBLICLY OPENED:

Alaska Railroad Corporation
Attn. Tim Bates, 2nd Floor
327 W. Ship Creek Avenue
Anchorage, Alaska 99501

IMPORTANT

Your bid package (qualifications and bids) must be complete. See instructions and conditions enclosed. Return bid packages in sealed envelopes according to the instructions in 17-29-206050. Bids received by facsimile transmission will not be considered for award. Bids shall be submitted on the forms furnished herein. Hand-delivered bids, amendments, or withdrawals must be received by ARRC's Contracts Section prior to the date and time listed above.

PRE-BID Site Visit: A Pre-Bid site visit is scheduled for **October 12 at 10:00 AM**; the site visit will begin at the Potter Location and we will HyRail through all locations stopping at the Girdwood Location. Please RSVP with how many people from your company will be attending. These site are active tracks, PPE is required (hard hat, steel toe boots, vest and eye protection). This is not a mandatory meeting, although interested firms are encouraged to participate. A bidder's failure to attend the pre-bid conference will in no way relieve the bidder of the responsibility of performing the work in strict compliance with the true intent and meaning of the terms, conditions and specifications of this ITB.

Contracting Officer: The person authorized to enter into and administer the Contract on behalf of the Owner. He has authority to make findings, determinations and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract.

ARRC shall not be held responsible for bidder's lack of understanding of what is required by this bid. Should a bidder not understand any aspect of this bid, or require further explanation, or clarification regarding the intent or requirements of this bid, it shall be the responsibility of the bidder to seek guidance from the ARRC.

ARRC reserves the right to reject any and all bids, or any part thereof, negotiate changes in bids, accept any bids or any part thereof, waive minor informalities or defects in any bids, and not to award the proposed contract if it is in the best interest of the ARRC. Any resulting contract from this Invitation to Bid shall incorporate the Standard Instructions, and General Terms and Conditions incorporated in this Invitation to Bid.

This Invitation to Bid is not to be construed as a commitment of any kind nor does it commit the ARRC to pay for any costs incurred in the submission of an offer or for any other incurred cost prior to the execution of a formal contract

Bidder/contractor imposed terms and conditions which conflict with this Invitation to Bid terms and conditions are considered counter offers and, as such, will cause the Alaska Railroad Corporation to consider the bid non-responsive. PROSPECTIVE BIDDERS ARE CAUTIONED TO PAY PARTICULAR ATTENTION TO THIS CLAUSE.

ARRC Disadvantaged Business Enterprise (DBE) Program: ARRC is an equal opportunity corporation that encourages the participation of DBEs as prime contractors and subcontractors on its contracts funded in whole or in part by the Federal Transit Administration (FTA) or the Federal Highway Administration (FHWA). The ARRC has a race neutral DBE Program and does not set DBE goals on individual solicitations. Nonetheless, the ARRC aspires to achieve an overall DBE participation on federal contracts of 3.875 % in FY 2016-2018. If this contract is funded in whole or in part by funds from the FTA or the FHWA, it is imperative that you consult the Federal Terms and Conditions portion of this solicitation.



The Alaska Railroad is a member of Green Star (www.greenstarinc.org). ARRC earned an initial Green Star Award in 1994 and a Green Star Air Quality Award in 2007. The Alaska Railroad considers Green Star membership to be a positive business attribute, and regards a Green Star award as a tangible sign of an organization's commitment to environmental stewardship and continual improvement within its operations.

Please direct all responses and/or questions concerning this ITB to Tim Bates, Alaska Railroad Corporation, Contracts, 327 Ship Creek Avenue, Second Floor,

Anchorage, AK 99501, telephone number 907-265-2355, fax number 907-265-2439
or at email address BatesT@akrr.com.

Sincerely,

Tim Bates

Tim Bates
Contract Administrator

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1. PAMPHLET 600 - Issue 34, Effective April 1, 2017

APPENDIX A

REQUIRED DOCUMENTS

REQUIRED FOR PROPOSAL/BID Bids will not be considered if the following documents are not completely filled out and submitted at the time of bidding.

1. Bidder Questionnaire - [Form 395-0136]
2. Construction Bid Form - [Form 395-0121]
3. Bid Bond - [Form 395-0120]
4. Cost Schedule - Appendix I
5. Statement of Qualifications letter (SQL)
6. Alaska Contractors Licenses

REQUIRED AFTER NOTICE OF AWARD The successful proposer is required to complete and submit the following documents within **five (5) working days** after receipt of written notification:

1. Subcontractor List - [Form 395-0131]

REQUIRED FOR AWARD In order to be awarded the contract, the successful bidder must completely fill out and submit the following documents within the time specified in the intent to award letter:

1. Certificate of Insurance - [from Insurance Carrier]
2. Payment Bond - [Form 395-0126]
3. Performance Bond - [Form 395-0127]
4. Alaska Business Licenses
5. State of Alaska Department of Labor Notice of Work
6. Construction Contract - [Form 395-0122]; Notice to Proceed (from ARRC)
7. Construction Quality Control (CQC) Plan
8. Contractor's Site Health & Safety Plan
9. Submittal of Bid Escrow Documentation

POST AWARD DOCUMENTATION

1. Weekly Certified Payrolls
2. Copy of State of Alaska Contractor Letter of Completion

APPENDIX B

SCOPE OF WORK AND BIDDER QUALIFICATIONS

The Alaska Railroad Corporation (ARRC) is adding equipment to monitor manual switches between Girdwood and Potter, Alaska in conjunction with Positive Train Control (PTC) implementation. This work will occur between Alaska Railroad MP 73 and MP 102, and other locations as needed.

SCOPE OF SERVICES

Construction will involve the procurement; construction, and installation of manual switch monitoring cabling and equipment, and OS (presence detection) circuits at each siding track location in the following table. Upon completion of each siding, the contractor shall work with the ARRC to test installation work. ARRC will incorporate the work into ARRC's Positive Train Control (PTC) system as outlined in ARRC's PTC Implementation Plan filed with the FRA. The substantial completion date is October 31, 2018. The Contractor is advised that delays may result in substantial liquidated damages.

The Contractor shall provide Construction Services as provided in the Contract Documents, including without limitation:

- Collaborate with ARRC and the Engineer to execute the Project.
- Develop and update Project construction schedules, to include procurement of long lead-time items.
- Provide a minimum of 100% of the on-site installation and 90% of the on-site oversight work with its own or designated subcontractor forces. Work not performed by the Contractor shall be performed by Subcontractors featured in the Contractor's bid. Subcontractors not featured in the Contractor's offer shall receive ARRC approval prior to performing any work on the Project.
- Provide reports, Construction Management, and Management of Contractor forces.
- Procurement of required equipment for ARRC installation.
- Testing and commissioning in accordance with the specifications and the Quality Assurance and Site Acceptance Test Plan, attached.

The Contractor shall provide construction services to deliver the Project to the ARRC within the approved Bid Price. The Contractor shall also recommend optimal construction phasing and coordinate with other railroad work and utilities mentioned in Appendix F, Supplemental Conditions. Consistency of the key personnel as featured in the proposal is mandatory for the duration of the project. ARRC reserves the right to cancel the contract if unapproved changes are made to key personnel involvement, roles, or responsibilities.

Detailed scope by site¹:

Girdwood: Contractor will bring all cabling to the Girdwood shelter location, which is just north of the existing shelter location.

- **Access:** The contractor can drive to the north switch and shelter. The south switch and south end of the siding are only accessible by rail.
- **Siding Description:** Girdwood siding is approximately 1855' clear length with #11 switches at each end. The siding is on the east side. Passenger access platforms cross the siding and abut the main track at 4 locations. These platforms will have to be removed and replaced to accommodate cable trenching. Existing switch point monitoring cables serve both switches.
- **SSS Switch Point NEMA Box:** Goes on existing pad to east side.
- **SSS Clearance NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform to east side.
- **Cable route from House to South Clearance and Switch Point Boxes:**
Between main and siding.
- **NSS Clearance NEMA Box on East Side:** Route direct to shelter on the east side
- **NSS Switch Point NEMA Box on East Side:** Route direct to shelter.
- **Girdwood Contractor Scope Summary:**
 - Install NEMA boxes as shown on the plans.
 - Tie the track circuit cabling into the track as shown on the plans.
 - Provide temporary switch point monitoring cables and coordinate installation and testing with ARRC.
 - Install OS cables as shown on the plans, bringing the cables to the shelter location. It is expected this will destroy the existing switch point monitoring cable. Any existing cabling to be removed by contractor.
 - Install new 7C#9 switch point monitoring cables from the south switch to the shelter.

¹Note on ARRC use of terms and definitions: North, south, east and west are all relative to the track, with north being towards Fairbanks and south towards Seward. "NSS" means North Siding Switch, and "SSS" means south siding switch. "OS" means On Station, and refers to the presence detection track circuit at a turnout.

- Provide and install the specified PSO 4000 equipment and enclosure.
- Reroute the power feed to an underground location and remove the existing overhead line. Repave access road as required.
- Once location has switched over to the new switch point cable, remove the temporary cable.
- Clean and dress the site.

Indian: NSS Indian and SSS Indian have an existing shelter located adjacent to the switches. Each site is on its own wind/solar/SOFC power.

- **Access:** The south switch and south end of the siding are only accessible by rail. The north switch and north end of the siding are only accessible by rail
- **Siding Description:** Indian siding is approximately 4822' clear length with #11 switches at each end. The siding is on the west side. Existing switch point monitoring cables serves these switches.
- **Indian Contractor Scope Summary:**
 - Take the NSS House and set it at mid siding
 - Remove the SSS House and Solar Tower from the field and return to the Signal Department
 - This includes any cabling associated with the SSS House and Solar Tower
 - Tie the track circuit cabling into the track as shown on the plans.
 - Provide temporary switch point monitoring cables and coordinate installation and testing with ARRC.
 - Install OS cables as shown on the plans, bringing the cable to the new shelter location
 - Install new 7C#9 switch point monitoring cables from both switches to the new shelter.
 - Upgrade current meter service to 100 amps meeting Chugach Electric Standards. Current meter service is only 50 amps. Coordinate final meter location with ARRC

- Provide the specified PSO 4000 equipment and install in accordance with the plans and specifications. Do preliminary and final testing and place in service
- Clean and dress the site

Rainbow: The existing shelter is located about 200' south of the NSS on the west side. This site is powered by wind/solar/SOFC.

- **Access:** Both the north and south switches and the siding are only accessible by rail.
- **Siding Description:** Rainbow siding is approximately 792' clear length with #11 switches at each end. The siding is on the west side. Existing switch point monitoring cables serve both switches.
- **SSS Switch Point NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform on the west side of the tracks.
- **SSS Clearance NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform on the west side of the tracks.
- **Cable route from House to South Clearance and Switch Point Boxes:** Between main and siding.
- **NSS Clearance NEMA Box:** Route direct to shelter
- **NSS Switch Point NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform on west side and route direct to shelter.
- **Rainbow Contractor Scope Summary:**
 - Install NEMA boxes as shown on the plans.
 - Provide temporary switch point monitoring cables and coordinate installation and testing with ARRC.
 - Tie the track circuit cabling into the track as shown on the plans.
 - Install OS cables as shown on the plans, bringing the cables to the shelter location. It is expected this will destroy the existing switch point monitoring cable.
 - Install new 7C#9 switch point monitoring cables from the south switch to the shelter.

- Provide the specified PSO 4000 equipment and install in accordance with the plans and specifications. Do preliminary and final testing and place in service.
- Once location has switched over to the new switch point cable, remove the temporary cable.
- Clean and dress the site.

Potter: The contractor will relocate the shelter from the SSS to mid-siding. This location is about 75' north of the crossing on the east side. The site will then be on commercial power.

- **Access:** The contractor can drive to the shelter. The north and south switches and both ends of the siding are only accessible by rail.
- **Siding Description:** Potter siding is approximately 2179' clear length with #11 switches at each end. The siding is on the east side. An industry timber crossing is present at mid siding and will have to be removed and replaced for cable installation. Existing switch point monitoring cables serve both switches and are routed between the main and siding tracks. It is expected that the existing cable will be destroyed by this installation, so the contractor will have to provide a new switch monitoring cable and temporary cables for use during installation.
- **SSS Switch Point NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform on the east side of the tracks.
- **SSS Clearance NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform to east side.
- **NSS Clearance NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform to east side.
- **NSS Switch Point NEMA Box:** Goes on a new contractor designed and ARRC approved pad or platform on the east side of the tracks.
- **Cable route:** Between main and siding with a new switch point monitoring cable required.
- **Potter Contractor Scope Summary:**
 - Install NEMA Boxes as shown on the plans.

- Remove existing House Platform and return to ARRC. Existing pilings can stay in the ground.
- Tie the track circuit cabling into the track as shown on the plans.
- Provide temporary switch point monitoring cables and coordinate installation and testing with ARRC.
- Install OS cables as shown on the plans, bringing the cables to the shelter location. It is expected this will destroy the existing switch point monitoring cable.
- Install new 7C#9 switch point monitoring cables from the switches to the shelter.
- Provide the specified PSO 4000 equipment and install in accordance with the plans and specifications. Do preliminary and final testing and place in service.
- Once location has switched over to the new switch point cable, remove the temporary cable
- Clean and dress the site

Other information:

- **Coordination with ARRC rail traffic:** Much of this work may be conducted during the ARRC passenger season. Contractor will coordinate the work so as not to delay passenger or other trains, as further noted below, Typically, a work window opens in this area between the southbound Whittier passenger train (departs Anchorage at 0945) and the northbound Whittier train (departs Whittier about 1830), except on days when cruise ships dock (generally Saturdays, Sundays, and alternating Wednesdays and Mondays). Passenger season begins in early May and ends in late September. Other trains will occasionally transit the work locations.

Sidings may be available overnight depending on rail traffic. Any equipment or materials left trackside overnight will be properly secured to allow unhindered train movements. No excavations adjacent to active tracks will be left open for the night.

- **The ARRC will provide:**
 - The ARRC will provide all of the needed 2C#6 cabling for OS circuits of this project. This cable is available in a truck-able container located near Talkeetna, Alaska. Contractor will provide transportation from this location.

- An updated track chart to the successful bidder as a reference.

SCHEDULE

- Jan. 5, 2018: Notice to Proceed issued to Contractor
- Feb. 23, 2018: Material submittals provided to ARRC
- Oct. 31, 2018: End of 2018 field construction
- Nov. 30, 2018: Final completion

EXPERIENCE OF FIRM AND REQUIRED QUALIFICATIONS

Each firm must submit a Statement of Qualifications Letter (SQL) with their bid. SQLs shall be at least 5 pages, and the SQL shall describe five freight railway projects completed (or substantially completed) by your company in the past 10 years. Projects may be completed as a subcontractor or general contractor. These minimum qualifications may be satisfied by use of a sub-contractor. Project submissions should be similar to this Project's scope, complexity, and value for construction including, but not limited to:

- New rail signal systems construction;
- Modification of / to existing rail signal systems;
- Testing and commissioning of railway signal and train control systems and communication systems;
- Experience working on mixed-use (freight and commuter) rail line with track speeds up to and including 59 MPH (passenger) and 49 MPH (freight) while maintaining existing service.

For each project listed above, provide the following:

- Project name, description, location, owner, and key team members
- Primary and alternate owner contact (name and phone number)
- Engineer primary and alternate contact (name and phone number)
- General contractor primary and alternate contact (name and phone number) if Proposer performed work as a subcontractor
- Scope of work self-performed by your company
- Relevance to the this Project
- Total value, value of subcontracts, original completion date, time extensions
- Liquidated damages incurred by the contractor
- Litigation, claims, dispute proceedings, and/or arbitration
- Termination for cause or disciplinary actions
- Awards, citations/commendations

Reference contact information must be current and verifiable. Contact for references must be a Project Manager or Assistant Project Manager or similar level of responsibility for both Owner and Engineer. Please provide their titles on the project references. Offerors are encouraged to present projects on which the Project Manager, Construction

Foremen, and any Subcontractor Foremen have worked within the last 10 years that are comparable to the Project. Firms that do not meet the Required Qualifications will not be considered for award.

The Contractor's proposed Signal Engineer and Signal Manager(s) may be subject to an interview by the ARRC prior to commencement of any work that may affect the signal system. The work of this project includes working within tight windows on a live railroad consisting of freight and passenger trains. The ARRC's Director, Signals decision concerning the candidate's qualifications will be final. The Contractor shall propose alternate personnel if the original candidate is found unacceptable.

AVAILABILITY OF WORK SITE

Some of these work locations are not accessible by roadway. ARRC will not provide transportation to and from any work site. The Contractor may provide track-based access (e.g. hi-rail) operated by a fully-qualified Contractor employee, but this will require pre-approval and on-track operation under the immediate direction of an ARRC Employee In Charge.

MAINTENANCE OF RAILROAD TRAFFIC

The Contractor is advised that the entire work site is located along an operating railroad with as many as 12 trains per day. The Work for this Contract must be executed in such a manner that existing train traffic and track speed are not impacted. ARRC will work with the Contractor in the advance securing work windows if required, but ARRC cannot guarantee that such work windows will be available, if at all. Delay of trains is unacceptable to ARRC, and the Contractor may be assessed \$300 per minute of unplanned train delay.

OFFEROR REQUIREMENTS

Offerors are required to carefully examine this ITB and its associated documents prior to submitting an offer for work outlined in the Scope of Services. Submission of an offer shall be considered conclusive evidence that the Offeror fully understands the requirements, scope, and location of the work outline in the Scope of Services. By submission of an Offer, Offeror further warrants, agrees and acknowledges all of the following:

- (a) Offeror perceives no ambiguity in the ITB documents or the work as outlined in the Scope of Services and Specifications.
- (b) Each Offeror shall be solely responsible for all costs and expenses associated with the preparation and/or submission of its offer, and ARRC shall have no responsibility or liability whatsoever for any such costs and expenses.
- (c) Pursuant to AS 42.40.910, ARRC is exempt from all forms of state or local sales, property and other taxes. Accordingly, any Offeror who submits an offer shall not include any such tax in any of its offer prices or in any calculation thereof.
- (d) Offeror is satisfied that no conditions exist that could affect the performance and/or cost of work outlined in the Scope of Services including, but not limited to, conditions related to the following:
 1. Movement of personnel and materials on or off of the work site.
 2. Safety of personnel while on work site.
 3. The availability and accessibility of communications systems, water, and electric power at the work site.
 4. Environmental controls and/or protection from weather elements provided at the work site.

5. Offeror is satisfied as to the character, quantity and quality of materials and services to be provided by ARRC pursuant to this ITB.
6. Offeror confirms that the amount of time allowed for completion of the Scope of Services is adequate.
7. Offeror is familiar with and shall comply with all applicable Federal, State and local laws, ordinances and regulations that might affect the work associated with the Scope of Services and/or those engaged in activities related to the work.

Any failure of Offeror to take the actions described above to support the required acknowledgements associated with submission of an offer shall not relieve Offeror from the following responsibilities:

- (a) Offeror is responsible for properly estimating the difficulty and cost of successfully performing the work required by the Scope of Services.
- (b) Offeror is responsible for completing the work required by the Scope of Services without additional expense to ARRC.
- (c) By submission of an Offer, Proposer agrees that ARRC will not be liable for any claims whatsoever (including, but not limited to, claims for additional payments or time) resulting from the following:
 1. Proposer's failure to investigate and become sufficiently knowledgeable of the Scope of Services and conditions under which the work is to be performed.
 2. Proposer's perception of ambiguity in this ITB document and/or the Scope of Services if:
 - (i) Offeror discovers the ambiguity, but fails to notify ARRC;
 - (ii) A particular Proposer fails to discover any ambiguity that would be discovered by any reasonably prudent Offeror in preparing an Offeror.
 3. Offeror's lack of familiarity with any Federal, State and local laws, ordinances and regulations that may, in any manner, affect cost, progress or performance required by the Scope of Services.

Offeror's shall promptly notify ARRC of any ambiguity, inconsistency, conflict, or error which they may discover upon examination of the Invitation to Bid documents. Verbal inquiries are permitted ONLY at the Pre-Bid meeting. All other inquiries must be made in writing and received at ARRC's offices prior to the Pre-Bid meeting. ARRC will respond to all or part of the written inquiries received through the issuance of a written amendment to this solicitation (ITB).

All submitted offers will be considered confidential until notice of intent to award is issued. After notice of intent to award is issued, all offers will become public information.

APPENDIX C

BIDDERS INSTRUCTIONS & SPECIAL REQUIREMENTS (CONSTRUCTION)

To be considered for award, Bids must be made in accordance with the following requirements:

Duty to Seek Clarification: ARRC shall not be held responsible for a Bidder's lack of understanding of what is required by the Invitation to Bid. Should a Bidder not understand any aspect of the Invitation to Bid, or require further explanation or clarification regarding the intent or requirements of the same, it shall be the responsibility of the Bidder to seek clarification from ARRC prior to submitting his or her Bid.

Terms and Conditions: Any resulting contract from this Invitation to Bid shall incorporate the general terms and conditions contained in this bid package.

Contract Documents: Bidders shall familiarize themselves with the requirements of all of the Contract Documents which include, but are not limited to the "Bidders Instructions & Special Requirements", the Invitation to Bid, Bid and Contract Forms, General Conditions, Special Conditions, Specifications, Drawings, any Addenda issued prior to the receipt of Bids, and any other documents referenced or incorporated therein.

Examination and Interpretation of Documents: Each Bidder shall examine the Contract Documents carefully and shall make written requests to ARRC prior to Bid submission for interpretation or correction of any ambiguity, inconsistency, discrepancy, omission, or error therein which the bidder may discover. Any interpretation or correction will be issued in an Addendum by ARRC. Only a written interpretation or correction shall be binding. No Bidder shall rely on any interpretation or correction given by any other method.

Addenda: ARRC may modify the Invitation to Bid prior to the date fixed for opening of Bids by issuance of an Addendum to all parties who have been furnished the Bid Package for bidding purposes. Bidders must acknowledge receipt of all Addenda on the Construction Bid Form [Form 395-0121].

Qualification of Bidders: Pursuant to ARRC Procurement Rule 1600.3, before a Bid is considered for award, ARRC may request a Bidder to submit information regarding the Bidder's capability in all respects to fully perform the contract requirements or the individual integrity and reliability which will assure good faith performance. Such information shall include the Bidder's prior experience in performing comparable Work, the availability of necessary financing, equipment, facilities, expertise and personnel to perform the Work and whether he or she has ever been terminated or defaulted on construction work.

Bid Forms: Bids must be submitted on the forms provided by ARRC, completed in all respects as required by the Bid Forms and other Contract Documents and manually signed by an authorized official of the Bidder. Bidders may make copies of the Bid Forms for submission of Bids.

Submission of Bids: Bids must be sealed, marked, and addressed as directed in the Invitation to Bid and must be delivered to the office designated in the Invitation to Bid prior to the exact time set for opening bids. Late bids will not be considered.

Modification, Correction, Withdrawal of Bids: Modification, correction or withdrawal of Bids will be allowed only as provided in ARRC Procurement Rule 1200.8.

Bid Opening: Bids will be opened in public at the time set forth in the Invitation to Bid in accordance with ARRC Procurement Rule 1200.6. The contents of the Bids will be open for public inspection after the notice of intent to award a contract is given.

Evaluation of Bids: Bids will be evaluated in accordance with the provisions of ARRC Procurement Rule 1200.7. Alternative bids, if called for, are intended to provide ARRC a range of comparative costs which will allow identification of the combinations most responsive to ARRC's need. The order in which the alternatives are listed or set out in the Invitation to Bid should not be taken as any indication as to the order in which ARRC may elect to select the alternatives, if any. Bidders shall submit bid prices for all alternatives stated in the Invitation to Bid and are advised that the order in which the alternatives, if any, are chosen by ARRC, may affect which Bidder is the lowest responsive and responsible Bidder.

Bid Security: In accordance with ARRC Procurement Rule 1200.4, all Bids shall be accompanied by bid security in the form of a cashier's check or an acceptable Bid Bond, a form of which is provided herein, in the amount of five percent (5%) of the Bid price.

Rejection of Bids: ARRC reserves the right to waive minor defects or informalities in a Bid in accordance with the provisions of ARRC Procurement Rule 1200.8, or to reject any or all Bids in accordance with the provisions of ARRC Procurement Rule 1600.2.

Award of Contract: Unless the Invitation to Bid is canceled or all bids are rejected, the procurement officer shall award a contract based on the solicited bids with reasonable promptness by written notice to the lowest, responsible and responsive Bidder whose bid conforms in all material respects to the requirements and criteria set out in the Invitation to Bid.

Execution of Contract: A written contract must be signed by the Bidder to whom an award is made and returned to ARRC within ten (10) calendar days, together with all required performance and payment bonds, and certificate(s) of insurance in the amounts required by the Invitation to Bid. The Bidder to whom award is made shall not be permitted to occupy the project site until he has first obtained the required insurance

and submitted to ARRC proof of such insurance together with a statement certifying that said insurance conforms to requirements set forth in the Invitation to Bid.

Failure to Execute Contract: If the Bidder to whom the Contract is awarded refuses or neglects to execute it, or fails to furnish the required bonds and insurance within the time specified, the amount of his bid security may be retained by ARRC as liquidated damages.

Government Contract Requirements: If Federal funds will be used to pay for any part of the project described in the Invitation to Bid, any contract awarded hereunder will contain provisions requiring the successful Bidder to comply with all pertinent provisions, agreements, and clauses of the subject federal grant and all pertinent laws, regulations, Presidential directives, and executive orders to the extent they apply to the subject matter of the contract.

Drug and Alcohol-Free Workplace: Safety is paramount at ARRC. For that reason, ARRC maintains an alcohol and drug-free workplace and requires that the Contractor do the same. At all times during the performance of this contract, the Contractor shall have in place a written drug and alcohol program that includes, at a minimum, the following:

- a. a requirement that all applicants present a negative pre-employment drug screen prior to being hired by the Contractor;
- b. a requirement that employees submit to a "reasonable suspicion" drug and/or alcohol test when showing signs and symptoms of drug and/or alcohol influence on duty;
- c. a requirement that employees submit to "reasonable cause/post-accident" drug and alcohol tests following certain accidents or incidents (with the threshold level triggering testing to be determined by the Contractor);
- d. a provision defining a positive alcohol test as one that reveals a breath alcohol level of .02 or greater;
- e. a provision defining a positive drug test as one that reveals concentrations at the levels set forth in 49 C.F.R. § 40.87(b)(screening test) and 49 C.F.R. § 40.87(c)(confirmatory test) or greater;
- f. a provision that outlines the consequences of a positive drug or alcohol test and the consequences of an employee's refusal to submit to drug/alcohol testing; and
- g. a provision that establishes the conditions under which an employee may return to work following a positive drug and/or alcohol test, which at a minimum

include an evaluation by a substance abuse professional and compliance with a recommended treatment program.

The Contractor agrees that at any time during the performance of this contract, if an ARRC employee reports to the Contractor that an employee of the Contractor or its subcontractor is showing signs and symptoms of drug/alcohol influence on duty, the Contractor shall remove the employee from ARRC property immediately and shall have the employee tested for drug/alcohol influence. If the employee tests positive, the Contractor shall ensure that the employee is not returned to work on the project until he/she has met the return to work requirements contained in the Contractor's written program.

Offer Acceptance Period: For the purpose of award, offers made in accordance with this ITB shall be good and firm for a period of thirty (30) days from the date of bid opening.

Site-Safety Plan Requirement: Before the contractor or any subcontractor begins any construction related work under this contract including but not limited to mobilization, equipment setup, storage, etc., taking place on sites under Alaska Railroad Corporation (ARRC) control, they will submit a site Health and Safety Plan to ARRC for compatibility acceptance.

The plan must be compatible with ARRC Safety Policies, including On-Track Safety, ARRC on-site employee safety including safety for Project Managers, Construction Managers, Flaggers, Visitors, Safety personnel, Quality Assurance staff, vendors, and the public. The plan must outline procedures for first aid, emergency response, chemical exposures, spills, site sign-in requirements for site-safety briefings, coordination with ARRC dispatch, Section 6.16 (SAFETY AND PROTECTION), Section 6.17 (WORK SAFETY ON RAILROAD PROPERTY), and Section 6.18 (EMERGENCIES), other sections of the contract GENERAL CONDITIONS, Appendix E.

A complete, detailed Site-Safety Plan shall be submitted to the Project Manager at least 10 days prior to commencement of any Work on the Project

Contractor's Instructions for Submitting Certified Payroll:

This contract includes work on an Alaska Railroad Corporation (ARRC) construction project, which is subject to the wage/certified payroll requirements of the Alaska Department of Labor Workforce Development (DOLWD) and/or it may include work on a federally funded construction project and be subject to U. S. Department of Labor Davis-Bacon Act wage/certified payroll requirements.

As part of the contract the following will be required:

1. All contractors on a construction project funded in whole or in part with federal funds shall pay laborers and mechanics the higher of the two wages listed in this

contract from the U. S. Department of Labor (www.access.gpo.gov/davisbacon/ or <http://www.gpo.gov/davisbacon/ak.html>) or from the DOLWD (www.labor.state.ak.us/lss/home.htm). Contractors on an ARRC-funded construction project shall pay laborers and mechanics the appropriate wage established by the DOLWD under the Little Davis Bacon Act.

2. All contractors employing laborers and mechanics on the project for must submit weekly certified payrolls that contain the information listed on the DOLWD Weekly Certified Payroll Form 07-6058, pages 1 and 2. Page 2 is the “Statement of Compliance” and must bear an original signature. The prime contractor is responsible for gathering the certified payrolls from each subcontractor and for submitting them, along with their own, to ARRC.
3. These weekly certified payrolls must be sent to ARRC within seven days after the regular “payday” for that certified payroll at the following address:

Alaska Railroad Corporation
Attn: Certified Payroll Clerk
P.O. Box 107500
Anchorage, AK 99510-7500

The contractor and its subcontractors are also responsible for filing certified payrolls with DOLWD as required.

4. The certified payroll must be completely filled out by the contractor including, but not limited to:
 - i. **Contractor’s complete name**, including joint ventures, Inc., LLC, etc.
 - ii. **Contractor’s license number**, also called the contractor’s registration number, is required in addition to a business license to do construction work in the state
 - iii. **Employee’s**
 - a. Name
 - b. Address (domicile and mailing)
 - c. Social security number
 - d. Job classification
 - e. Hours worked
 - f. Wages/fringe benefits paid
 - iv. **Contracting agency project number**, which is the ARRC contract/purchase order number and is listed on the DOLWD finalized Notice of Work. This notice also lists the **DOLWD project number, project name, and location**. The prime contractor will supply all of this information to its subcontractors.
 - v. **Week ending date and payroll numbers**. The first week or part of a week of payroll will be designated as payroll number 1 for the first

week, 2 for the second week, etc. until the final week worked on the project. If no work is completed during a given week, the contractor must nonetheless submit a certified payroll for that week, with the appropriate consecutive payroll number for that week, and write “No Work Performed” on payroll.

- vi. The **Statement of Compliance** must be completely filled out indicating how fringe benefits are paid and listing the payroll period. The Statement of Compliance must be signed, dated, and filed within seven days of the payment date of the payroll.
- vii. **Stamp or write “Confidential”** on the certified payroll to help insure the privacy of contractor employees.

Sample copies of DOLWD certified payroll forms with the “Statement of Compliance” is shown in Figures 1 and 2 below.

Failure to timely submit complete and accurately filled out weekly certified payrolls to ARRC may result in the delay of payment on the contract.



Alaska Department of Labor & Workforce Development
Labor Standards & Safety Division
Wage & Hour Administration

CERTIFIED PAYROLL

Contractor Name Alaska Strong Steel, Inc.		Contractor License No. 28888		Week Ending 18-Dec-04		Payroll No. 1		Contracting Agency Project # .5604		Dept. Labor Project # 04/12-1500		Address 782 Northridge Avenue, Anchorage, AK 99503											
Phone 907-555-1212		Name, SSN, Permanent Domicile Address (NO P.O. BOX or RURAL ROUTES ACCEPTED) and Mailing Address (if different) for each employee Social Security numbers (SSN) MUST be included for all employees Joe H. Worker, SSN: 555-55-5555 316 Timber Lake Road Anchorage, AK 99515		Specific Work Class Code Including certificate #'s for Electricians, Plumbers, Painters, Powdermen, Adapters Workers, Truck Drivers include truck license number S0301		Union Member-ship? If NONE put N/A N/A		Date of the Month S M T W TH F S 0.50 1.00 8.00 8.00 8.00 8.00 0.00 8.50 9.00 8.00 8.00 0.00		Total Hours Worked 1.50 32.00 41.5		Hourly Rate Paid 42.15 28.10 12.75		Gross Amount Earned 63.23 899.20 427.13		Contract Amount \$50,000.00		Date Work Started 12-Dec-04		Est. Completion Date October-05			
DEDUCTIONS																							
FICA		Gross Amount Earned		Total Hours Worked		Hourly Rate Paid		FED WITH TAX		ESD		UNION DUES		MEDICAL INSURANCE		OTHER (EPLANS)		Total DEDUCTIONS		Net Amount Paid		Check No. #678 110404	
		427.13		41.5		12.75		259.21										385.50		1074.05			

CONFIDENTIAL

Figure 1. Sample Certified Payroll Form with Social Security Numbers

STATEMENT OF COMPLIANCE

CERTIFIED PAYROLL FORM 07-6058

SSN MUST be listed for each employee on payroll

Contractors & Subcontractors Please Note!!!

8 AAC 30.020 CERTIFIED PAYROLL. (a) All Contractors (including owner/operators) who perform work on a public construction contract for the state or political subdivision of the state shall file with the Department of Labor and Workforce Development a certified payroll (Form 07-6058) before Friday of each week that covers the preceding week.

(b) The certified payroll shall be submitted to the Department's regional office in which the work is performed.

Region I.

North of N63°

Labor Standards & Safety Div. DOLWD

675 7th Ave., Station J-1

Fairbanks, AK 99701-4593

(907) 451-2886 Fax: (907) 451-2885

Region II.

South of N63°

Labor Standards & Safety Div. DOLWD

3301 Eagle Street, Suite 301

Anchorage, AK 99503-4149

(907) 269-4900 Fax: (907) 269-4915

Region IIIA, Southeast Alaska.

(From Yakutat south)

Labor Standards & Safety, DOLWD

P. O. Box 21149

1111 W. 8th Street, Rm 302

Juneau, AK 99801

(907) 465-4842 Fax: (907) 465-3584

In lieu of submitting Form 07-6058, contractors may submit his/her payroll form. THE FORM MUST CONTAIN SOCIAL SECURITY NUMBERS FOR EACH EMPLOYEE.

The contractor's payroll records must contain the same information required on this form.

Sec. 35.05040 requires that all contractors or subcontractors who perform work on a public construction contract for the state or a political subdivision of the state shall, BEFORE

FRIDAY OF EACH WEEK, file with the Department of Labor and Workforce Development (DOLWD), a sworn affidavit for the previous week, setting out in detail the

number of workers employed, wages paid each week, job classification of each employee, hours worked each day and week, and other information which the DOLWD requires.

CONTRACTORS WHO DISOBEY THEIR OBLIGATIONS TO THEIR EMPLOYEES, INCLUDING PAYMENT OF THE APPROPRIATE PREVAILING RATES OF PAY, UNCONDITIONAL PAYMENT,

AND PAYMENT NOT LESS THAN ONCE A WEEK MAY BE DEBARRED FROM PUBLIC CONSTRUCTION.

Date:

22-Dec-04

(2) That Alaska Strong Steel, Inc.

(Contractor / Subcontractor)

I, Jane Doe, President do hereby state

(Name of Signatory Party) (Title)

(1) That I pay or supervise the payment of persons employed by

Alaska Strong Steel, Inc.

(Contractor / Subcontractor)

Gold Creek Bridge Project; that during the payroll

(Building or work)

period commencing on 12-Dec-04, and ending on

(date)

18-Dec-04, all persons employed on said project have

(date)

been paid full weekly wages earned, that no rebates have

been or will be made either directly or indirectly to or on behalf of

said

Alaska Strong Steel, Inc.

(Contractor / Subcontractor)

from the full weekly wages earned by an person, and that no deductions have been made either directly or indirectly from the full wages earned by any person, other than permissible

deductions, on projects covered by Alaska Statute 36 as defined in regulations issued by the Commissioner of Labor, or on Federal Projects as defined in Regulations, Part 3 (29 CFR Subtitle A), issued by the Secretary of Labor under the Copeland Act, as

amended (48 Stat. 948; 63 Stat. 108; 72 Stat. 967; 76 Stat. 357; 40 USC 275 (c), and described below:

(3) That any payrolls otherwise under this contract required to be submitted for the above period are correct and complete;

(4) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship program registered with the State apprenticeship agency recognized by the Bureau of Apprenticeship and Training, United States Department of Labor, or if no such agency exists in the State, are registered with the Bureau of Apprenticeship and Training, United States Department of Labor, or

(5) That I am a bona fide owner/operator and that my contract amount meets or exceeds the prevailing wage for each hour I have worked. My last progress payment was received on

For

(6) That where fringe benefits are paid to approved plans, funds or programs: (check all applicable items)

(a) In addition to the basic hourly wage rates paid to each laborer, mechanic or field surveyor listed on this payroll, payments of fringe benefits as currently published by DOLWD have been or will be made to a union trust.

(b) In addition to the basic hourly wage rates paid to each laborer, mechanic or field surveyor listed on this payroll, payments of fringe benefits as currently published by DOLWD have been or will be made to a union trust.

(6) Each laborer, mechanic or field surveyor listed on the payroll has been paid, as indicated on the payroll, an amount not less than the sum of the applicable basic hourly wage rate plus the amount of the required fringe benefits as currently published by DOLWD, except as noted in Section 6(d).

(7) Exceptions:

(8) Exceptions:

(9) Exceptions:

(10) Exceptions:

(11) Exceptions:

(12) Exceptions:

Table with 2 columns: Exception (Craft), Explanation

The willful falsification of any of the above information may subject the contractor or subcontractor to civil or criminal prosecution. See Section 10071 of Title 18 and Section 231 of the United States Code. Also see AS 36.05.060.

Jane Doe

Signature (original signature required)

APPENDIX D

FORMS

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Bidder Questionnaire

Note: Failure to provide the information requested in this questionnaire may be cause for rejection of your bid or offer on the grounds of non-responsiveness and/or non-responsibility.

Project: ITB 17-29-206050 Manual Switch Monitoring Equipment and Construction: Girdwood to Potter, AK

Name of Your Business: _____

Street Address: _____

Mailing Address if Different: _____

City: _____ State: _____ Mailing Zip: _____

Telephone: _____ Fax: _____ E-Mail: _____

Date Firm Established:

How many years has the business been under the above name? _____

Previous business name(s) if any: _____

Federal Tax ID Number: _____

Business License Number: _____

Contractor License Number (For Construction): _____

Bid Acceptance Period _____ Days. (Bids providing less than thirty - 30 calendar days for acceptance may be considered non-responsive and may be rejected.)

Discount for prompt pay _____ % _____ days.

The bidder shall list any variations from or exceptions to the Terms, Conditions or Specifications of the Invitation to Bid:

OVER PLEASE—continued on reverse

List the three most recent contracts performed by your company where the commodity or service requested in this Invitation to Bid was the primary commodity or service supplied. Include the client's name, contract amount, contract date, person to contact regarding performance, their telephone, facsimile number and e-mail.

Clients name, Contact person, Contact info. Description of Work and Contract Amount
(Provide: telephone, fax, and email)

List any other business related experience:	

Are you acting as a broker or the primary supplier in this transaction?

- Broker
- Primary Supplier

Business Information (Please check all that apply):

- My business is Individual
- My business is a Partnership
- My business is a Non-Profit
- My business is a Joint-Venture
- My business is a Corporation incorporated under the laws of the State of _____
- My business is full-time
- My business is part-time
- My business **is not** a certified Disadvantaged Business (DBE)
- My business **is** a certified DBE
- My DBE was certified by State DOTPF
- My DBE was certified by the Municipality of Anchorage
- My business is an 8(a)/WBE/MBE and is certified by SBA
- My business was certified by _____
- My DBE Certification # is _____

Firms Annual Gross Receipts:

- <\$500,000
- \$500,000 - \$999,999
- \$1,000,000 - \$4,999,999
- \$5,000,000 - \$9,999,999
- \$10,000,000 - \$16,999,999
- >\$17,000,000

Completed by: _____ **Title:** _____

Signature: _____ **Date:** _____

**ALASKA RAILROAD CORPORATION
CONSTRUCTION BID FORM of**

NAME _____

ADDRESS _____

To the CONTRACTING OFFICER, ALASKA RAILROAD CORPORATION:

In compliance with your Invitation to Bid Number, Invitation to Bid 15-50-204341 December 15, 2015, the Undersigned proposes to furnish and deliver all the materials and do all the work and labor required in the construction of the Manual Switch Monitoring Equipment and Construction project, located at or near Talkeetna, Alaska according to the plans and specifications and for the amount and prices named herein as indicated on the Cost Schedule, which is made a part of this Bid.

The Undersigned declares that he/she has carefully examined the contract requirements and that he/she has made a personal examination of the site of the work; that he/she understands that the quantities, where such are specified in the Cost Schedule or on the plans for this Project, are approximate only and subject to increase or decrease, and that he/she is willing to perform increased or decreased quantities of work at unit prices bid under the conditions set forth in the Contract Documents.

The Undersigned hereby agrees to execute the said contract and bonds within **Ten (10) Calendar Days**, or such further time as may be allowed in writing by the Contracting Officer, after receiving notification of the acceptance of this Bid, and it is hereby mutually understood and agreed that in case the Undersigned does not, the accompanying bid guarantee shall be forfeited to the Alaska Railroad Corporation as liquidated damages, and said Contracting Officer may proceed to award the contract to others.

The Undersigned agrees to commence the work within **Ten (10) Calendar Days** after the effective date of the Notice to Proceed and to complete the work by _____, unless extended in writing by the Contracting Officer.

The Undersigned proposes to furnish a Payment Bond in the amount of One Hundred Percent (100%) and a Performance Bond in the amount of One Hundred Percent (100%) (of the contract), as surety conditioned for the full, complete and faithful performance of this contract.

The Undersigned acknowledges receipt of the following addenda to the drawings and/or specifications (give number and date of each).

Addenda No.	Date Issued	Addenda No.	Date Issued	Addenda No.	Date Issued
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

NON-COLLUSION AFFIDAVIT

The Undersigned declares, under penalty of perjury under the laws of the United States, that neither he/she nor the firm, association, or corporation of which he/she is a member, has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this Bid.

The Undersigned has read the foregoing proposal and hereby agrees to the conditions stated therein by affixing his/her signature below:

Signature

Name and Title of Person Signing

Telephone Number

Facsimile Number

ALASKA RAILROAD CORPORATION - BID BOND

for ITB 17-29-206050 Manual Switch Monitoring Equipment and
Construction: Girdwood to Potter, AK

	DATE BOND EXECUTED
PRINCIPAL (Legal name and business address)	TYPE OF ORGANIZATION
	<input type="checkbox"/> INDIVIDUAL <input type="checkbox"/> PARTNERSHIP <input type="checkbox"/> JOINT VENTURE <input type="checkbox"/> CORPORATION
	STATE OF INCORPORATION

SURETY(IES) (Name and business address)		
A.	B.	C.

PENAL SUM OF BOND	DATE OF BID
--------------------------	--------------------

We, the PRINCIPAL and SURETY above named, are held and firmly bound to the Alaska Railroad Corporation (ARRC), in the penal sum of the amount stated above, for the payment of which sum will be made, we bind ourselves and our legal representatives and successors, jointly and severally, by this instrument.

THE CONDITION OF THE FOREGOING OBLIGATION is that the Principal has submitted the accompanying bid or proposal in writing, date as shown above, on the following project: _____, in accordance with contract documents filed in the office of the Contracting Officer, and under the Invitation for Bids therefore, and is required to furnish a bond in the amount stated above.

If the Principal's bid is accepted and he/she is offered the proposed contract for award, and if Principal fails to enter into the contract, then the obligation to ARRC created by this bond shall be in full force and effect.

If the Principal enters into the contract, then the foregoing obligation is null and void.

PRINCIPAL				
Signature(s)	1.	2.	3.	Corporate Seal
Name(s) & Titles [Typed]	1.	2.	3.	

CORPORATE SURETY(IES)				
S U R E T Y A	Name of Corporation		State of Incorporation	Liability Limit \$
	Signature(s)	1.	2.	Corporate Seal
	Name(s) & Titles [Typed]	1.	2.	

CORPORATE SURETY(IES)

S U R E T Y B	Name of Corporation		State of Incorporation	Liability Limit \$
	Signature(s)	1.	2.	Corporate Seal
	Name(s) & Titles [Typed]	1.	2.	

CORPORATE SURETY(IES)

S U R E T Y C	Name of Corporation		State of Incorporation	Liability Limit \$
	Signature(s)	1.	2.	Corporate Seal
	Name(s) & Titles [Typed]	1.	2.	

INSTRUCTIONS

1. This form shall be used whenever a bid bond is submitted.
2. Insert the full legal name and business address of the Principal in the space designated. If the Principal is a partnership or joint venture, the names of all principal parties must be included (e.g., "Smith Construction, Inc. and Jones Contracting, Inc. dba Smith/Jones Builders, a Joint Venture"). If the Principal is a corporation, the name of the state in which incorporated shall be inserted in the space provided.
3. Insert the full legal name and business address of the Surety in the space designated. The Surety on the bond may be any corporation or partnership authorized to do business in Alaska as an insurer under AS 21.09. Individual sureties will not be accepted.
4. The penal amount of the bond may be shown either as an amount (in words and figures) or as a percent of the contract bid price (a not-to-exceed amount may be included).
5. The scheduled bid opening date shall be entered in the space marked Date of Bid.
6. The bond shall be executed by authorized representatives of the Principal and Surety. Corporations executing the bond shall also affix their corporate seal.
7. Any person signing in a representative capacity (e.g., an attorney-in-fact) must furnish evidence of authority if that representative is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved.
8. The states of incorporation and the limits of liability of each surety shall be indicated in the spaces provided.
9. The date that bond is executed must not be later than the bid opening date.

Form 395-0120

ALASKA RAILROAD CORPORATION

SUBCONTRACTOR LIST

[First Tier Subcontractors Only]

The apparent low bidder shall complete this form and submit it so as to be received by the Contracting Officer prior to the close of business on the **Fifth (5th) Working Day** after receipt of written notice from the Alaska Railroad Corporation.

Failure to submit this form with all required information by the due date will result in the bidder being declared non-responsive and may result in the forfeiture of the Bid Security.

Scope of work must be clearly defined. If an item of work is to be performed by more than one (1) firm, indicate the portion or percent of work to be done by each.

Check as applicable: All work on the below-referenced project will be accomplished without subcontracts greater than ½ of 1% of the contract amount.

Or

Subcontractor List is as follows:

FIRM NAME, ADDRESS, TELEPHONE NUMBER	BUSINESS LICENSE NUMBER AND CONTRACTOR'S REGISTRATION NUMBER	SCOPE OF WORK TO BE PERFORMED	TOTAL DOLLAR AMOUNT OF WORK

[CONTINUE SUBCONTRACTOR INFORMATION ON REVERSE]

I hereby certify that the above-listed licenses and registrations were valid at the time bids were received for this project. For contracts involving Federal-aid funding, Alaska Business License and Contractor Registration will be required prior to award of a subcontract.

COMPANY NAME

SIGNATURE BY AND FOR THE BIDDER

COMPANY ADDRESS

PRINTED NAME OF BIDDER

COMPANY ADDRESS

DATE OF BID

CONTACT PHONE NUMBER

CONTACT FAX NUMBER

FIRM NAME, ADDRESS, TELEPHONE NUMBER	BUSINESS LICENSE NUMBER AND CONTRACTOR'S REGISTRATION NUMBER	SCOPE OF WORK TO BE PERFORMED	TOTAL DOLLAR AMOUNT OF WORK

**ALASKA RAILROAD CORPORATION
PAYMENT BOND**

KNOW ALL PERSONS BY THESE PRESENTS:

That _____
of: _____ as Principal,
and _____
of: _____ as Surety,
firmly bound and held unto the Alaska Railroad Corporation in the penal sum of _____ Dollars (\$ _____),
good and lawful money of the United States of America for the payment whereof, well and truly to be paid
to the Alaska Railroad Corporation, we bind ourselves, our heirs, successors, executors, administrators,
and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has entered into a written contract with said Alaska Railroad Corporation,
on the _____ of _____, 20_____,
for _____, said work to be done
according to the terms of said contract. **ARRC Project: ITB 17-29-206050 Manual Switch
Monitoring Equipment and Construction: Girdwood to Potter, AK.**

NOW, THEREFORE, the conditions of the foregoing obligation is such that if the said Principal shall
comply with all requirements of law and pay, as they become due, all just claims for labor performed and
materials and supplies furnished upon or for the work under said contract, whether said labor be
performed and said materials and supplies be furnished under the original contract, any subcontract, or
any and all duly authorized modifications thereto, then these presents shall become null and void;
otherwise they shall remain in full force and effect.

IN WITNESS WHEREOF, We have hereunto set our hands and seals this _____ day of
_____, 20_____.

Principal: _____

Address: _____

Telephone Number: _____

Contact Name: _____

By: _____

By: _____

Surety: _____

Address: _____

Contact Name: _____

By: _____

By: _____

The offered bond has been checked for adequacy under the applicable statutes and regulations:

Alaska Railroad Corporation [Authorized Representative] _____ Date

(Instructions on Next Page)

INSTRUCTIONS

1. This form, for the protection of persons supplying labor and material, shall be used whenever a payment bond is required. There shall be no deviation from this form without approval from the Contracting Officer.
2. The full legal name, business address, telephone number, and point of contact of the Principal and Surety shall be inserted on the face of the form. Where more than a single surety is involved, a separate form shall be executed for each surety.
3. The penal amount of the bond, or in the case of more than one surety the amount of obligation, shall be entered in words and in figures.
4. The bond shall be signed by authorized persons. Where such persons are signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of authority must be furnished.

Form 395-0126

**ALASKA RAILROAD CORPORATION
PERFORMANCE BOND**

KNOW ALL PERSONS BY THESE PRESENTS:

That _____
of: _____ as Principal,
and _____
of: _____ as Surety,
firmly bound and held unto the Alaska Railroad Corporation in the penal sum of _____ Dollars (\$ _____),
good and lawful money of the United States of America for the payment whereof, well and truly to be paid
to the Alaska Railroad Corporation, we bind ourselves, our heirs, successors, executors, administrators,
and assigns, jointly and severally, firmly by these presents.

WHEREAS, the said Principal has entered into a written contract with said Alaska Railroad Corporation,
on the _____ of _____, 20____,
for _____,

said work to be done according to the terms of said contract. **ARRC Project: ITB 17-29-206050
Manual Switch Monitoring Equipment and Construction: Girdwood to Potter, AK.**

NOW, THEREFORE, the conditions of the foregoing obligation is such that if the said Principal shall well
and truly perform and complete all obligations and work under said contract and if the Principal shall
reimburse upon demand of the Alaska Railroad Corporation any sums paid him/her which exceed the
final payment determined to be due upon completion of the project, then these presents shall become null
and void; otherwise they shall remain in full force and effect.

IN WITNESS WHEREOF, We have hereunto set our hands and seals this _____ day of
_____, 20_____.

Principal: _____
Address: _____
Telephone Number: _____
Contact Name: _____

By: _____
By: _____

Surety: _____
Address: _____
Contact Name: _____

By: _____
By: _____

The offered bond has been checked for adequacy under the applicable statutes and regulations:

Alaska Railroad Corporation

(Instructions on Next Page)

[Authorized Representative] Date

INSTRUCTIONS

1. This form shall be used whenever a performance bond is required. There shall be no deviation from this form without approval from the Contracting Officer.
2. The full legal name, business address, telephone number, and point of contact of the Principal and Surety shall be inserted on the face of the form. Where more than a single surety is involved, a separate form shall be executed for each surety.
3. The penal amount of the bond, or in the case of more than one surety the amount of obligation, shall be entered in words and in figures.
4. The bond shall be signed by authorized persons. Where such persons are signing in a representative capacity (e.g., an attorney-in-fact), but is not a member of the firm, partnership, or joint venture, or an officer of the corporation involved, evidence of authority must be furnished.

Form 395-0127

**ALASKA RAILROAD CORPORATION
CONSTRUCTION CONTRACT (Sample)**

Contract Number: _____

This CONTRACT, between the ALASKA RAILROAD CORPORATION, herein called ARRC, acting by and through its Contracting Officer, and **Contractors Named Here**

a Corporation, incorporated under the laws of the State of Alaska, its successors and assigns, hereinafter called the Contractor, is effective the date of the signature of the Contracting Officer on this document.

Billing Information: Invoices shall be submitted to Accounts Payable, Alaska Railroad Corporation, PO Box 107500, Anchorage, AK 99510-7500. Please reference your contract number on all invoices and correspondence.

WITNESSETH: That the Contractor, for and in consideration of the payment or payments herein specified and agreed to by ARRC, hereby covenants and agrees to furnish and deliver all the materials and to do and perform all the work and labor required in the construction of the following project: **ITB 15-50-204341 Manual Switch Monitoring Equipment and Construction** at the prices bid by the Contractor for the respective estimated quantities aggregating approximately the sum of: **Bid Amount dollars and zero/cents (\$____.00)** for the Base Bid and such other items as are mentioned in the original Bid, which Bid and prices named, together with the Contract Documents (Invitation to Bid, Addenda & Contract) and Contractors Bid are made a part of this Contract and accepted as such, the project being situated at the Alaska Railroad stations of Deadhorse and Usibelli, Alaska.

It is distinctly understood and agreed that no claim for additional work or materials, done or furnished by the Contractor and not specifically herein provided for shall be allowed by ARRC, nor shall the Contractor do any work or furnish any material not covered by this Contract, unless such work is ordered in writing by ARRC. In no event shall ARRC be liable for any materials furnished or used, or for any work or labor done, unless the materials, work, or labor are required by the Contract or on written order furnished by ARRC. Any such work or materials which may be done or furnished by the Contractor without written order first being given shall be at the Contractor's own risk, cost, and expense and the Contractor hereby covenants and agrees to make no claim for compensation for work or materials done or furnished without any such written order.

The Contractor further covenants and agrees that all materials shall be furnished and delivered and all labor shall be done and performed, in every respect, to the satisfaction of ARRC, **November 30, 2018.**

It is expressly understood and agreed that in case of the failure on the part of the Contractor, for any reason, except with the written consent of ARRC, to complete the furnishing and delivery of materials and the doing and performance of the work before the aforesaid date, ARRC shall have the right to deduct from any money due or which may become due the Contractor, or if no money shall be due, ARRC shall have the right to recover liquidated damages as spelled out in General Conditions, Construction. The bonds given by the Contractor in the sum of: **100% of Bid Amount \$____.00 Payment Bond, and 100% of Bid Amount _____.00 Performance Bond**, to secure the proper compliance with the terms and provisions of this Contract, are submitted herewith and made a part hereof.

IN WITNESS WHEREOF, the parties hereto have executed this Contract and hereby agree to its terms and conditions.

CONTRACTOR

Name of Contractor

Signature

Date

Name and Title

(Corporate Seal)

ALASKA RAILROAD CORPORATION

Contracting Officer (Signature)

Date

Typed or Print Name

Form 395-0122

APPENDIX E

REQUIRED CONTRACT PROVISIONS FOR FEDERAL-AID CONTRACTS [Revised August 19, 2013]

The following contract provisions shall apply, where applicable, to all work performed on the contract by the contractor's own organization and by subcontractors. As provided in this Section, the contractor shall insert in each subcontract all of the stipulations contained in these Required Contract Provisions and further require their inclusion in any lower tier subcontracts or purchase orders that may in turn be made. Incorporation by reference shall not be allowed. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with all applicable Required Contract Provisions.

1. CARGO PREFERENCE REQUIREMENTS - 46 USC §1241, 46 CFR Part 381 [Applicable to all Federal-aid contracts involving equipment, materials or commodities which may be transported by ocean vessel]

Cargo Preference Use of United States - Flag Vessels - The contractor agrees: **a. to use** privately owned United States-Flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for United States-Flag commercial vessels; **b. to furnish** within twenty (20) working days following the date of loading for shipments originating within the United States or within thirty (30) working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, "on-board" commercial ocean bill-of-lading in English for each shipment of cargo described in the preceding subsection to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to ARRC (through the contractor in the case of a subcontractor's bill-of-lading.) **c. to include these** requirements in all subcontracts issued pursuant to this contract when the subcontract may involve the transport of equipment, material, or commodities by ocean vessel.

2. DEBARMENT, SUSPENSION, INELIGIBILITY & VOLUNTARY EXCLUSION - 49 CFR Part 29; Executive Order 12549 [Applicable to all Federal-aid contracts which exceed \$25,000]

Instructions for Certification - Lower Tier Covered Transactions:

1. By signing and submitting this bid or proposal, the prospective lower tier participant is providing the signed certification set out below.

2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, ARRC may pursue available remedies, including suspension and/or debarment.

3. The prospective lower tier participant shall provide immediate written notice to ARRC if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "persons," "lower tier covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of rules implementing Executive Order 12549 [49 CFR Part 29]. You may contact ARRC for assistance in obtaining a copy of those regulations.

5. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized in writing by ARRC.

6. The prospective lower tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction", without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the Non-procurement List issued by U.S. General Service Administration.

8. Nothing contained in the foregoing shall be construed to require establishment of system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under Paragraph 5 of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to all remedies available to the Federal Government, ARRC may pursue available remedies including suspension and/or debarment.

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion Lower Tier Covered Transaction

(1) The prospective lower tier participant certifies, by submission of this bid or proposal, that neither it nor its "principals" [as defined at 49 CFR §29.105(p)] is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal department or agency.

(2) When the prospective lower tier participant is unable to certify to the statements in this certification, such prospective participant shall attach an explanation to this proposal.

3. DAVIS-BACON AND COPELAND ANTI-KICKBACK ACTS - 40 USC 3141 et seq.; 18 USC 874; 29 CFR Part 5; 49 CFR 18.36(i)(5) [Applicable to all Federal-aid construction contracts which exceed \$2,000]

(1) Minimum wages - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made

or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and

(4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or

(C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or

(C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) Withholding - ARRC shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, ARRC may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to ARRC for transmission to the Federal grantor agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors.

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete;

(2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

(iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal grantor agency or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant,

or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements - The contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

(6) Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility - (i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

4. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT - 40 USC 3701 et seq.; 29 CFR Part 5; 29 CFR §1926 [Applicable to all Federal-aid construction in excess of \$100,000 and all nonconstruction contracts which employ mechanics and laborers on a public work in excess of \$100,000]

A. Overtime (Applicable to construction and nonconstuction contracts)

(1) Overtime requirements - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in paragraph (1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of

the clause set forth in paragraph (1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1) of this section.

(3) Withholding for unpaid wages and liquidated damages - ARRC shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2) of this section.

(4) Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses set forth in this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in this section.

(5) Payrolls and basic records - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

B. Contract Work Hours and Safety Standards Act (Applicable to construction contracts only) (i) The Contractor agrees to comply with section 107 of the Contract Work Hours and Safety Standards Act, 40 USC § 333, and applicable DOL regulations, "Safety and Health Regulations for Construction" 29 CFR Part 1926. Among other things, the Contractor agrees that it will not require any laborer or mechanic to work in unsanitary, hazardous, or dangerous surroundings or working conditions.

(ii) **Subcontracts** - The Contractor also agrees to include the requirements of this section in each subcontract. The term "subcontract" under this section is considered to refer to a person who agrees to perform any part of the labor or material requirements of a contract for construction, alteration or repair. A person who undertakes to perform a portion of a contract involving the furnishing of supplies or materials will be considered a "subcontractor" under this section if the work in question involves the performance of construction work and is to be performed: (1) directly on or near the construction site, or (2) by the employer for the specific project on a customized basis. Thus, a supplier of materials which will become an integral part of the construction is a "subcontractor" if the supplier fabricates or assembles the goods or materials in question specifically for the construction project and the work involved may be said to be construction activity. If the goods or materials in question are ordinarily sold to other customers from regular inventory, the supplier is not a "subcontractor." The requirements of this section do not apply to contracts or subcontracts for the purchase of supplies or materials or articles normally available on the open market.

5. CLEAN WATER REQUIREMENTS - 33 USC 1251 [Applicable to all Federal-aid contracts which exceed \$100,000]

Clean Water - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq. The Contractor agrees to report each violation to ARRC and understands and agrees that ARRC will, in turn, report each violation as required to assure notification to the Federal grantor agency and the appropriate EPA Regional Office. (2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal funds.

6. CLEAN AIR REQUIREMENTS - 42 USC 7401 et seq., 40 CFR 15.61 & 49 CFR Part 18 [Applicable to all Federal-aid contracts which exceed \$100,000]

Clean Air - (1) The Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act, as amended, 42 USC 7401 et seq. The Contractor agrees to report each violation to ARRC and understands and agrees that ARRC will, in turn, report each violation as required to assure notification to the Federal grantor agency and the appropriate EPA Regional Office. (2) The Contractor also agrees to include these requirements in each subcontract exceeding \$100,000 financed in whole or in part with Federal funds.

7. ACCESS TO RECORDS AND REPORTS - 49 CFR 18.36 [Applicable to all Federal-aid contracts]

Access to Records - The following access to records requirements apply to this Contract:

1. Contractor agrees to provide ARRC, the Federal grantor agency, the Comptroller General, or any of their duly authorized representatives access to the Contractor's books, documents, papers and records which are directly pertinent to this contract for the purpose of making audit, examination, excerpts and transcriptions.
2. Contractor agrees to permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.
3. Contractor agrees to maintain all books, records, accounts and reports required under this contract for a period of not less than three years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case Contractor agrees to maintain the same until ARRC, the Federal grantor agency, the Comptroller General, or any of their duly authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto.

8. FEDERAL CHANGES - 49 CFR Part 18 [Applicable to all Federal-aid contracts]

Federal Changes - Contractor shall at all times comply with all applicable Federal regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Agreement between ARRC and the Federal grantor agency, as they may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

9. NO GOVERNMENT OBLIGATION TO THIRD PARTIES [Applicable to all Federal-aid contracts]

(1) ARRC and Contractor acknowledge and agree that, notwithstanding any concurrence by the Federal Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the Federal Government, the Federal Government is not a party to this contract and shall not be subject to any obligations or liabilities to ARRC, Contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) The Contractor agrees to include the above clause in each subcontract financed in whole or in part with Federal assistance. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

10. PROGRAM FRAUD AND FALSE OR FRAUDULENT STATEMENTS AND RELATED ACTS - 31 USC 3801 et seq.; 49 CFR Part 31; 18 USC 1001 [Applicable to all Federal-aid contracts]

(1) The Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 USC §3801 et seq. and U.S. DOT regulations, "Program Fraud Civil Remedies," 49 CFR Part 31, apply to its actions pertaining to this Project. Upon execution of the underlying contract, the Contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or the Federally assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, the Contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification, the Federal Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act of 1986 on the Contractor to the extent the Federal Government deems appropriate.

(2) The Contractor also acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submission, or certification to the Federal Government under a contract connected with a project that is financed in whole or in part with Federal assistance, the Government reserves the right to impose the penalties of 18 USC §1001 on the Contractor, to the extent the Federal Government deems appropriate.

(3) The Contractor agrees to include the above two clauses in each subcontract financed in whole or in part with Federal assistance. It is further agreed that the clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

11. SEISMIC SAFETY REQUIREMENTS - 42 USC 7701 et seq. & 49 CFR Part 41 [Applicable only to Federal-aid contracts for the construction of new buildings or additions to existing buildings]

Seismic Safety - The contractor agrees that any new building or addition to an existing building will be designed and constructed in accordance with the standards for Seismic Safety required in Department of Transportation Seismic Safety Regulations, 49 CFR Part 41 and will certify to compliance to the extent required by the regulation. The contractor also agrees to ensure that all work performed under this contract including work performed by a subcontractor is in compliance with the standards required by the Seismic Safety Regulations and the certification of compliance issued on the project.

12. ENERGY CONSERVATION REQUIREMENTS - 42 USC 6321 et seq. & 49 CFR Part 18 [Applicable to all Federal-aid contracts]

Energy Conservation - The Contractor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act.

13. CIVIL RIGHTS REQUIREMENTS - 29 USC §623, 42 USC §2000, 42 USC §6102, 42 USC §12112, 42 USC §12132, 29 CFR Part 1630, & 41 CFR Parts 60 et seq. [Applicable to all Federal-aid contracts]

Civil Rights - The following requirements apply to the underlying contract:

1. Nondiscrimination - In accordance with Title VI of the Civil Rights Act, as amended, 42 USC §2000d, section 303 of the Age Discrimination Act of 1975, as amended, 42 USC §6102, and section 202 of the Americans with Disabilities Act of 1990, 42 USC §12132, the Contractor agrees that it will not discriminate against any employee or applicant for employment because of race, color, creed, national

origin, sex, age, or disability. In addition, the Contractor agrees to comply with applicable Federal implementing regulations and other implementing requirements the Federal grantor agency may issue.

2. Equal Employment Opportunity - The following equal employment opportunity requirements apply to the underlying contract:

(a) Race, Color, Creed, National Origin, Sex - In accordance with Title VII of the Civil Rights Act, as amended, and 42 USC §2000e, the Contractor agrees to comply with all applicable equal employment opportunity requirements of U.S. Department of Labor (U.S. DOL) regulations, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor," 41 CFR Parts 60 et seq., (which implement Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," 42 USC §2000e note), and with any applicable Federal statutes, executive orders, regulations, and Federal policies that may in the future affect construction activities undertaken in the course of the Project. The Contractor agrees to take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, creed, national origin, sex, or age. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. In addition, the Contractor agrees to comply with any implementing requirements the Federal grantor agency may issue.

(b) Age - In accordance with section 4 of the Age Discrimination in Employment Act of 1967, as amended, and 29 USC § 623, the Contractor agrees to refrain from discrimination against present and prospective employees for reason of age. In addition, the Contractor agrees to comply with any implementing requirements the Federal grantor agency may issue.

(c) Disabilities - In accordance with section 102 of the Americans with Disabilities Act, as amended, 42 USC §12112, the Contractor agrees that it will comply with the requirements of U.S. Equal Employment Opportunity Commission, "Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act," 29 CFR Part 1630, pertaining to employment of persons with disabilities. In addition, the Contractor agrees to comply with any implementing requirements the Federal grantor agency may issue.

3. The Contractor also agrees to include these requirements in each subcontract financed in whole or in part with Federal assistance, modified only if necessary to identify the affected parties.

14. BREACHES AND DISPUTE RESOLUTION - 49 CFR Part 18 [Applicable to all Federal-aid contracts in excess of \$100,000]

Disputes - Disputes arising in the performance of this Contract which are not resolved by agreement of the parties shall be decided in accordance with ARRC's Procurement Rules.

Performance During Dispute - Unless otherwise directed by ARRC, Contractor shall continue performance under this contract while matters in dispute are being resolved.

Notification - In addition to the notice requirements set out elsewhere in this contract, if the contractor becomes aware of any act or occurrence which may form the basis of a claim by the contractor for additional compensation or an extension of time for performance, or if any dispute arises regarding a question of fact or interpretation of the contract, the contractor shall immediately inform the Project Manager. If the matter cannot be resolved by agreement within 7 days, the contractor shall, within the next 14 days, submit an Intent to Claim in writing to the Project Manager. The claim, if not resolved, shall be presented to the Project Manager, in writing, within 60 days following receipt of the Intent to Claim. Receipt of the claim will be acknowledged in writing by the Project Manager. The Contractor agrees that unless these written notices are provided, the contractor will have no entitlement to additional time or compensation for such act, event or condition.

Presenting Claim - A claim shall be submitted in accordance with ARRC Procurement Rule 1800.12 and shall specifically include the following:

1. The act, event or condition giving rise to the claim.
2. The contract provisions which apply to the claim and under which relief is provided.
3. The item or items of contract work affected and how they are affected.
4. The specific relief requested, including additional contract time if applicable, and the basis upon which it was calculated.

Claim Validity, Additional Information, & Project Manager's Actions - The claim, in order to be valid, must not only show that the contractor suffered damages or delay but that those conditions were actually a result of the act, event or condition complained of and that the contract provides entitlement to relief to the contractor for such act, event, or condition. The Project Manager reserves the right to make written request to the contractor at any time for additional information which the contractor may possess relative to the claim. The contractor agrees to provide the Project Manager such additional information within 30 days of receipt of such a request. Failure to furnish such additional information may be regarded as a waiver of the claim. The claim, if not resolved by agreement within 60 days of its receipt, will automatically be forwarded to the Manager of Purchasing & Materials for formal written decision.

Decision on Claim - The contractor will be furnished the Manager of Purchasing & Materials' decision within the next 90 days, unless additional information is requested by the ARRC. The Manager of Purchasing & Materials' decision is final and conclusive unless fraudulent as to the Claim.

Notice of Appeal - Within 14 days of receipt of the Manager of Purchasing & Materials' decision, the contractor may deliver a Notice of Appeal to ARRC in accordance with ARRC Procurement Rule 1800.13 and request a hearing. The Notice of Appeal shall include specific exceptions to the Manager of Purchasing & Materials' decision, including specific provisions of the contract, which the contractor intends to rely upon in the appeal. General assertions that the Manager of Purchasing & Materials' decision is contrary to law or to fact are not sufficient.

Decision on Appeal - The decision of the ARRC on appeal will be rendered within 90 days after the conclusion of a hearing conducted under ARRC Procurement Rule 1800.15 or the date of receipt of the Notice of Appeal, whichever is later. The time limits given above may be extended by mutual consent. The decision of ARRC on appeal shall be final and conclusive unless the Contractor appeals to the superior court in accordance with ARRC Procurement Rule 1800.18.

15. NONSEGREGATED FACILITIES [Applicable to all Federal-aid construction contracts and to all related subcontracts of \$10,000 or more]

1. By submission of this bid, the execution of this contract or subcontract, or the consummation of this material supply agreement or purchase order, as appropriate, the bidder, Federal-aid construction contractor, subcontractor, material supplier, or vendor, as appropriate, certifies that the firm does not maintain or provide for its employees any segregated facilities at any of its establishments, and that the firm does not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The firm agrees that a breach of this certification is a violation of the EEO Provisions of this contract. The firm further certifies that no employee will be denied access to adequate facilities on the basis of sex or disability.

2. As used in this certification, the term "segregated facilities" means any waiting rooms, work areas, restrooms and washrooms, restaurants and other eating areas, timeclocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees which are segregated by explicit directive, or are, in fact, segregated on the basis of race, color, religion, or national origin, age or disability, because of habit, local custom, or otherwise. The only exception will be for the disabled when the demands for accessibility override (e.g. disabled parking).

3. The contractor agrees that it has obtained or will obtain identical certification from proposed subcontractors or material suppliers prior to the award of subcontracts or consummation of material supply agreements of \$10,000 or more and that it will retain such certifications in its files.

16. NATIONAL HISTORIC PRESERVATION ACT REQUIREMENTS - 16 USC §470 et seq.
[Applicable to all Federal-Aid contracts]

In the performance of this contract, neither Contractor nor its subcontractors shall take any action (which term includes but is not limited to the seeking of any required federal license or permit, and the extraction of material or natural resources from any source whatsoever) that may affect a district, site, building, structure or object that is included in or eligible for inclusion in the National Register of Historic Places without prior notice to ARRC and compliance with the requirements of the National Historic Preservation Act of 1966, 16 USC § 470 et seq. Contractor is advised that both historic and cultural sites may be eligible for inclusion on the National Register.

17. FLY AMERICA REQUIREMENT - 49 USC §40118; 41 CFR § 301-3.61(b) & 301-10.131 et seq.
[Applicable to all Federal-aid contracts which may involve the international air transportation of equipment, materials, commodities, products or personnel]

The Contractor agrees to comply with 49 U.S.C. 40118 (the "Fly America" Act) in accordance with the General Services Administration's regulations at 41 CFR Part 301-10, which provide that recipients and subrecipients of Federal funds and their contractors are required to use U.S. Flag air carriers for U.S. Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. The Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a U.S. flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. The Contractor agrees to include the requirements of this section in all subcontracts that may involve international air transportation.

18. RECYCLED PRODUCTS - 42 USC §6962; 40 CFR PART 247 [Applicable to all Federal-aid contracts for items designated by the EPA, for the purchase of \$10,000 or more of one of these items during the fiscal year]

The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 USC 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247. The contractor agrees to include this requirement in all subcontracts issued pursuant to this contract when the subcontract may involve the purchase of said items.

19. INCORPORATION OF FEDERAL TRANSIT ADMINISTRATION TERMS - FTA Circular 4220.1F [Applicable to all FTA funded contracts]

The provisions herein include, in part, certain Standard Terms and Conditions required by USDOT, whether or not expressly set forth in the contract provisions. All contractual provisions required by USDOT, as set forth in FTA Circular 4220.1F are incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this agreement. The contractor shall not perform any act, fail to perform any act, or refuse to comply with any ARRC requests which would cause ARRC to be in violation of the FTA terms and conditions.

20. DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM [Applicable to all FTA and FHWA funded contracts]

1. Assurance - The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 C.F.R. Part 26 in the award and administration of U.S. Department of Transportation-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the ARRC deems appropriate.

2. Contract Goal - This contract has no contract goal for the participation of Disadvantaged Business Enterprises (DBEs). Nonetheless, the ARRC strongly encourages the contractor to use the services of small businesses, including DBEs, as subcontractors whenever possible. The ARRC requests that the contractor consider such measures as: (1) subcontracting to small businesses, including DBEs, portions of the work the contractor might otherwise do with its own forces; (2) reducing or waiving subcontractor bonding requirements for small businesses, including DBEs; (3) reviewing the list of businesses certified in the Small Business Administration's 8(a) Business Development Program for potential subcontractors [contact the SBA at (907) 271-4022] and (4) reviewing the list of businesses certified as DBEs by the Alaska Unified Certification Program for potential subcontractors [<http://www.dot.state.ak.us/cvlrts/directory.shtml>].

3 Prompt Payment - The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than thirty (30) days from the receipt of each payment the prime contractor receives from the ARRC. The prime contractor agrees further to return retainage payments to each subcontractor within thirty (30) days after the subcontractor's work is satisfactorily completed. Any retainage not returned to a subcontractor will be reported to the ARRC by the prime contractor. This clause applies to both DBE and non-DBE subcontractors.

21. FHWA BUY AMERICA REQUIREMENTS - 23 CFR §635.410 [Applicable only to FHWA funded construction contracts in excess of \$100,000]

Unless a waiver has been granted by the FHWA, all steel and iron materials which are incorporated into the work, and the action of applying a coating to a covered material (i.e., steel and iron), shall be manufactured in the United States except that minor amounts of steel and iron materials of foreign manufacture may be used, provided the aggregate cost of such materials does not exceed one tenth of one percent (0.1 percent) of the total contract amount, or \$2500, whichever is greater. Coating includes epoxy coating, galvanizing, painting, and any other coating that protects or enhances the value of a material subject to the requirements of this section. For the purposes of this section, the cost is the value of the products as they are delivered to the project. When steel and iron materials manufactured in the United States are shipped to a foreign country where non-steel or iron products are installed on or in them (i.e., electronic components in a steel cabinet), the steel and iron is considered to meet the requirements of this section. A certification of materials origin, attesting to compliance with this provision, shall be furnished to the Engineer prior to incorporating any steel or iron products into the project. Bidders may submit an alternate bid for the project based on the use of foreign iron or steel materials. In this event, the contract will be awarded to the bidder who submits the lowest total responsive bid based on furnishing domestic iron and steel materials unless such total bid exceeds the lowest total responsive bid based on furnishing foreign steel and iron materials by more than 25 percent.

Certificate of Compliance with 23 CFR §635.410

The bidder or offeror hereby certifies that it will comply with the requirements of 23 CFR §635.410.

Date: _____

Signature: _____

Company Name: _____

Title: _____

22. FTA BUY AMERICA REQUIREMENTS - 49 USC §5323(j); 49 CFR Part 661 [Applicable only to FTA funded construction contracts and contracts for the purchase of goods or rolling stock in excess of \$100,000]

Buy America - The contractor agrees to comply with 49 U.S.C. 5323(j) and 49 C.F.R. Part 661, which provide that Federal funds may not be obligated unless steel, iron, and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 C.F.R. 661.7, and include final assembly in the United States for 15 passenger vans and 15 passenger wagons produced by Chrysler Corporation, microcomputer equipment, software, and small purchases (currently less than \$100,000) made with capital, operating, or planning funds. Separate requirements for rolling stock are set out at 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11. Rolling stock must be assembled in the United States and have a 60 percent domestic content.

A bidder or offeror must submit to the FTA recipient the appropriate Buy America certification (below) with all bids or offers on FTA-funded contracts, except those subject to a general waiver. Bids or offers that are not accompanied by a completed Buy America certification must be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

Certification requirement for procurement of steel, iron, or manufactured products:

Certificate of Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it will meet the requirements of 49 U.S.C. 5323(j)(1) and the applicable regulations in 49 C.F.R. Part 661.5.

Date: _____
Signature: _____
Company Name: _____
Title: _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(1)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(1) and 49 C.F.R. 661.5, but it may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 C.F.R. 661.7.

Date: _____
Signature: _____
Company Name: _____
Title: _____

Certification requirement for procurement of buses, other rolling stock and associated equipment:

Certificate of Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and the regulations at 49 C.F.R. Part 661.11.

Date: _____
Signature: _____
Company Name: _____
Title: _____

Certificate of Non-Compliance with 49 U.S.C. 5323(j)(2)(C)

The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j)(2)(C) and 49 C.F.R. 661.11, but may qualify for an exception pursuant to 49 U.S.C. 5323(j)(2)(A), 5323(j)(2)(B), or 5323(j)(2)(D), and 49 CFR 661.7.

Date: _____
Signature: _____
Company Name: _____
Title: _____

23. FRA BUY AMERICA REQUIREMENTS-SUPPLIES - 41 USC §§10a-d; 48 CFR Part 25
[Applicable only to FRA funded contracts for the purchase of goods, supplies or equipment in excess of \$100,000]

(a) The FRA requires its grantees to comply with The Buy American Act (41 U.S.C. 10) which provides that preference be given to domestic end products.

Components, as used in this clause, means those articles, materials, and supplies incorporated directly into the end products.

Domestic end product, as used in this clause, means (1) an unmanufactured end product mined or produced in the United States, or (2) an end product manufactured in the United States, if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of the cost of all its components. Components of foreign origin of the same class or kind as the products referred to in subparagraphs (b) (2) or (3) of this clause shall be treated as domestic. Scrap generated, collected, and prepared for processing in the United States is considered domestic.

End products, as used in this clause, means those articles, materials, and supplies to be acquired for public use under this contract.

(b) The Contractor shall deliver only domestic end products, except those-

(1) For use outside the United States;

(2) That government agencies have determined are not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality. A current list of such items is contained in 48 CFR 25.108.

(3) For which the agency determines that domestic preference would be inconsistent with the public interest; or

(4) For which the agency determines the cost to be unreasonable under 48 CFR 25.105. The offered price of a domestic end product shall be determined to be unreasonable when the lowest acceptable domestic offer exceeds the lowest acceptable foreign offer, inclusive of duty, by more than 6 percent, if the domestic offer is from a large business or more than 12 percent, if the domestic offer is from a small business concern.

A bidder must submit to ARRC the Buy America certification (below) with its bid response for FRA funded supply contracts. Bids that are not accompanied by a completed Buy America certification may be rejected as nonresponsive.

Certificate of Compliance with 41 USC §§10a-d - Supplies

The bidder or offeror hereby certifies that the products it proposes to supply hereunder comply with the requirements of 49 USC §§10a-d and the applicable regulations in 48 CFR Part 25.

Date: _____

Signature: _____

Company Name: _____

Title: _____

24. FRA BUY AMERICA REQUIREMENT-CONSTRUCTION - 41 USC §10a-d; 48 CFR Part 25
[Applicable only to FRA funded construction contracts in excess of \$100,000]

(a) The FRA requires its grantees to comply with The Buy American Act (41 U.S.C. 10) which provides that preference be given to domestic construction materials. As used in this clause-

Components means those articles, materials, and supplies incorporated directly into construction materials.

Construction material means an article, material, or supply brought to the construction site for incorporation into the building or work. Construction material also includes an item brought to the site pre-assembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, which are discrete systems incorporated into a public building or work and which are produced as a complete system, shall be evaluated as a single and distinct construction material regardless of when or how the individual parts or components of such systems are delivered to the construction site.

Domestic construction material means (1) an unmanufactured construction material mined or produced in the United States, or (2) a construction material manufactured in the U.S., if the cost of its components mined, produced, or manufactured in the United States exceeds 50 percent of cost of all its components. Materials of foreign origin of the same class or kind as the materials listed in 48 CFR 25.108 shall be treated as domestic.

(b)(1) The Buy American Act (41 U.S.C. 10a-10d) requires that only domestic construction material be used in performing this contract, except as provided in paragraphs (b)(2) and (b)(3) of this clause.

(2) The requirement in paragraph (b)(1) of this clause does not apply to the excepted construction materials or components listed by the Government as follows: NONE

(3) Other foreign construction material may be used on this project if ARRC determines that-

(i) The cost would be unreasonable (the cost of a particular domestic construction material shall be determined to be unreasonable when the cost of such material exceeds the cost of foreign material by more than 6 percent, unless the agency head determines a higher percentage to be appropriate);

(ii) The application of the restriction of the Buy American Act to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(4) The Contractor agrees that only domestic construction materials will be used by the Contractor, subcontractors, material men, and suppliers in the performance of this contract, except for foreign construction materials, if any, listed in paragraph (b)(2) or allowed under paragraph (b)(3) of this clause.

(c) *Request for determination.* (1) Contractors requesting to use foreign construction material under paragraph (b)(3) of this clause shall provide adequate information for ARRC evaluation of the request for a determination regarding the inapplicability of the Buy American Act in time to allow determination before submission of bids or offers. Each submission shall include a description of the foreign and domestic construction materials, including unit of measure, quantity, price, time of delivery or availability, location of the construction project, name and address of the proposed contractor, and a detailed justification of the reason for use of foreign materials cited in accordance with paragraph (b)(3) of this clause. A submission based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause. The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(2) If ARRC determines after contract award that an exception to the Buy American Act applies, the contract shall be modified to allow use of the foreign construction material, and adequate consideration shall be negotiated. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration shall not be less than the differential established in paragraph (b)(3)(i) of this clause.

(3) If ARRC does not determine that an exception to the Buy American Act applies, the use of that particular foreign construction material will be a failure to comply with the Act.

(d) For evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the following information and any applicable supporting data based on the survey of suppliers shall be included in the request:

**FOREIGN AND DOMESTIC CONSTRUCTION
MATERIALS PRICE COMPARISON**

Construction material description	Unit of Measure	Quantity	Price (Dollars) ^{1/}
Item 1: Foreign construction material Domestic construction material			
Item 2: Foreign construction material Domestic construction material			

List name, address, telephone number, and contact for suppliers surveyed. Attach copy of response; if oral, attach summary. Include other applicable supporting information.

^{1/}Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued).

A bidder must submit to ARRC the Buy America certification (below) with its bid response for FRA funded construction. Bids that are not accompanied by a completed Buy America certification may be rejected as nonresponsive.

Certificate of Compliance with 41 USC § §10a-d - Construction

The bidder or offeror hereby certifies that the construction materials it proposes to provide hereunder comply with the requirements of 49 USC §§10a-d and the applicable regulations in 48 CFR Part 25.

Date: _____

Signature: _____

Company Name: _____

Title: _____

25. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING - 31 USC §1352, 49 CFR Parts 19, 20 [Applicable to all Federal-aid contracts and to all related subcontracts which exceed \$100,000]

A bidder must submit to ARRC the below certification with its bid response for any Federally funded contract that exceeds \$100,000. Bids that are not accompanied by a completed certification may be rejected as nonresponsive.

1. The undersigned Contractor certifies, to the best of his or her knowledge and belief, that:
 - a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
 - b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
2. The undersigned also agrees that he or she shall require that the language of this certification be included in all lower tier subcontracts, which exceed \$100,000 and that all such recipients shall certify and disclose accordingly.
3. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 USC 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

The Contractor, _____ certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 USC 3801, *et seq.*, apply to this certification and disclosure, if any.

Signature of Contractor's Authorized Official: _____

Name and Title of Contractor's Authorized Official: _____

Date: _____

26. FTA PRE-AWARD AND POST DELIVERY AUDITS REQUIREMENTS - 49 U.S.C. 5323 & 49 CFR Part 663 [Applicable only to FTA funded contracts for the purchase of rolling stock in excess of \$100,000]

Pre-Award and Post-Delivery Audit Requirements - The Contractor agrees to comply with 49 U.S.C. § 5323(l) and FTA's implementing regulation at 49 C.F.R. Part 663 and to submit the following certifications:

(1) Buy America Requirements: The Contractor shall complete and submit a declaration certifying either compliance or noncompliance with Buy America. If the Bidder/Offeror certifies compliance with Buy America, it shall submit documentation which lists 1) component and subcomponent parts of the rolling stock to be purchased identified by manufacturer of the parts, their country of origin and costs; and 2) the location of the final assembly point for the rolling stock, including a description of the activities that will take place at the final assembly point and the cost of final assembly.

(2) Solicitation Specification Requirements: The Contractor shall submit evidence that it will be capable of meeting the bid specifications.

(3) Federal Motor Vehicle Safety Standards (FMVSS): The Contractor shall submit 1) manufacturer's FMVSS self-certification sticker information that the vehicle complies with relevant FMVSS or 2) manufacturer's certified statement that the contracted buses will not be subject to FMVSS regulations.

27. CERTIFICATION REGARDING COMPLIANCE WITH 49 CFR 26.49 - ESTABLISHMENT OF DBE GOAL [Applicable to all FTA funded contracts for Transit Vehicles]

Certificate of Compliance with 49 CFR 26.49

The bidder or offeror hereby certifies that it has established a DBE goal and submitted it to the FTA for approval in accordance with the provisions of 49 CFR 26.49.

Date: _____

Signature: _____

Company Name: _____

Title: _____

APPENDIX F

GENERAL CONDITIONS (CONSTRUCTION) (Revised 11/14/05)

1. ARTICLE 1 - DEFINITIONS:

Wherever used in the Contract Documents the following terms, or pronouns in place of them, are used, the intent and meaning, unless a different intent or meaning is clearly indicated, shall be interpreted as set forth below.

The titles and headings of the Sections, Subsections and Articles herein are intended for convenience of reference and shall not be considered as having bearing on their interpretation.

Whenever used in the Specifications or other Contract Documents the following terms have the meaning indicated which are applicable to both the singular and plural thereof. Working titles which have a masculine gender, are intended to refer to persons of either sex.

Terms not defined below shall have their ordinary accepted meanings within the context which they are used. "Webster's Third New International Dictionary of the English Language, Unabridged, Copyright 1961", or subsequent revision thereof, shall provide ordinarily accepted meanings. Words which have a well-known technical or trade meaning when used to describe Work, materials or equipment shall be interpreted in accordance with such meaning.

Addenda: All clarifications, corrections, or changes issued graphically or in writing by the Owner after the Invitation to Bid but prior to the opening of Bids.

Application for Payment: The form provided by the Owner which is used by the Contractor in requesting progress or Final payments and which is to include such supporting documentation as is required by the Contract Documents.

Approved or Approval: Means written approval by the Owner or his authorized representative as defined in paragraph 2.1.

ARRC Procurement Rules: Means the Rules governing the procurement of supplies, services, professional services and construction adopted by ARRC in accordance with A.S. 36.30.015(e). Said Rules may be downloaded from ARRC's web site, www.alaskarailroad.com, under General Information, Purchasing/Contracts.

A.S.: Initials which stand for Alaska Statute.

Award: The acceptance, by the Owner, of the successful Bid.

Bid: The offer of a Bidder, on the prescribed form to perform the Work in accordance with the Contract Documents at the prices quoted.

Bid Bond: The security furnished with a Bid to guarantee that the Bidder will enter into a Contract if his Bid is accepted by the Owner.

Bidder: Any individual, firm, corporation or any acceptable combination thereof, or joint venture submitting a Bid for the advertised Work.

Calendar Day: Every day shown on the calendar, beginning and ending at midnight.

Change Order: A written order by the Owner directing changes to the Contract, within its general scope.

Conditions of the Contract: Those portions of the Contract Documents which define the rights and responsibilities of the contracting parties and of others involved in the Work. The Conditions of the Contract include General Conditions, Supplementary Conditions and other Conditions specified in the Invitation to Bid.

Contract: The Contract Documents form the Contract between the Owner and the Contractor for the Work to be performed. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral.

Contract Documents: The Contract Form, Addenda, the bidding requirements and Contractor's Bid (including all appropriate bid tender forms), the Bonds, the Conditions of the Contract and all other Contract requirements, the Specifications, and the Drawings furnished by the Owner to the Contractor, together with all Change Orders and documents approved by the Contracting Officer for inclusion, modifications and supplements issued on or after the Effective Date of the Contract.

Contracting Officer: The person authorized to enter into and administer the Contract on behalf of the Owner. He has authority to make findings, determinations and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract.

Contractor: The individual, firm, corporation or any acceptable combination thereof, contracting with the Owner for performance of the Work.

Contract Amount: The total moneys payable by the Owner to the Contractor under the terms of the Contract Documents.

Contract Time: The number of Calendar Days or the date specified in the Contract and authorized time extensions which identify how much time the Contractor is allowed to achieve Final Completion.

Consultant: A person, firm, agency or corporation retained by the Owner to prepare Contract Documents, perform construction administration services, or other Project related services.

Defective: An adjective which refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or Approval referred to in the Contract Documents, or has been damaged prior to the Owner's Approval of Final payment.

Directive: A written communication to the Contractor from the Owner interpreting or enforcing a Contract requirement or ordering commencement of an item of Work.

Drawings: The drawings which show the character and scope of the Work to be performed and which have been furnished by the Owner or the Owner's Consultant and are by reference made a part of the Contract Documents.

Effective Date of the Contract: The date on which the Contract is fully executed by both Contractor and the Owner.

Final Completion: The Work (or specified part thereof) has progressed to the point that all Work is complete as determined by the Owner.

General Requirements: Sections of the Contract Documents which contain administrative and procedural requirements as well as requirements for temporary facilities.

Holidays: The Owner recognizes the following Holidays:

New Years Day - January 1
President's Day - Third Monday in February
Memorial Day - Last Monday in May
Independence Day - July 4
Labor Day - First Monday in September
Columbus Day-Second Monday in October
Veteran's Day - November 11
Thanksgiving Day - Fourth Thursday in November
Christmas Day - December 25

If any Holiday listed above falls on a Saturday, Saturday and the preceding Friday are both legal Holidays. If the holiday should fall on a Sunday, Sunday and the following Monday are both legal Holidays.

Install: Means to build into the Work, ready to be used in complete and operable condition and in compliance with the Contract Documents.

Invitation to Bid: The public announcement, as required by law, inviting Bids for Work to be performed and/or materials to be furnished.

Notice of Intent to Award: The written notice by the Owner to all Bidders identifying the apparent successful Bidder and establishing the Owner's intent to execute the Contract when all conditions required for execution of the Contract are met.

Notice to Proceed: A written notice to the Contractor to begin the Work and establishing the date on which the Contract Time begins.

Owner: The Alaska Railroad Corporation ("ARRC") or its authorized representative(s).

Payment Bond: The security furnished by the Contractor and his Surety to guarantee payment of the debts arising out of performance of the Work.

Performance Bond: The security furnished by the Contractor and his Surety to guarantee performance and completion of the Work in accordance with the Contract Documents.

Project: The total construction, of which the Work performed under the Contract Documents is the whole or a part.

Project Manager: The authorized representative of the Owner who is responsible for administration of the Contract.

Regulatory Requirements: All laws, rules, regulations, ordinances, codes and/or orders applicable to the Work.

Shop Drawings: All Drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the Work and all illustrations, brochures, standard schedules, performance charts, instructions, diagrams and other information prepared by a supplier and submitted by the Contractor to illustrate material, equipment, fabrication, or erection for some portion of the Work.

Specifications: Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards and workmanship as applied to the Work and certain administrative and procedural details applicable thereto.

Subcontractor: An individual, firm, or corporation to whom the Contractor sublets part of the Contract.

Substantial Completion: Although not fully completed, the Work (or a specified part thereof) has progressed to the point where, in the opinion of the Owner as evidenced by the Owner's written notice, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended. The terms "Substantially Complete" and "Substantially Completed" as applied to any Work refer to Substantial Completion thereof.

Supplemental Agreement: A written agreement between the Contractor and the Owner covering Work that is not within the general scope of the Contract.

Surety: The corporation, partnership, or individual, other than the Contractor, executing a bond furnished by the Contractor.

Unit Price Work: Work to be paid for on the basis of unit prices.

Work: Work is the act of, and the result of, performing services, furnishing labor, furnishing and incorporating materials and equipment into the Project and performing other duties and obligations, all as required by the Contract Documents. Such Work, however incremental, will culminate in the entire completed Project, or the various separately identifiable parts thereof.

2. ARTICLE 2 - AUTHORITIES AND LIMITATIONS:

2.1 AUTHORITIES AND LIMITATIONS:

2.1.1 The Owner alone, shall have the power to bind the Owner and to exercise the rights, responsibilities, authorities and functions vested in the Owner by the Contract Documents, except that the Owner shall have the right to designate in writing authorized representatives to act for him.

2.1.2 Wherever any provision of the Contract Documents specifies an individual or organization, whether Governmental or private, to perform any act on behalf of or in the interests of the Owner that individual or organization shall be deemed to be the Owner's authorized representative under this Contract but only to the extent so specified.

2.1.3 The Owner may, at any time during the performance of this Contract, vest in any such authorized representatives additional power and authority to act for the Owner or designate additional representatives, specifying the extent of their authority to act for the Owner. A copy of each document vesting additional authority in or removing that authority from an

authorized representative or designating an additional authorized representative shall be furnished to the Contractor.

2.1.4 The Owner reserves the right to appoint a new Project Manager without affecting any of the Contractor's obligations to the Owner under this Contract.

2.1.5 The Contractor shall perform the Work in accordance with any written order (including but not limited to instruction, direction, interpretation or determination) issued by an authorized representative in accordance with the authorized representative's authority to act for the Owner.

2.1.6 The Contractor assumes all the risk and consequences of performing the Work in accordance with any order (including but not limited to instruction, direction, interpretation or determination) of anyone not authorized to issue such order, and of any order not in writing.

2.1.7 Should the Owner or his authorized representative designate Consultant(s) to act for the Owner as provided for in Paragraph 2.1.1, the performance or nonperformance of the Consultant under such authority to act, shall not give rise to any Contractual obligation or duty of the Consultant to the Contractor, any subcontractor, any supplier, or any other organization performing any of the Work or any Surety representing them.

2.1.8 The term "Owner" when used in the text of these General Conditions or other Contract Documents following this section shall also mean any duly authorized representative of the Owner when authorized in accordance with Paragraph 2.1.1.

2.2 EVALUATIONS BY OWNER:

2.2.1 The Owner will decide all questions which may arise as to:

2.2.1.1 Quality and acceptability of materials furnished;

2.2.1.2 Quality and acceptability of Work performed;

2.2.1.3 Compliance with the Schedule of Progress;

2.2.1.4 Interpretation of Contract Documents;

2.2.1.5 Acceptable fulfillment of the Contract on the part of the Contractor.

2.2.2 In order to avoid cumbersome terms and confusing repetition of expressions in the Contract Documents, whenever the terms "as ordered", "as directed", "as required", "as approved", or terms of like effect or import are used, or the adjectives "reasonable", "suitable", "acceptable", "proper" or "satisfactory" or adjectives of like effect or import are used it shall be understood as if the expression were followed by the words "the Owner".

2.2.3 When such terms are used to describe a requirement, direction, review or judgment of the Owner as to the Work, it is intended that such requirement, direction, review or judgment will be solely to evaluate the Work for compliance with the Contract Documents (unless there is a specific statement indicating otherwise).

2.2.4 The use of any such term or adjective shall not be effective to assign to the Owner any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraphs 2.3 or 2.4.

2.3 MEANS & METHODS:

2.3.1 The means, methods, techniques, sequences or procedures of construction, or safety precautions and the program incident thereto, and the failure to perform or furnish the Work in accordance with the Contract Documents are the sole responsibility of the Contractor.

2.4 VISITS TO SITE:

2.4.1 The Owner will make visits to the site, off-site fabrication sites and approved remote storage sites at intervals appropriate to the various stages of construction to observe the progress and quality of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents.

2.4.2 Such observations or the lack of such observations shall in no way relieve the Contractor from his duty to perform the Work in accordance with the Contract Documents.

3. ARTICLE 3 - CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE:

3.1 INCOMPLETE CONTRACT DOCUMENTS:

3.1.1 The execution of the Contract by the Contractor is considered a representation that the Contractor examined the Contract Documents to make certain that all sheets and pages were provided and that the Contractor is satisfied as to the conditions to be encountered in performing the Work.

3.1.2 The Owner expressly denies any responsibility or liability for a Bid submitted on the basis of an incomplete set of Contract Documents.

3.2 COPIES OF CONTRACT DOCUMENTS:

3.2.1 The Owner shall furnish to the Contractor up to five copies of the Contract Documents.

3.2.2 Additional copies will be furnished, upon request, at the cost of reproduction stated in the Invitation to Bid.

3.3 SCOPE OF WORK:

3.3.1 The Contract Documents comprise the entire Contract between the Owner and the Contractor concerning the Work.

3.3.2 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. The Contract Documents will be construed in accordance with the Regulatory Requirements of the place of the Project.

3.3.3 It is specifically agreed between the parties executing this Contract that it is not intended by any of the provisions of the Contract to create in the public or any member thereof a third party benefit, or to authorize anyone not a party to this Contract to maintain a suit pursuant to the terms or provisions of the Contract.

3.4 INTENT OF CONTRACT DOCUMENTS:

3.4.1 It is the intent of the Contract Documents to describe a functionally complete Project to be constructed in accordance with the Contract Documents.

3.4.2 Any work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied, without any adjustment in Contract Amount or Contract Time, whether or not specifically called for.

3.4.3 Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the Regulatory Requirements of any governmental authority, whether such reference be specific or by implication, shall mean the edition stated in the Contract Documents or if not stated the latest standard specification, manual, code or Regulatory Requirements in effect at the time of advertisement for the Project (or, in the Effective Date of the Contract if there was no advertisement).

3.4.4 However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of the Owner and the Contractor, or any of their Consultants, agents or employees from those set forth in the Contract Documents, nor shall it be effective to assign to the Owner or any of the Owner's Consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraphs 2.3 or 2.4.

3.4.5 Unless otherwise specified in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

3.5 DISCREPANCY IN CONTRACT DOCUMENTS:

3.5.1 Before undertaking the Work, the Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures, and dimensions shown thereon and all applicable field measurements.

3.5.2 Work in the area by the Contractor shall imply verification of figures, dimensions and field measurements.

3.5.3 If, during the above study or during the performance of the Work, the Contractor finds a conflict, error, discrepancy or omission in the Contract Document, or a discrepancy between the Contract Documents and any standard specification, manual, code, or regulatory requirement which affects the Work, the Contractor shall promptly report such discrepancy in writing to the Owner.

3.5.4 The Contractor shall obtain a written interpretation or clarification from the Owner before proceeding with any Work affected thereby.

3.5.5 Any adjustment made by the Contractor without this determination shall be at his own risk and expense.

3.5.6 However, the Contractor shall not be liable to the Owner for failure to report any conflict, error or discrepancy in the Contract Documents unless the Contractor had actual knowledge thereof or should reasonably have know thereof.

3.6 DISCREPANCY - ORDER OF PRECEDENCE:

3.6.1 When conflicts, errors, or discrepancies within the Contract Documents exist, the order of precedence from most governing to least governing will be as follows:

3.6.1.1 Supplementary Conditions

3.6.1.2 General Conditions

3.6.1.3 Technical Specification

3.6.1.4 Drawings

3.6.1.5 Standard Construction Details

3.6.1.6 Standard Specifications

3.6.2 The Contractor shall not take advantage of any apparent error or omission in the Contract Documents. If the Contractor discovers an error or omission, the Owner shall be promptly notified. The Owner will make corrections and interpretation as necessary to fulfill the intent of the Contract. Scaled measurements shall not be used when the dimensions on the plan are given or can be computed.

3.7 CLARIFICATIONS AND INTERPRETATIONS:

3.7.1 The Owner will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents as the Owner may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents.

3.8 REUSE OF DOCUMENTS:

3.8.1 Neither the Contractor nor any subcontractor, or supplier or other person or organization performing or furnishing any of the Work under a direct or indirect Contract with the Owner shall have or acquire any title to or ownership rights in any of the Contract Documents (or copies thereof) prepared by or for the Owner and they shall not reuse any of the Contract Documents on extensions of the Project or any other Project without written consent of the Owner.

3.8.2 Contract Documents prepared by the Contractor in connection with the Work shall become the property of the Owner.

4. ARTICLE 4 - LANDS AND PHYSICAL CONDITIONS:

4.1 AVAILABILITY OF LANDS:

4.1.1 The Owner shall furnish as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for use of the Contractor in connection with the Work.

4.1.2 Easements for permanent structures or permanent changes in existing facilities will be obtained and paid for by the Owner, unless otherwise provided in the Contract Documents.

4.1.3 The Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2 VISIT TO SITE:

4.2.1 The execution of the Contract by the Contractor is considered a representation that the Contractor has visited and carefully examined the site and is satisfied as to the conditions to be encountered in performing the Work and as to the requirements of the Contract Documents.

4.3 EXPLORATIONS AND REPORTS:

4.3.1 Reference is made to the Supplementary Conditions for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by the Owner in preparation of the Contract Documents.

4.3.2 The Contractor may for his purposes rely upon the accuracy of the factual data contained in such reports, but not upon interpretations or opinions drawn from such factual data contained therein or for the completeness or sufficiency thereof.

4.3.3 Except as indicated in the immediately preceding sentence and in paragraphs 4.4 and 9.9, Contractor shall have full responsibility with respect to surface and subsurface conditions at the site.

4.4 UTILITIES:

4.4.1 The horizontal and vertical locations of known underground utilities as shown or indicated by the Contract Documents are approximate and are based on information and data furnished to the Owner by the owners of such underground utilities.

4.4.2 The Contractor shall have full responsibility for:

4.4.2.1 Reviewing and checking all information and data concerning utilities.

4.4.2.2 Locating all underground utilities shown or indicated in the Contract Documents which are affected by the Work.

4.4.2.3 Coordination of the Work with the owners of all utilities during construction.

4.4.2.4 Safety and protection of all utilities as provided in paragraph 6.16.

4.4.2.5 Repair of any damage to utilities resulting from the Work in accordance with paragraphs 4.4.4 and 4.5.

4.4.3 If Work is to be performed by any utility owner, the Contractor shall cooperate with such owner to facilitate the Work.

4.4.4 In the event of interruption to any utility service as a result of accidental breakage or as a result of being exposed or unsupported, the Contractor shall promptly notify the utility owner and the Owner.

4.4.5 If service is interrupted repair Work shall be continuous until the service is restored.

4.4.6 No Work shall be undertaken around fire hydrants until provisions for continued service have been approved by the local fire authority.

4.5 DAMAGED UTILITIES:

4.5.1 When utilities are damaged by the Contractor, the utility owner shall have the choice of repairing the utility or having the Contractor repair the utility.

4.5.2 In the following circumstances, the Contractor shall reimburse the utility Owner for repair costs or provide at no cost to the utility owner or the Owner, all materials, equipment and labor necessary to complete repair of the damage:

4.5.2.1 When the utility is shown or indicated in the Contract Documents.

4.5.2.2 When the utility has been located by the utility owner.

4.5.2.3 When no locate was requested by the Contractor for utilities shown or indicated in the Contract Documents.

4.5.2.4 All visible utilities.

4.5.2.5 When the Contractor could have, otherwise, reasonably been expected to be aware of such utility.

4.6 UTILITIES NOT SHOWN OR INDICATED:

4.6.1 If, while directly performing the Work, an underground utility is uncovered or revealed at the site which was not shown or indicated in the Contract Documents and which the Contractor could not reasonably have been expected to be aware of, the Contractor shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted by paragraph 6.18) identify the Owner of such underground facility and give written notice thereof to that owner and to the Owner.

4.6.2 The Owner will promptly review the underground utility to determine the extent to which the Contract Documents and the Work should be modified to reflect the impacts of the discovered utility.

4.6.3 The Contract Documents will be amended or supplemented to the extent necessary through the issuance of a Change Order by the Owner.

4.6.4 During such time, the Contractor shall be responsible for the safety and protection of such underground utility as provided in paragraph 6.16.

4.6.5 The Contractor may be allowed an increase in the Contract Amount or an extension of the Contract Time, or both, to the extent that they are directly attributable to the existence of any underground utility that was not shown or indicated in the Contract Documents and which the Contractor could not reasonably have been expected to be aware of.

4.7 SURVEY CONTROL:

4.7.1 The Owner will identify sufficient horizontal and vertical control data to enable the Contractor to survey and layout the Work.

4.7.2 All survey control work shall be performed under the direct supervision of a registered Land Surveyor.

4.7.3 Upon completion of survey work, all equipment and unused materials shall be removed and the Owner's property shall be left in a neat and clean condition satisfactory to the Owner.

4.7.4 Should the Contractor or its subcontractor fail to comply with the preceding subparagraph, the Owner may perform the required clean-up. All Owner costs and expenses for performing this work shall be collected from the Contractor.

5. ARTICLE 5 - BONDS, INSURANCE, AND INDEMNIFICATION:

5.1 DELIVERY OF BONDS:

5.1.1 When the Contractor delivers the executed Contract to the Owner, the Contractor shall also deliver to the Owner such bonds as the Contractor may be required to furnish in accordance with paragraph 5.2.

5.2 BONDS:

5.2.1 The Contractor shall furnish Performance and Payment Bonds, each in an amount as shown on the Contract as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents.

5.2.2 These bonds shall remain in effect for one year after the date of Final Completion and until all obligations under this Contract, except special guarantees as per paragraph 12.7, have been met.

5.2.3 All bonds shall be furnished on forms provided by the Owner (or copies thereof) and shall be executed by such Sureties as are authorized to do business in the State of Alaska.

5.2.4 The Owner may at his option copy the Surety with notice of any potential default or liability.

5.3 REPLACEMENT OF BOND AND SURETY:

5.3.1 If the Surety on any bond furnished in connection with this Contract is declared bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.2, or otherwise becomes unacceptable to the Owner, or if any such Surety fails to furnish reports as to his financial condition as requested by the Owner, the Contractor shall within five days thereafter substitute another bond and Surety, both of which must be acceptable to Owner.

5.4 INSURANCE REQUIREMENTS:

5.4.1 The Contractor shall carry and maintain throughout the life of this Contract, at its own expense, insurance not less than the amounts and coverage herein specified, and the Owner shall be named as an additional named insured under the insurance coverage so specified, with respect to the performance of the Work.

5.4.2 There shall be no right of subrogation against the Owner or its agents performing work in connection with the Work, and this waiver of subrogation shall be endorsed upon the policies.

5.4.3 Insurance shall be placed with the companies acceptable to the Owner, and these policies providing coverage thereunder shall contain provisions that no cancellation or material changes in the policy shall become effective except upon 30 days prior written notice thereof to the Owner.

5.4.4 Prior to commencement of the Work, the Contractor shall furnish certificates to the Owner, in duplicate, evidencing that the insurance policy provisions required hereunder are in force.

5.4.5 Acceptance by the Owner of deficient evidence of insurance does not constitute a waiver of Contract insurance requirements.

5.4.6 The Contractor shall furnish the Owner with certified copies of policies upon request. The minimum coverages and limits required are as follows:

5.4.7 Worker's Compensation insurance in accordance with the statutory coverages required by the State of Alaska and Employers Liability insurance with limits not less than \$1,000,000 and, where applicable, insurance in compliance with any other statutory obligations, whether State or Federal, pertaining to the compensation of injured employees assigned to the Work, including but not limited to Voluntary Compensation, Federal Longshoremen and Harbor

Workers Act, Maritime and the Outer Continental Shelf's Land Act and the Federal Employers Liability Act.

5.4.8 Commercial General Liability with limits not less than \$2,000,000 per occurrence and \$2,000,000 aggregate for Bodily Injury and Property Damage, including coverage for Premises and Operations Liability, Products and Completed Operations Liability, Contractual Liability, Broad Form Property Damage Liability and Personal Injury Liability. Coverage shall not contain any exclusions of Explosion, Collapse, or Underground.

5.4.9 Commercial Automobile Liability on all owned, non-owned, hired and rented vehicles with limits of liability of not less than \$1,000,000 Combined Single Limit for Bodily Injury and Property Damage per each accident or loss.

5.4.10 If Work involves use of aircraft, Aircraft Liability insurance covering all owned and non-owned aircraft with a per occurrence limit of not less than \$5,000,000.

5.4.11 If Work involves use of watercraft, Protection and Indemnity insurance with limits not less than \$5,000,000 per occurrence. Hull and Machinery coverage is to be carried on the vessel for the full current market value. This coverage requirement may be waived at the discretion of the Owner if the Contractor self-insures the equipment and will waive all rights of recovery against the Owner in writing.

5.4.12 Where applicable, Professional Liability insurance with limits of not less than \$1,000,000 per claim and \$2,000,000 aggregate, subject to a maximum deductible \$10,000 per claim. The Owner has the right to negotiate increase of deductibles subject to acceptable financial information of the policyholder.

5.4.13 Where applicable, Pollution Liability insurance with a Project limit of not less than \$5,000,000 to include coverage for Asbestos, Hazardous Materials, Lead or other related environmental hazards.

5.4.14 Builder's Risk Insurance: Coverage shall be on an "All Risk" completed value basis and protect the interests of the Owner the Contractor and his subcontractors. Coverage shall include all materials, equipment and supplies that are intended for specific installation in the Project while such materials, supplies and equipment are located at the Project site and in transit from port of arrival to jobsite and while temporarily located away from the Project site.

5.4.15 All insurance policies as described above are required to be written on an "occurrence" basis. In the event occurrence coverage is not available, the Contractor agrees to maintain "claims made" coverage for a minimum of two years after Project Completion.

5.5 INDEMNIFICATION:

5.5.1 The Contractor shall indemnify, save harmless, and defend the Owner and its agents and its employees from any and all claims or actions for injuries or damages sustained by any person or property arising directly or indirectly from the Work or the Contractor's performance of this Contract; however, this provision has no effect if, but only if, the sole proximate cause of the injury or damage is the negligence of the Owner or its agents.

6. ARTICLE 6 - CONTRACTOR'S RESPONSIBILITIES:

6.1 SUPERVISION OF WORK:

6.1.1 The Contractor shall supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents.

6.1.2 All Work under this Contract shall be performed in a skillful and workmanlike manner. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction.

6.1.3 The Contractor shall keep on the Work at all times during its progress a competent resident superintendent. The Owner shall be advised in writing of the

superintendent's name, local address, and telephone number. This written advice is to be kept current until Final Completion.

6.1.4 The superintendent will be the Contractor's representative at the site and shall have full authority to act and sign documents on behalf of the Contractor.

6.1.5 All communications given to the superintendent shall be as binding as if given to the Contractor.

6.1.6 The Contractor shall cooperate with the Owner in every way possible.

6.2 CHARACTER OF WORKERS:

6.2.1 The Contractor shall provide a sufficient number of competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents.

6.2.2 The Contractor shall at all times maintain good discipline and order at the site.

6.2.3 The Owner may, in writing, require the Contractor to remove from the Work any employee the Owner deems incompetent, careless, or otherwise detrimental to the progress of the Work, but the Owner shall have no duty to exercise this right.

6.3 CONTRACTOR TO FURNISH:

6.3.1 Unless otherwise specified in the Contract Documents, the Contractor shall furnish and assume full responsibility for all materials, equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.4 MATERIALS AND EQUIPMENT:

6.4.1 All materials and equipment shall be of specified quality and new, except as otherwise provided in the Contract Documents. If required by the Owner, the Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment.

6.4.2 All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier except as otherwise provided in the Contract Documents; but no provision of any such instructions will be effective to assign to the Owner or any of the Owner's Consultants, agents or employees, any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of Paragraphs 2.3 or 2.4.

6.5 ANTICIPATED SCHEDULES:

6.5.1 The construction of this project shall be planned and recorded with a Critical Path Method ("CPM") schedule. The schedule shall be used for coordination and monitoring of all work under the contract including all activity of subcontractors, manufacturers, supplies, utility companies and review activity of the Owner. Within a reasonable time prior to the preconstruction conference, the Contractor shall submit for Owner's approval, a detailed initial CPM schedule. The schedule shall meet the requirements set forth below. The construction time for the entire project shall not exceed the specified Contract Time. Following the Owner's review, if revisions to the proposed CPM schedule are required, the Contractor shall do so promptly. The CPM schedule must be finalized within 30 days of the Notice to Proceed.

6.5.2 The CPM schedule shall be presented as a Precedence Diagram Network developed in the activity-on-node format and shall include a description of no less than 15 major project activities, the duration of each of the project activities, the resources required for each of the project activities, including:

6.5.2.1 Labor, showing workdays per week, holidays, shifts per day, men per shift, and hours per shift;

6.5.2.2 Equipment, including the number of units of each type of equipment; and

6.5.2.3 Materials.

6.5.3 Owner reserves the right to adjust or add to the required project activities.

6.5.4 The activity-on-node diagram shall show the sequence and interdependence of all activities required for complete performance of all items of Work under this Contract, including shop drawings submittals and reviews and fabrication and delivery activities. No activity duration shall be longer than 15 working days without the Owner's approval. Owner reserves the right to limit the number of activities on the schedule.

6.5.5 Before proceeding with any Work on site, the Contractor shall prepare, submit, and receive the Owner's approval of a 60-Day Preliminary Schedule. The Preliminary Schedule shall provide a detailed breakdown of activities scheduled for the first 60 days of the project and summary of activities for Work beyond 60 days. Said schedule shall include mobilization, submittals, procurement, and construction.

6.5.6 No Work may be pursued at the site without an approved 60-Day Preliminary Schedule or an approved CPM schedule. A Finalized CPM Schedule with detailed breakdown of activities for the entire contract period shall be submitted prior to the first progress payment and accepted prior to application of the second progress payment. The Contractor shall create a baseline schedule of the Accepted Finalized Schedule.

6.5.7 Within fifteen days after the date of the Notice to Proceed, the Contractor shall submit to the Owner for review: anticipated schedule of Shop Drawing submissions, and anticipated Schedule of Values for all of the Work which will include quantities and prices of items aggregating the Contract Amount and will subdivide the Work into no less than 15 line item component parts to serve as the basis for progress payments during construction.

6.5.8 Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by the Contractor at the time of submission

6.5.9 The CPM schedule shall be submitted in an MS Project format. For each submittal required hereunder, Contractor shall submit one copy in an electronic format and one hard copy.

6.6 FINALIZING SCHEDULES:

6.6.1 Prior to processing the first Application for Payment, the Owner and the Contractor will finalize the schedules required by paragraph 6.5.

6.6.2 Acceptance by the Owner of the progress schedule will neither impose on the Owner nor relieve the Contractor from full responsibility for the progress or scheduling of the Work.

6.6.3 If accepted, the Finalized Schedule of Shop Drawings and other required submissions will be acceptable to the Owner as providing a workable arrangement for processing the submissions. If accepted the Finalized Schedule of Values will be acceptable to the Owner as an approximation of anticipated value of Work accomplished over the anticipated Contract Time.

6.6.4 Receipt and acceptance of a schedule submitted by the Contractor shall not be construed to assign responsibility for performance or contingencies to the Owner or relieve the Contractor of his responsibility to adjust his forces, equipment, and work schedules as may be necessary to insure completion of the Work within prescribed Contract Time.

6.6.5 Should the prosecution of the Work be discontinued for any reason, the Contractor shall notify the Owner at least 24 hours in advance of resuming operations.

6.7 ADJUSTING SCHEDULES:

6.7.1 Job site progress meetings will be held bi-weekly by the Owner and the Contractor for the purpose of updating the CPM schedule. Progress will be reviewed to verify finish dates of completed activities, remaining duration of uncompleted activities, and any proposed logic and/or time estimate revisions. The Contractor shall submit a reviewed CPM schedule within seven (7) calendar days after this meeting. The revised schedule shall show finish dates of completed activities and updated times for the remaining Work, including any addition, deletion, or revision of activities required by contract modification. In submitting a revised CPM schedule, the Contractor shall state specifically the reason for the revision and the adjustments made in this schedule or methods of operation to ensure completion of all Work within the Contract Time.

6.7.2 The Contract Time will be adjusted only for causes specified in this Contract. As determined by CPM analysis, only delays in activities, which affect milestones dates or contract completion dates will be considered for a time extension. It is understood and agreed by the Owner and the Contractor that float is shared equally. Project float is the time between the scheduled completion of the Work and Substantial Completion and is a resource available to both the Owner and the Contractor. Neither owns the float: the Project owns the float. As such, liability for delay of the Substantial Completion date rests with the party whose actions, last in time, actually cause delay to the Substantial Completion date.

6.7.3 In addition to the CPM schedule, every week during construction, the Contractor shall submit a work plan detailing his/her proposed operations for the forthcoming two (2) weeks. The work plan presented shall be a time scaled Two Week Look Ahead bar chart based and correlated by activity number to the current schedule. In the event portions of the Work affecting critical milestone dates or contract completion dates are in danger of being delayed, or actually are delayed, the Contractor shall develop and present a plan for remedial action. This plan shall detail the following:

- 6.7.3.1 work activities;
- 6.7.3.2 manpower involved by trade;
- 6.7.3.3 work hours;
- 6.7.3.4 equipment involved; and
- 6.7.3.5 the location of the work to be performed.

6.7.4 Preparation and updating of the CPM schedule and Two Week Work Plans will not be paid for directly. Failure to submit the CPM work schedule and Two Week Work Plans as specified will result in partial withholding of progress payments.

6.8 SUBSTITUTES OR "OR-EQUAL" ITEMS:

6.8.1 Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier the naming of the item is intended to establish the type, function and quality required.

6.8.2 Unless the name is followed by words indicating that no substitution is permitted, materials or equipment of other Suppliers may be accepted by the Owner only if sufficient information is submitted by the Contractor which clearly demonstrates to the Owner that the material or equipment proposed is equivalent or equal in all aspects to that named.

6.8.3 Requests for review of substitute items of material and equipment will not be accepted by the Owner from anyone other than the Contractor.

6.8.4 If the Contractor wishes to furnish or use a substitute item of material or equipment, the Contractor shall make written application to the Owner for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified.

6.8.5 The application will state that the evaluation and acceptance of the proposed substitute will not delay the Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct Contract with the Owner for Work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty.

6.8.6 All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated.

6.8.7 The application will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Owner in evaluating the proposed substitute.

6.8.8 The Owner may require the Contractor to furnish at the Contractor's expense additional data about the proposed substitute.

6.8.9 The Owner may reject any substitution request which the Owner determines is not in the best interest of the Owner.

6.9 SUBSTITUTE MEANS AND METHODS:

6.9.1 If a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents, the Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to the Owner, if the Contractor submits sufficient information to allow the Owner to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.

6.10 EVALUATION OF SUBSTITUTION:

6.10.1 The Owner will be allowed a reasonable time within which to evaluate each proposed substitute. The Owner will be the sole judge of acceptability, and no substitute will be ordered, installed or utilized without the Owner's prior written acceptance which will be evidenced by either a Change Order or a Shop Drawing approved in accordance with paragraphs 6.19 and 6.20. The Owner may require the Contractor to furnish at the Contractor's expense a special Performance Bond or other Surety with respect to any substitute.

6.11 DIVIDING THE WORK:

6.11.1 The divisions and sections of the Specifications and the identifications of any Drawings shall not control the Contractor in dividing the Work among subcontractors or suppliers or delineating the Work to be performed by any specific trade, except as required by law.

6.12 SUBCONTRACTORS:

6.12.1 The Contractor may utilize the services of licensed specialty subcontractors on those parts of the Work which, under normal contracting practices, are performed by licensed specialty subcontractors, in accordance with the following conditions:

6.12.2 The Contractor shall not award any Work to any subcontractor without prior written Approval of the Owner. This Approval will not be given until the Contractor submits to the Owner a written statement concerning the proposed award to the subcontractor which shall contain required E.E.O. Documents, evidence of insurance, and a copy of the proposed subcontract executed by the subcontractor.

6.12.3 No acceptance by the Owner of any such subcontractor shall constitute a waiver of any right of the Owner to reject Defective Work.

6.12.4 The Contractor shall be fully responsible to the Owner for all acts and omissions of the subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect Contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions.

6.12.5 All Work performed for Contractor by a subcontractor will be pursuant to an appropriate written agreement between Contractor and the subcontractor which specifically binds the subcontractor to the applicable terms and conditions of the Contract Documents for the benefit of the Owner and contains waiver provisions as required by paragraph 13.17 and termination provisions as required by Article 14.

6.12.6 Nothing in the Contract Documents shall create any contractual relationship between the Owner and any such subcontractor, supplier or other person or organization, nor shall it create any obligation on the part of the Owner to pay or to see to the payment of any moneys due any such subcontractor, supplier or other person or organization except as may otherwise be required by Regulatory Requirements.

6.12.7 The Owner will not undertake to settle any differences between or among the Contractor, subcontractors, or suppliers.

6.12.8 The Contractor and subcontractors shall coordinate their Work and facilitate general progress of Work.

6.12.9 Each trade shall afford other trades every reasonable opportunity for installation of their Work and storage of materials.

6.12.10 If cooperative Work of one trade must be altered due to lack of proper supervision, or failure to make proper provisions in time by another trade, such conditions shall be remedied by the Contractor with no change in Contract Amount or Contract Time.

6.12.11 The Contractor shall include on his own payrolls any person or persons working on the Contract who are not covered by written subcontract, and shall ensure that all subcontractors include on their payrolls all persons performing Work under the direction of the subcontractor.

6.13 USE OF PREMISES:

6.13.1 The Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the Project limits and approved remote storage sites and lands and areas identified in and permitted by Regulatory Requirements, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment.

6.13.2 The Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any land or areas contiguous thereto, resulting from the performance of the Work.

6.13.3 Should any claim be made against the Owner by any such owner or occupant because of the performance of the Work, the Contractor shall defend, indemnify and hold the Owner and its agents harmless therefrom.

6.14 STRUCTURAL LOADING:

6.14.1 The Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall the Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.15 RECORD DOCUMENTS:

6.15.1 The Contractor shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Field Memos, Work Orders, Change Orders, Supplemental

Agreements, and written interpretations and clarifications issued pursuant to paragraph 3.7 in good order and annotated to show all changes made during construction.

6.15.2 Copies of these record documents together with all approved samples and a counterpart of all approved Shop Drawings shall be provided to the Owner on site.

6.15.3 Upon completion of the Work, the annotated record documents, samples and Shop Drawings will be delivered to the Owner.

6.15.4 Record documents shall accurately record variations in the Work which vary from requirements shown or indicated in the Contract Documents.

6.16 SAFETY AND PROTECTION:

6.16.1 The Contractor alone shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work.

6.16.2 The Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.16.2.1 All employees on the Work and other persons and organizations who may be affected thereby;

6.16.2.2 All the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.16.2.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation or replacement in the course of construction.

6.16.3 In the performance of this contract, the Contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation. The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the Owner may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the Work covered by the contract.

It is a condition of this contract, and shall be made a condition of each subcontract entered into pursuant to this contract, that the Contractor and any subcontractor shall not permit any employee in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous, or dangerous to his/her health or safety, as determined under the OSHA construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 333).

6.16.4 The Contractor shall notify owners of adjacent property and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property.

6.16.5 All damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor, supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by the Contractor with no change in Contract Amount or Contract Time except as stated in paragraph 4.6, except damage or loss attributable to unforeseeable causes beyond the control of and without the fault or negligence of the Contractor, including but not restricted to acts of God, or the public enemy or governmental authorities.

6.16.6 The Contractor's duties and responsibilities for the safety and protection of the Work shall continue until Final Completion except as otherwise expressly provided in connection with Substantial Completion.

6.16.7 The Contractor shall designate a responsible safety representative at the site. This person shall be the Contractor's superintendent unless otherwise designated in writing by the Contractor to the Owner.

6.17 WORK SAFETY ON RAILROAD PROPERTY:

6.17.1 The safety of personnel, property, rail operations, and the public is of paramount importance in the prosecution of the Work pursuant to this contract. As reinforcement and in furtherance of overall safety measures to be observed by Contractor (and not by way of limitation), the following special safety rules shall be followed while working on Alaska Railroad Corporation ("ARRC") property. Further railroad safety information may be obtained from the ARRC Safety Office at 907-265-2440. Safety information is also available on the ARRC website at www.alaskarailroad.com.

6.17.2 In the event Contractor or its subcontractor will be performing construction or other activities on or in close proximity to a railroad track, the Contractor shall be responsible for compliance with the Federal Railroad Administration's Roadway Worker Protection ("RWP") regulations (49 CFR 214, Subpart C). Under 49 CFR 214, Subpart C, railroad contractors are responsible for the training of their employees on these regulations. All RWP related Work shall be conducted in strict compliance with the RWP safety standards set forth in 49 CFR 214, Subpart C and the Contractor will be required to submit a Railroad Safety Plan to ARRC to demonstrate compliance with said safety standards prior to beginning any RWP related Work. Specific information on Railroad Safety Plans may be obtained from the ARRC Safety Office at 907-265-2440.

6.17.3 In the event Contractor will be performing construction or other activities on a railroad bridge, the provisions of 49 CFR 214 regarding bridge worker safety shall apply. All bridge related Work shall be conducted in strict compliance with the bridge worker safety standards set forth in 49 CFR 214 and the Contractor will be required to submit a Railroad Safety Plan to ARRC to demonstrate compliance with said safety standards prior to beginning any bridge related Work.

6.17.4 Contractor shall arrange with ARRC to keep itself informed on the time of arrival of all trains and shall stop any of Contractor's or Subcontractor's operations which might be or cause a hazard to the safe passage of the train past the Work site from 10 minutes before the expected arrival of the train until it has passed or at any other time as directed by the flagman.

6.17.5 ARRC flag protection is required before any activity can occur on or near a railroad operating facility such as a track, yard, bridge or shop building. For incidental work, such as surveying or inspection, an ARRC qualified flagman will provide a safety briefing prior to the commencement of the Work to discuss how and when protection from train traffic is to be provided. For any activity involving a disturbance or potential disturbance to the track, track embankment, or any railroad facility, ARRC may require a specific Railroad Safety Plan prior to startup. Projects which involve activities which cross the tracks or are longitudinal to the tracks will require a specific Railroad Safety Plan and a one hour ARRC provided training course for Contractor's project supervisors prior to the initiation of Work on ARRC property.

6.17.6 The Contractor and/or Subcontractor shall arrange for ARRC flag protection when performing any Work within 20 feet of any track. All Work within 20 feet of the track shall cease when a train passes and all Contractor and Subcontractor employees shall maintain a distance of at least 20 feet from the track until the train has safely passed. In addition, any Work that could come within 20 feet of the track will cease when a train passes. For example, crane or pile driving activities shall stop when trains pass when the maximum boom and suspended load radius can come within 20 feet of the tracks. Pile driving shall not be done

when trains are passing the Work site. Vehicles and other construction equipment shall not be operated or parked closer than 20 feet from any track without ARRC flag protection.

6.17.7 Track outages require ARRC's prior approval. Prior to a proposed track outage, the Contractor shall submit a closure plan to ARRC for approval. The plan will describe the Work to be accomplished, the equipment, manpower and other resources required, and the schedule. Once approved by ARRC, the Contractor shall follow the plan. ARRC reserves the right to assume control of the Work to reestablish rail service if the schedule is not met. Contractor shall bear all costs and damages which may result from failure to meet the closure schedule.

6.17.8 Whenever an ARRC flag person is required for performance of the Work, he or she will be provided by the ARRC at no expense to the Contractor. A minimum of 48 hours notice is required for ARRC flag protection.

6.18 EMERGENCIES:

6.18.1 In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Owner, is obligated to act to prevent threatened damage, injury or loss.

6.18.2 The Contractor shall give the Owner prompt written notice if the Contractor believes that any significant changes in the Work or variations from the Contract Documents is required because of the action taken in response to an emergency. A change will be authorized by one of the methods indicated in paragraph 9.2, as determined appropriate by the Owner.

6.19 SHOP DRAWINGS AND SAMPLES:

6.19.1 After checking and verifying all field measurements and after complying with applicable procedures specified in the Contract Documents, the Contractor shall submit to the Owner for review and Approval in accordance with the accepted schedule of Shop Drawing submissions the required number of all Shop Drawings, which will bear a stamp or specific written indication that the Contractor has satisfied Contractor's responsibilities under the Contract Documents with respect to the review of the submission. All submissions will be identified as the Owner may require. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to enable the Owner to review the information as required.

6.19.2 The Contractor shall also submit to the Owner for review and Approval with such promptness as to cause no delay in Work, all samples required by the Contract Documents. All samples will have been checked by and accompanied by a specific written indication that the Contractor has satisfied Contractor's responsibilities under the Contract Documents with respect to the review of the submission and will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended.

6.19.3 Before submission of each Shop Drawing or sample the Contractor shall have determined and verified all quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar data with respect thereto and reviewed or coordinated each Shop Drawing or sample with other Shop Drawings and samples and with the requirements of the Work and the Contract Documents.

6.19.4 At the time of each submission the Contractor shall give the Owner specific written notice of each variation that the Shop Drawings or samples may have from the requirements of the Contract Documents, and, in addition, shall cause a specific notation to be made on each Shop Drawing submitted to the Owner for review and Approval of each such variation.

6.19.5 All variations of the proposed Shop drawing from that specified will be identified in the submission and available maintenance, repair and replacement service will be indicated.

6.19.6 The submittal will also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such variation, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by the Owner in evaluating the proposed variation.

6.19.7 If the variation may result in a change of Contract Time or Amount, or Contract responsibility, and is not minor in nature, the Contractor must submit a written request for Change Order with the variation to notify the Owner of his intent.

6.19.8 The Owner may require the Contractor to furnish at the Contractor's expense additional data about the proposed variation.

6.19.9 The Owner may reject any variation request which the Owner determines is not in the best interest of the Owner.

6.20 SHOP DRAWING AND SAMPLE REVIEW:

6.20.1 The Owner will review with reasonable promptness Shop Drawings and samples, but the Owner's review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto.

6.20.2 The review of a separate item as such will not indicate acceptance of the assembly in which the item functions.

6.20.3 The Contractor shall make corrections required by the Owner and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review.

6.20.4 The Contractor shall direct specific attention in writing to revisions other than the corrections called for by the Owner on previous submittals.

6.20.5 The Owner's review of Shop Drawings or samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless the Contractor has in writing advised the Owner of each such variation at the time of submission as required by paragraph 6.19.4.

6.20.6 The Owner, if he so determines, may give written Approval of each such variation by Change Order, except that, if the variation is minor and no Change Order has been requested a specific written notation thereof incorporated in or accompanying the Shop Drawing or sample review comments shall suffice as a modification.

6.20.7 No Approval by the Owner will relieve the Contractor from responsibility for errors or omissions in the Shop Drawings or from responsibility for having complied with the provisions of paragraph 6.20.3.

6.20.8 Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to the Owner's review of the pertinent submission will be at the sole expense and responsibility of the Contractor.

6.21 MAINTENANCE DURING CONSTRUCTION:

6.21.1 The Contractor shall maintain the Work during construction and until Substantial Completion, at which time the responsibility for maintenance shall be established in accordance with paragraph 13.10.

6.22 CONTINUING THE WORK:

6.22.1 The Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with the Owner.

6.22.2 No Work shall be delayed or postponed pending resolution of any disputes, disagreements, or claims except as the Contractor and the Owner may otherwise agree in writing.

6.23 CONSENT TO ASSIGNMENT:

6.23.1 The Contractor shall obtain the prior written consent of the Owner to any proposed assignment of any interest in, or part of this Contract.

6.23.2 The consent to any assignment or transfer shall not operate to relieve the Contractor or his Sureties of any of his or its obligations under this Contract or the Performance Bonds.

6.23.3 Nothing herein contained shall be construed to hinder, prevent, or affect an assignment of monies due, or to become due hereunder, made for the benefit of the Contractor's creditors pursuant to law.

6.24 USE OF EXPLOSIVES:

6.24.1 When the use of explosives is necessary for the prosecution of the Work, the Contractor shall exercise the utmost care not to endanger life or property, including new Work and shall follow all Regulatory Requirements applicable to the use of explosives.

6.24.2 The Contractor shall be responsible for all damage resulting from the use of explosives.

6.24.3 All explosives shall be stored in a secure manner in compliance with all Regulatory Requirements, and all such storage places shall be clearly marked.

6.24.4 Where no Regulatory Requirements apply, safe storage shall be provided not closer than 1,000 feet from any building, camping area, or place of human occupancy.

6.24.5 The Contractor shall notify each public utility owner having structures in proximity to the site of his intention to use explosives. Such notice shall be given sufficiently in advance to enable utility owners to take such steps as they may deem necessary to protect their property from injury.

6.24.6 However, the Contractor shall be responsible for all damage resulting from the use of the explosives, whether or not, utility owners act to protect their property.

6.25 CONTRACTOR'S RECORDS:

6.25.1 Records of the Contractor and subcontractors relating to personnel, payrolls, invoices of materials, and any and all other data relevant to the performance of the Contract, must be kept on a generally recognized accounting system.

6.25.2 Such records must be available during normal Work hours to the Owner for purposes of investigation to ascertain compliance with Regulatory Requirements and provisions of the Contract Documents.

6.25.3 Payroll records must contain the name and address of each employee, his correct classification, social security number, rate of pay, daily and weekly number of hours of worked, deductions made, and actual wages paid and any other information required by the U.S. and/or State Department of Labor.

6.25.4 The Contractor and subcontractors shall make employment records available for inspection by the Owner and representatives of the U.S. and/or State Department of Labor and will permit such representatives to interview employees during working hours on the Project.

6.25.5 Records of all communications between the Owner and the Contractor and other parties, where such communications affected performance of this Contract, must be kept by the Contractor and maintained for a period of three years from Final Completion.

6.25.6 The Owner or its assigned representative may perform an audit of these records during normal work hours after written notice to the Contractor.

6.26 CONSTRUCTION QUALITY CONTROL PLAN:

6.26.1 The Contractor shall establish and maintain an effective quality management system. The quality management system shall consist of plans, procedures, and the organization necessary to provide material, equipment, and workmanship to comply with the requirements of the contract documents. The system shall cover the proposed sequence of the work including both on-site and off-site operations. To meet this requirement, the Contractor shall prepare a Construction Quality Control (CQC) plan that addresses all quality control requirements specified in the contract documents. A complete, detailed CQC plan shall be submitted to the Project Manager at least 10 days prior to commencement of any Work on the Project. The CQC must be approved in writing by the Project Manager prior to proceeding with the Work. The Contractor shall not revise the CQC or the quality staffing levels or replace any of the key personnel specified therein without prior written approval from the Project Manager.

7. ARTICLE 7 - LAWS AND REGULATIONS:

7.1 LAWS TO BE OBSERVED:

7.1.1 The Contractor shall keep fully informed of all Federal and State Regulatory Requirements and all Orders and decrees of bodies or tribunals having any jurisdiction or authority, which in any manner affect those engaged or employed on the Work, or which in any way affect the conduct of the Work.

7.1.2 The Contractor shall at all times observe and comply with all such Regulatory Requirements, orders and decrees; and shall defend and indemnify the Owner and its representatives against claim or liability arising from or based on the violation of any such Regulatory Requirement, order, or decree whether by the Contractor, subcontractor, or any employee of either.

7.1.3 Except where otherwise expressly required by applicable Regulatory Requirements, the Owner shall not be responsible for monitoring Contractor's compliance with any Regulatory Requirements.

7.2 PERMITS, LICENSES, AND TAXES:

7.2.1 The Contractor shall procure all permits and licenses, pay all charges, fees and taxes, and give all notices necessary and incidental to the due and lawful prosecution of the Work. As a condition of performance of this Contract, the Contractor shall pay all Federal, State and local taxes incurred by the Contractor, in the performance of the Contract. Proof of payment of these taxes is a condition precedent to Final payment by the Owner under this Contract.

7.2.2 The Contractor's certification that taxes have been paid (as contained in the Release of Contract) will be verified with the Department of Revenue and Department of Labor, prior to Final payment.

7.2.3 If any Federal, State or local tax is imposed, charged, or repealed after the date of Bid opening and is made applicable to and paid by the Contractor on the articles or supplies herein contracted for, then the Contract shall be increased or decreased accordingly by a Change Order.

7.3 PATENTED DEVICES, MATERIALS AND PROCESSES:

7.3.1 If the Contractor employs any design, device, material, or process covered by letters of patent, trademark or copyright, the Contractor shall provide for such use by suitable legal agreement with the patentee or owner.

7.3.2 The Contractor and the Surety shall, defend, indemnify and save harmless the Owner and its agents, any affected third party, or political subdivision from any and all claims for infringement by reason of the use of any such patented design, device, material or process, or any trademark or copyright, and shall indemnify the Owner for any costs, expenses, and

damages which it may be obliged to pay by reason of any infringement, at any time during the prosecution or after the completion of the Work.

7.4 COMPLIANCE OF SPECIFICATION AND DRAWINGS:

7.4.1 If the Contractor observes that the Specification and Drawings supplied by the Owner are at variance with any Regulatory Requirements, Contractor shall give the Owner prompt written notice thereof, and any necessary changes will be authorized by one of the methods indicated in paragraph 9.2. as determined appropriate by the Owner.

7.4.2 If the Contractor performs any Work knowing or having reason to know that it is contrary to such Regulatory Requirements, and without such notice to the Owner, the Contractor shall bear all costs arising therefrom; however, it shall not be the Contractor's primary responsibility to make certain that the Specifications and Drawings supplied by the Owner are in accordance with such Regulatory Requirements.

7.5 ACCIDENT PREVENTION:

7.5.1 The Contractor shall comply with AS 18.60.075 and all pertinent provisions of the Construction Code Occupational Safety and Health Standards issued by the Alaska Department of Labor.

7.6 SANITARY PROVISIONS:

7.6.1 The Contractor shall provide and maintain in a neat and sanitary condition such accommodations for the use of his employees and Owner representatives in strict accordance with the requirements of the State and local Boards of Health, OSHA or of other bodies or tribunals having jurisdiction.

7.7 BUSINESS REGISTRATION:

7.7.1 The Contractor shall comply with AS 08.18.011, as follows: *"it is unlawful for a person to submit a bid or Work as a Contractor until he has been issued a certificate of registration by the Department of Commerce. A partnership or joint venture shall be considered registered if one of the general partners or venturers whose name appears in the name under which the partnership or venture does business is registered."*

7.8 PROFESSIONAL REGISTRATION AND CERTIFICATION:

7.8.1 All craft trades, architects, engineers and land surveyors, electrical administrators, explosive handlers, and welders employed under the Contract shall specifically comply with applicable provisions of AS 08.18, 08.48, 08.40, 08.52, and 08.99.

7.8.2 Provide copies of individual licenses within seven days following a request from the Owner.

7.9 LOCAL BUILDING CODES:

7.9.1 The Contractor shall comply with AS 35.10.025 which requires construction in accordance with applicable local building codes including the obtaining of required permits.

7.10 AIR QUALITY CONTROL:

7.10.1 The Contractor shall comply with all applicable provision of AS 46.03.04 as pertains to Air Pollution Control.

7.11 ARCHAEOLOGICAL OR PALEONTOLOGICAL DISCOVERIES:

7.11.1 When the Contractor's operation encounters prehistoric artifacts, burials, remains of dwelling sites, or paleontological remains, such as shell heaps, land or sea mammal bones or tusks, the Contractor shall cease operations immediately and notify the Owner.

7.11.2 No artifacts or specimens shall be further disturbed or removed from the ground and no further operations shall be performed at the site until so directed.

7.11.3 Should the Owner order suspension of the Contractor's operations in order to protect an archaeological or historical finding, or order the Contractor to perform extra Work, such shall be covered by an appropriate Contract change document.

7.12 WAGES AND HOURS OF LABOR:

7.12.1 The Contractor shall submit certified payrolls bearing an original signature on a weekly or biweekly basis to the State Department of Labor as required by law, and shall comply with all other applicable labor reporting laws. The Contractor shall also submit certified payrolls bearing an original signature, along with those of its subcontractors, to the Owner on a weekly basis and shall retain copies of the payrolls for a minimum of three (3) years.

7.12.2 The Contractor shall be responsible for the submission and retention of certified payrolls of all of its subcontractors.

7.12.3 The certification shall affirm that the payrolls are current and complete, that the wage rates contained therein are not less than the applicable rates referenced in the Contract Documents, and that the classification set forth for each laborer or mechanic conforms with the work he performed.

7.12.4 The Contractor and its subcontractors shall attend all hearings and conferences and produce such books, papers, and documents all as requested by the Department of Labor.

7.13 THE FOLLOWING LABOR PROVISIONS SHALL ALSO APPLY TO THIS CONTRACT:

7.13.1 The Contractor and his subcontractors shall pay all employees unconditionally and not less than once a week. Wages may not be less than those stated in the Invitation to Bid, regardless of the contractual relationship between the Contractor or Subcontractors and laborers, mechanics, or field surveyors. The scale of wages to be paid shall be posted by the Contractor in a prominent and easily accessible place at the site of the Work. The Owner shall withhold so much of the accrued payments as is necessary to pay laborers, mechanics, or field surveyors employed by the Contractor or Subcontractors the difference between the rates of wages required by the Contract to be paid laborers, mechanics, or field surveyors on the Work, and the rates of wages in fact received by laborers, mechanics or field surveyors.

7.14 OVERTIME WORK HOURS AND COMPENSATION:

7.14.1 Pursuant to 40 U.S.C. 327-330 and AS 23.10.060, the Contractor shall not require nor permit any laborer or mechanic in any workweek in which he is employed on any Work under this Contract to work in excess of eight hours in any Calendar Day or in excess of forty hours in such workweek on work subject to the provisions of the Contract Work Hours and Safety Standards Act unless such laborer or mechanic receives compensation at a rate not less than one and one half times his basic rate of pay for all such hours worked in excess of eight hours in any Calendar Day or in excess of forty hours in such workweek whichever is the greater number of overtime hours.

7.14.2 In the event of any violation of this provision, the Contractor shall be liable to any affected employee for any amounts due and penalties and to the Owner for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic employed in violation of this provision in the sum of \$10.00 for each Calendar Day on which such employee was required or permitted to be employed on such Work in excess of eight hours or in excess of the standard workweek of forty hours without payment of the overtime wages required by this paragraph.

7.15 COVENANT AGAINST CONTINGENT FEES:

7.15.1 The Contractor warrants that no person or selling agent has been employed or retained to solicit or secure this Contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Contractor for the purpose of securing business.

7.15.2 For breach or violation of this warranty, the Owner shall have the right to annul this Contract without liability or, in its discretion, to deduct such improper consideration from the Contract Amount or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

7.16 OFFICIALS NOT TO BENEFIT:

7.16.1 No member of or delegate to the U.S. Congress, the State Legislature, or other State or Owner officials shall be admitted to any share or part of this Contract, nor to any benefit that may arise there from. However, this provision shall not be construed to extend to this Contract if made with a corporation for its general benefit.

7.17 PERSONAL LIABILITY OF PUBLIC OFFICIALS:

7.17.1 In carrying out any of the provisions thereof, or in exercising any power or authority granted to the Owner by the Contract, there will be no liability upon the Owner nor upon its agents or authorized as its representatives, either personally or as officials of the State of Alaska, it being always understood that in such matters they act as agents and representatives of the Owner.

8. ARTICLE 8 - OTHER WORK:

8.1 RELATED WORK AT SITE:

8.1.1 The Owner reserves the right at any time to contract for and perform other or additional work on or near the Work covered by the Contract.

8.1.2 When separate contracts are let within the limits of the Project, the Contractor shall conduct his work so as not to interfere with or hinder the work being performed by other contractors. The Contractor shall join his work with that of the others in an acceptable manner and shall perform it in proper sequence to that of others.

8.1.3 If the fact that other such work is to be performed is identified or shown in the Contract Documents, the Contractor shall assume all liability, financial or otherwise, in connection with this Contract and indemnify and save harmless the Owner and its agents from any and all damages or claims that may arise because of inconvenience, delay, or loss experienced by the Contractor because of the presence and operations of other contractors.

8.1.4 If the fact that such other work is to be performed was not identified or shown in the Contract Documents, written notice thereof will be given to the Contractor prior to starting any such other work. If the Contractor believes that such performance will require an increase in Contract Amount or Contract Time, the Contractor shall notify the Owner of such required increase within fifteen (15) calendar days following receipt of the Owner's notice. Should the Owner find such increase(s) to be justified, a Change Order will be executed.

8.2 ACCESS, CUTTING, AND PATCHING:

8.2.1 The Contractor shall afford each utility owner and any other contractor who is a party to such a direct contract with the Owner (or the Owner, if the Owner is performing the additional work with the Owner's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such work and shall properly connect and coordinate the Work with the work of others.

8.2.2 The Contractor shall do all cutting, fitting and patching of the Work that may be required to make its several parts come together properly and integrate with such other Work, the Contractor shall not endanger any Work of others by cutting, excavating or otherwise altering their Work and will only cut or alter such other Work with the written consent of the Owner.

8.2.3 The duties and responsibilities of the Contractor under this paragraph are for the benefit of other contractors to the extent that there are comparable provisions for the benefit of the Contractor in said direct Contracts between the Owner and other contractors.

8.3 DEFECTIVE WORK BY OTHERS:

8.3.1 If any part of the Contractor's Work depends for proper execution or results upon the Work of any such other Contractor, utility owner, or the Owner, the Contractor shall inspect and promptly report to the Owner in writing any delays, defects or deficiencies in such Work that render it unavailable or unsuitable for such proper execution and results. The Contractor's failure to so report will constitute an acceptance of the other Work as fit and proper for integration with Contractor's Work except for latent or non-apparent defects and deficiencies in the other Work.

8.4 COORDINATION:

8.4.1 If the Owner contracts with others for the performance of other Work at the site, Owner will have authority and responsibility for coordination of the activities among the various contractors.

9. ARTICLE 9 - CHANGES:

9.1 OWNER'S RIGHT TO CHANGE:

9.1.1 Without invalidating the Contract and without notice to any Surety, the Owner may, at any time or from time to time, order additions, deletions or revisions in the Work within the general scope of the Contract, including but not limited to changes:

9.1.1.1 In the Contract Documents;

9.1.1.2 In the method or manner of performance of the Work;

9.1.1.3 In Owner-furnished facilities, equipment, materials, services, or site;

9.1.1.4 Directing acceleration in the performance of the Work.

9.2 AUTHORIZATION OF CHANGES WITHIN THE GENERAL SCOPE:

9.2.1 Additions, deletions, or revisions in the Work within the general scope of the Contract as specified in paragraph 9.1 shall be authorized by one or more of the following ways:

9.2.1.1 Directive (pursuant to paragraph 9.3)

9.2.1.2 A Change Order (pursuant to paragraph 9.4)

9.2.1.3 Owner's acceptance of Shop Drawing variations from the Contract Documents as specifically identified by the Contractor as required by paragraph 6.19.4.

9.3 DIRECTIVE:

9.3.1 The Owner shall provide written clarification or interpretation of the Contract Documents (pursuant to paragraph 3.7).

9.3.2 The Owner may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Amount or the Contract Time and are consistent with the overall intent of the Contract Documents.

9.3.3 The Owner may order the Contractor to correct Defective Work or methods which are not in conformance with the Contract Documents.

9.3.4 The Owner may direct the commencement or suspension of Work or emergency related Work (as provided in paragraph 6.18).

9.3.5 Upon the issuance of a directive to the Contractor by the Owner, the Contractor shall immediately proceed with the performance of the Work as prescribed by such directive.

9.3.6 If the Contractor believes that the changes noted in a directive may cause an increase in the Contract Amount or an extension of Contract Time, the Contractor shall immediately provide written notice to the Owner depicting such increases before proceeding with the directive, except in the case of an emergency.

9.3.7 If the Owner finds the increase in Contract Amount or the extension of Contract Time justified, a Change Order will be issued.

9.3.8 If however, the Owner does not find that a Change Order is justified, the Owner may direct the Contractor to proceed with the Work.

9.3.9 The Contractor shall cooperate with the Owner in keeping complete daily records of the cost of such Work.

9.3.10 If a Change Order is ultimately determined to be justified, in the absence of agreed prices and unit prices, payment for such Work will be made on a cost of the Work basis as provided in paragraph 10.4.

9.4 CHANGE ORDER:

9.4.1 A change in Contract Time, Contract Amount, or responsibility may be made for changes within the scope of the Work only by Change Order.

9.4.2 Upon receipt of an executed Change Order, the Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents except as otherwise specifically provided.

9.4.3 Changes in Contract Amount and Contract Time shall be made in accordance with Articles 10 and 11.

9.5 SHOP DRAWING VARIATIONS:

9.5.1 Variations by Shop Drawings shall only be eligible for consideration under paragraph 9.4 when the conditions affecting the price, time, or responsibility are identified by the Contractor in writing and a request for a Change Order is submitted as per paragraph 6.19.7.

9.6 CHANGES OUTSIDE THE GENERAL SCOPE; SUPPLEMENTAL AGREEMENT

9.6.1 Any change which is outside the general scope of the Contract, as determined by the Owner, must be authorized by the appropriate representatives of the Owner and the Contractor.

9.7 UNAUTHORIZED WORK:

9.7.1 The Contractor shall not be entitled to an increase in the Contract Amount or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in this Article 9, except in the case of an emergency as provided in paragraph 6.18 and except in the case of uncovering Work as provided in paragraph 12.4.4.

9.8 NOTIFICATION OF SURETY:

9.8.1 If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents including, but not limited to, Contract Amount or Contract Time is required by the provisions of any Bond to be given to a Surety, the giving of any such notice will be the Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

9.9 DIFFERING SITE CONDITIONS:

9.9.1 The Contractor shall promptly, and before such conditions are disturbed (except in an emergency as permitted by paragraph 6.18), notify the Owner in writing of:

9.9.1.1 subsurface or latent physical conditions at the site differing materially from those indicated in the Contract, and which could not have been discovered by a careful examination of the site, or

9.9.1.2 unknown physical conditions at the site, or an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in Work of the character provided for in this Contract.

9.9.2 The Owner shall promptly investigate the conditions, and if the Owner finds that such conditions do materially so differ and cause an increase or decrease in the Contractor's cost of, or time required for, performance of this Contract, an equitable adjustment shall be made and the Contract modified in writing accordingly.

9.9.3 Any claim for additional compensation by the Contractor under this clause shall be made in accordance with Article 15 and shall not be allowed unless the Contractor has first given the notice required by this Contract.

9.9.4 In the event that the Owner and the Contractor are unable to reach an agreement concerning an alleged differing site condition, the Contractor will be required to keep an accurate and detailed record which will indicate the actual cost of the Work done under the alleged differing site condition.

9.9.5 Failure to keep such a record shall be a bar to any recovery by reason of such alleged differing site conditions. The Owner shall be given the opportunity to supervise and check the keeping of such records.

9.10 VALUE ENGINEERING PROPOSALS BY THE CONTRACTOR:

9.10.1 Proposals may be submitted to the Owner for modifying the plans, specifications, or other requirements of the Contract for the sole purpose of reducing the total costs of construction without impairing in any manner the essential functions or characteristics of the project, including service life, economy of operations, ease of maintenance, benefits to the traveling public, desired appearance or design and safety standards. After execution of the Contract, an initiative may be recommended by the Contractor or, if applicable, sponsoring governmental agency. The initiative must be identified as a Value Engineering Proposal (VEP), and may include modifications to the plans or specifications, construction phasing or procedures, or other contract requirements. Any cost savings generated to the Contract as a result of VEP offered by the Contractor and approved by Owner will be shared equally between the Contractor and Owner as specified in paragraph 9.14. Bid prices are not to be based on the anticipated approval of a VEP. If a VEP is rejected, the Contract shall be completed in accordance with the original terms of the Contract or as otherwise modified. Any decision whether to approve or accept a VEP shall be within the sole discretion of Owner. Owner will bear no liability for any delay in considering a VEP, the refusal to accept or approve such a proposal, or any other matter connected with a VEP.

9.11 SUBMITTAL & REVIEW OF VEP CONCEPT OR IDEA:

9.11.1 The Contractor shall initially submit a brief letter proposal with graphics to Owner to illustrate the concept or idea. The Contractor shall indicate whether adequate time is available in its schedule for formal submittal and review prior to VEP implementation.

9.11.2 Owner will review the concept or idea within ten days of the Contractor's initial submittal and inform the Contractor in writing whether the concept or idea has merit and should be submitted as a formal VEP.

9.11.3 If Owner determines that the time for response is indicated in the Contractor's letter proposal is insufficient for review, Owner may choose to evaluate the need for a

noncompensable time extension to the Contract. Its evaluation will be based on the additional time needed by the Owner for its review and the effect on the Contractor's schedule occasioned by the added time. The need for such a time extension will be evaluated in accordance with Article 11.

9.12 FORMAL SUBMITTAL OF THE VEP:

9.12.1 Within 30 days after Owner has determined the VEP concept or idea has merit, the Contractor shall formally submit a proposal. The proposal shall include sufficient data for Owner to make an informed decision regarding the proposal and shall include, at a minimum, the following information:

9.12.1.1 A statement that the Proposal is submitted as a VEP.

9.12.1.2 A description of the difference between the existing contract and the proposed change and the advantages and disadvantages of each, including effects on service life, economy of operations, ease of maintenance, benefits to the traveling public, desired appearance and safety.

9.12.1.3 A complete set of plans and specifications showing the proposed revisions relative to the original contract features and requirements supported by design computations as necessary for a thorough and expeditious evaluation.

9.12.1.4 A complete analysis indicating the final estimated costs and quantities to be replaced by the VEP compared to the new costs and quantities generated by the VEP.

9.12.1.5 A statement specifying the date by which a Change Order adopting the VEP must be executed to obtain the maximum cost reduction.

9.12.1.6 A statement detailing the effect the VEP will have on the time for completing the Contract.

9.12.1.7 A description of any previous use or testing of the VEP and the conditions and results. If the VEP was previously submitted on another Owner project, indicate the date, contract number, and the action taken by Owner.

9.12.1.8 A detailed statement indicating the costs for developing the changes, along with the costs for preparing the value engineering joint proposal.

9.13 VEP CONDITIONS:

9.13.1 Value Engineering Proposals will be considered only when all of the following conditions are met:

9.13.1.1 A VEP, approved or not approved by Owner applies only to the contract on which it is submitted. A submitted VEP becomes the property of Owner. The VEP shall contain no restrictions imposed by the Contractor on its use or disclosure. Owner has the right to use, duplicate and disclose in whole or in part any data necessary for the utilization of the VEP. Owner retains the right to use any accepted VEP or part thereof on other projects without obligation to the Contractor. This provision is not intended to deny rights provided by law with respect to patented materials or processes.

9.13.1.2 If Owner is already considering certain revisions to the Contract or has considered or approved changes in the Contract of a like nature on other contracts which are subsequently incorporated in a VEP, Owner may reject the VEP and may change the Contract without obligation to the Contractor.

9.13.1.3 The Contractor shall have no claim for additional costs or delays resulting from the rejection of a VEP, including development costs, loss of anticipated profits, increased material or labor costs except as allowed in paragraph 9.14.

9.13.1.4 Owner will determine if a VEP qualifies for consideration and evaluation. It may reject any VEP that requires excessive time or costs for review, evaluation or investigation, or that is not consistent with Owner's design policies and criteria for the project.

9.13.1.5 Owner will reject all or any portion of work performed under an approved VEP if unsatisfactory results are obtained. The Owner will direct the removal of rejected work and require construction to proceed under the original contract requirements without reimbursement for rejected work performed under the VEP, or for its removal. Where modifications to the VEP are approved to adjust to field or other conditions, reimbursement will be limited to the total amount payable for the work at the contract bid prices as if it were constructed under the original contract requirements. The rejection or limitation of reimbursement shall not constitute the basis of any claim against Owner for delay or for other costs.

9.13.1.6 The proposed work shall not contain experimental features but shall contain features that have been used under similar or acceptable conditions on other projects or locations acceptable to Owner.

9.13.1.7 VEPs will not be considered if equivalent options are already provided in the Contract.

9.13.1.8 The savings generated by the VEP must be sufficient to warrant a review and processing. A savings resulting solely from the elimination or reduction in quantity of a single bid item will not be considered as a VEP. A savings resulting from the elimination or reduction in quantity of a bid item specified as part of a VEP will be considered.

9.13.1.9 Additional information needed to evaluate VEPs shall be provided in a timely manner. Untimely submittals of additional information will result in rejection of the VEP. Where design changes are proposed, the additional information could include results of field investigations and surveys, design computations, and field change sheets.

9.13.1.10 The Contractor may submit VEPs for an approved subcontractor. Reimbursement will be made to the Contractor. Subcontractors may not submit a VEP except through the Contractor.

9.13.1.11 The Contractor shall ensure the VEP is sealed by an Alaska Registered Engineer.

9.14 VEP ACCEPTANCE, REJECTION & PAYMENT:

9.14.1 Within 30 days of the Contractor's formal submission of the VEP, Owner will accept or reject the VEP.

9.14.2 The Contractor will be notified in writing by the Owner as to whether the proposal has been accepted. The decision by Owner is final and shall not be subject to the provisions of Article 15.

9.14.3 If the VEP is rejected, Owner will share equally in the Contractor's costs for developing and presenting the proposal, and the Contractor will share equally in the cost to Owner for investigating and evaluating the proposal. A Change Order will be executed to adjust the Contract Amount for the net increase or decrease in monies resulting from the Contractor's development costs as listed above in paragraph 9.12.1.8, and Owner's evaluation costs. The Change Order will terminate Owner's review of the VEP.

9.14.4 If the VEP is accepted in whole or part, the necessary contract modifications and contract price adjustments will be made by the execution of a Change Order which will specifically state that it is executed pursuant to the provisions of this subsection. Owner will be the sole judge of the acceptability of a VEP and of the estimated net savings in construction costs from the adoption of all or any part of the VEP.

9.14.5 The Contractor shall continue to perform the Work in accordance with the requirements of the Contract until a Change Order incorporating the VEP has been executed, or until the Contractor has been given written acceptance or rejection by the Owner.

9.14.6 The executed Change Order shall incorporate the changes in the plans, specifications, or other requirements of the Contract which are necessary to permit the VEP, or such part of it which has been accepted, to be put into effect, and shall include any conditions

upon which Owner's approval thereof is based. The executed Change Order shall extend or decrease the Contract Time if required by Owner.

9.14.7 The executed Change Order shall provide that the Contractor be paid 50% of the net savings amount as reflected by the difference between the cost of the revised work and the cost of the related construction required by the original contract computed at contract bid prices. The net savings will take into account the Contractor's cost of developing the VEP and implementing the change, and reducing this amount by Owner's cost for investigating and evaluating the VEP, including any ascertainable collateral costs to Owner. Such collateral costs may include increased costs for maintenance, operation, related work items, additional work items, or elements of related or additional work items.

9.14.8 The executed Change Order shall also provide for the adjustment of the Contract Amount. The Contract Amount shall be adjusted by subtracting Owner's share of the accrued net savings.

9.14.9 The amount specified to be paid to the Contractor in the executed Change Order shall constitute full compensation to the Contractor for the VEP and the performance of the work thereof pursuant to the said Change Order.

10. ARTICLE 10 - CONTRACT AMOUNT; COMPUTATION AND CHANGE:

10.1 CONTRACT AMOUNT:

10.1.1 The Contract Amount constitutes the total compensation (subject to authorized adjustments) payable to the Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the Contractor shall be at his expense without change in the Contract Amount. The Contract Amount may only be changed by a Change Order or Supplemental Agreement.

10.2 CLAIM FOR CHANGE IN CONTRACT AMOUNT:

10.2.1 Any claim for an increase or decrease in the Contract Amount shall be submitted in accordance with the terms of Article 15, and shall not be allowed unless the notice requirements of this Contract have been met.

10.3 CHANGE ORDER PRICE DETERMINATION:

10.3.1 The value of any Work covered by a Change Order for an increase or decrease in the Contract Amount shall be determined in one of the following ways:

10.3.2 Where the Work involved is covered by unit prices contained in the Contract Documents, by application of unit prices to the quantities of the items involved (subject to the provisions of paragraph 10.9).

10.3.3 By mutual acceptance of a lump sum price which includes overhead and profit.

10.3.4 When 10.3.1 and 10.3.2 are inapplicable, on the basis of the Cost of the Work (determined as provided in paragraphs 10.4 and 10.5) plus a contractor's fee for overhead and profit (determined as provided in paragraph 10.6).

10.4 COST OF THE WORK:

10.4.1 The term Cost of the Work means the sum of all costs necessarily incurred and paid by the Contractor in the proper performance of the Work.

10.4.2 Except as otherwise may be agreed to in writing by the Owner, such costs shall be in amount no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 10.5:

10.4.2.1 Payroll costs for employees in the direct employ of the Contractor in the performance of the Work under schedules of job classifications agreed upon by the Owner and the Contractor.

10.4.2.2 Payroll costs for employees not employed full time on the Work shall be apportioned on the basis of their time spent on the Work.

10.4.2.3 Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include Social Security Contributions, Unemployment, Excise and Payroll Taxes, Workers' or Workmen's compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto.

10.4.2.4 Such employees shall include superintendents and foremen at the site.

10.4.2.5 The expenses of performing Work after regular working hours, on Saturday, Sunday or Legal Holidays, shall be included in the above to the extent authorized by the Owner.

10.4.2.6 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and suppliers' field services required in connection therewith. All cash discounts shall accrue to the Contractor unless the Owner deposits funds with the Contractor with which to make payments, in which case the cash discounts shall accrue to the Owner. All trade discounts, rebates and refunds and all returns from sale of surplus materials and equipment shall accrue to the Owner, and the Contractor shall make provisions so that they may be obtained.

10.4.2.7 Payments made by the Contractor to subcontractors for Work performed by subcontractors. If required by the Owner, Contractor shall obtain competitive quotes from subcontractors or suppliers acceptable to the Contractor and shall deliver such quotes to the Owner who will then determine which quotes will be accepted. If a subcontract provides that the subcontractor is to be paid on the basis of Cost of the Work plus a fee, the subcontractor's Cost of the Work shall be determined in the same manner as the Contractor's Cost of Work. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

10.4.2.8 Costs of special Consultants (including but not limited to engineers, architects, testing laboratories, and surveyors) employed for services necessary for the completion of the Work.

10.4.2.9 Supplemental costs including the following:

10.4.2.9.1 The proportion of necessary transportation, travel and subsistence expenses of the Contractor's employees incurred in discharge of duties connected with the Work.

10.4.2.9.2 Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of the Contractor.

10.4.2.9.3 Rentals of all construction equipment and machinery and the parts thereof whether rented from the Contractor or others in accordance with rental agreements approved by the Owner and the costs of transportation, loading, unloading, Installation, dismantling and removal thereof - all in accordance with terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

10.4.2.9.4 Sales, consumer, use or similar taxes related to the Work, and for which the Contractor is liable, imposed by Regulatory Requirements.

10.4.2.9.5 Fees for permits and licenses.

10.4.2.9.6 Losses and damages (and related expenses), not compensated by insurance or otherwise, to the Work or otherwise sustained by the Contractor in connection with the performance and furnishing of the Work provided they have resulted from causes other than the negligence of the Contractor, any subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses

shall include settlements made with the written consent and Approval of the Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining the Contractor's Fee. If, however, any such loss or damage requires reconstruction and the Contractor is placed in charge thereof, the Contractor shall be paid for services a fee in accordance with paragraph 10.6.

10.4.2.9.7 The cost of utilities, fuel and sanitary facilities at the site.

10.4.2.9.8 Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

10.4.2.9.9 Cost of premiums for additional bonds and insurance required because of changes in the Work and premiums for property insurance coverage within the limits of the deductible amounts established by the Owner in accordance with Article 5.

10.5 EXCLUDED COSTS:

10.5.1 The term Cost of the Work shall not include any of the following:

10.5.1.1 Payroll costs and other compensation of Contractor's officers, executives, principles (of partnership and sole proprietorships), general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agency, expeditors, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 10.4.2.1 - all of which are to be considered administrative costs covered by the Contractor's Fee.

10.5.1.2 Expenses of Contractor's principal and branch offices other than Contractor's office at the site.

10.5.1.3 Any part of Contractor's capital expenses including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

10.5.1.4 Cost of premiums for all bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 10.4.2.9.9 above).

10.5.1.5 Costs due to the negligence of Contractor, any subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of Defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

10.5.1.6 Costs for the use of small tools having a value of five hundred dollars (\$500) or less.

10.5.1.7 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 10.4.

10.6 CONTRACTOR'S FEE:

10.6.1 The Contractor's Fee allowed to Contractor for overhead and profit shall be a mutually agreed upon fixed fee, or if none can be agreed upon, a fee based on the following percentages of the various portions of the Cost of the Work:

10.6.1.1 For costs incurred under subparagraphs 10.4.2.1 through 10.4.2.6, the Contractor's Fee shall be 15%;

10.6.1.2 For costs incurred under subparagraphs 10.4.2.7, 10.4.2.8 and 10.4.2.9, the Contractor's Fee shall be 10%; and if a subcontract is on the basis of Cost of the Work plus a fee, the maximum allowable to the Contractor on account of overhead and profit of all subcontractors shall be 10%;

10.6.2 No fee shall be payable on the basis of costs itemized under paragraph 10.5;

10.6.3 The amount of credit to be allowed by the Contractor to the Owner for any such change which results in a net decrease in cost will be the amount of the actual net decrease plus a deduction in Contractor's Fee by a mutually agreed upon amount or if none can be agreed upon, then an amount equal to 5% of the net decrease; and

10.6.4 When both additions and credits are involved in any one change, the adjustment in Contractor's Fee shall be computed on the basis of the net change in accordance with subparagraphs 10.6.1.1. and 10.6.1.2.

10.7 COST BREAKDOWN:

10.7.1 Whenever the cost of any Work is to be determined pursuant to paragraphs 10.4 and 10.5, the Contractor will submit in a form acceptable to the Owner an itemized cost breakdown together with supporting data.

10.8 CASH ALLOWANCES:

10.8.1 It is understood the Contractor has included in the Contract Amount all allowances so named in the Contract Documents and shall cause the Work so covered to be done by such subcontractors or suppliers and for such sums within the limit of the allowances as may be acceptable to the Owner. Contractor agrees that:

10.8.1.1 The allowances include the cost to Contractor (less any applicable trade discounts) of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

10.8.1.2 Contractor's cost for unloading and handling on the site, labor, installation costs, overhead, profit and other expenses contemplated for the allowances have been included in the Contract Amount and not in the allowances. No demand for additional payment on account of any thereof will be valid. Prior to Final payment, an appropriate Change Order will be issued to reflect actual amounts due the Contractor on account of Work covered by allowances, and the Contract Amount shall be correspondingly adjusted.

10.9 UNIT PRICE WORK:

10.9.1 Where the Contract Documents provide that all or part of the work is to be Unit Price Work, initially the Contract Amount will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Contract.

10.9.2 The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Amount.

10.9.3 Determinations of the actual quantities and classifications of Unit Price Work performed by the Contractor will be made by the Owner in accordance with paragraph 10.10.

10.9.4 Each unit price will be deemed to include an amount considered by the Contractor to be adequate to cover the Contractor's overhead and profit for each separately identified item.

10.9.5 If the "Basis of Payment" clause in the Contract Documents relating to any unit price in the bid schedule requires that the said unit price cover and be considered compensation for certain Work or material essential to the item, this same Work or material will not also be measured or paid for under any other pay item which may appear elsewhere in the Contract Documents.

10.9.6 Payment to the Contractor shall be made only for the actual quantities of Work performed and accepted or materials furnished, in conformance with the Contract Documents.

10.9.7 When the accepted quantities of Work or materials vary from the quantities stated in the bid schedule, or change documents, the Contractor shall accept as payment in full,

payment at the stated unit prices for the accepted quantities or Work and materials furnished, completed and accepted, except as provided below:

10.9.7.1 When the quantity of Work to be done or material to be furnished under any item, for which the total cost of the item exceeds 10% of the total Contract Amount, is increased by more the 25% of the quantity stated in the bid schedule, or change documents, either party to the Contract, upon demand, shall be entitled to an equitable unit price adjustment on the portion of the Work above 125% of the quantity stated in the bid schedule.

10.9.7.2 When the quantity of Work to be done or material to be furnished under any major item, for which the total cost of the item exceeds 10% of the total Contract Amount, is decreased by more than 25% of the quantity stated in the bid schedule, or change documents, either party to the Contract, upon demand, shall be entitled to an equitable price adjustment for the quantity of Work performed or material furnished, limited to a total payment of not more than 75% of the amount originally bid for the item.

10.10 DETERMINATIONS FOR UNIT PRICES:

10.10.1 The Owner will determine the actual quantities and classifications of Unit Price Work performed by the Contractor .

10.10.2 The Owner will review with the Contractor preliminary determinations on such matters before certifying the prices on the Bid Schedule.

10.10.3 The Owner's certification thereon will be final and binding on the Contractor, unless, within ten days after the date of any such decision, the Contractor delivers to the Owner written notice of intention to appeal from such a decision.

11. ARTICLE 11 - CONTRACT TIME; COMPUTATION & CHANGE:

11.1 COMMENCEMENT OF CONTRACT TIME; NOTICE TO PROCEED:

11.1.1 The Contract Time will commence to run on the day indicated in the Notice to Proceed.

11.2 STARTING THE WORK:

11.2.1 No Work on Contract items shall be performed before the effective date of the Notice to Proceed. The Contractor shall notify the Owner at least 24 hours in advance of the time actual construction operations will begin. The Contractor may request a limited Notice to Proceed after Award has been made, to permit him to order long lead materials which could cause delays in Project completion. However, granting is within the sole discretion of the Owner, and refusal or failure to grant a limited Notice to Proceed shall not be a basis for claiming for delay, extension of time, or alteration of price.

11.3 COMPUTATION OF CONTRACT TIME:

11.3.1 When the Contract Time is specified on a Calendar Days basis, all Work under the Contract shall be completed within the number of Calendar Days specified.

11.3.2 The count of Contract Time begins on the day following receipt of the Notice to Proceed by the Contractor, if no starting day is stipulated therein.

11.3.3 Calendar Days shall continue to be counted against Contract Time until and including the date of Final Completion of the Work.

11.3.4 When the Contract completion time is specified as a fixed calendar date, it shall be the date of Final Completion.

11.4 TIME CHANGE:

11.4.1 The Contract Time may only be changed by a Change Order or Supplemental Agreement.

11.5 EXTENSION DUE TO DELAYS:

11.5.1 The right of the Contractor to proceed shall not be terminated nor the Contractor charged with liquidated or actual damages because of any delays to the completion of the Work due to unforeseeable causes beyond the control and without the fault or negligence of the Contractor, including, but not restricted to the following: acts of God or of the public enemy, acts of the Owner in contractual capacity, acts of another contractor in the performance of a contract with the Owner, floods, fires, epidemics, quarantine restrictions, strikes, freight embargoes, unusually severe weather and delays of subcontractors or suppliers due to such causes.

11.5.2 Any delay in receipt of materials on the site, caused by other than one of the specifically mentioned occurrences above, does not of itself justify a time extension.

11.5.3 The Owner shall ascertain the facts and the extent of the delay and extend the time for completing the Work when the findings of fact justify such an extension.

11.6 ESSENCE OF CONTRACT:

11.6.1 All time limits stated in the Contract Documents are of the essence of the Contract.

11.7 REASONABLE COMPLETION TIME:

11.7.1 It is expressly understood and agreed by and between the Contractor and the Owner that the date of beginning and the time for Final Completion of the Work described herein are reasonable times for the completion of the Work.

11.8 DELAY DAMAGES:

11.8.1 Whether or not the Contractor's right to proceed with the Work is terminated, he and his sureties shall be liable for damages resulting from his refusal or failure to complete the Work within the specified time. Liquidated damages for delay shall be paid by the Contractor or his Surety to the Owner in the amount as specified in the Supplementary Conditions for each Calendar Day the completion of the Work or any part thereof is delayed beyond the Contract Time required by the Contract, or any extension thereof. If such amount of liquidated damages is not established by the Contract Documents, then the Contractor and his Surety shall be liable to the Owner for any actual damages occasioned by such delay.

11.8.2 The Contractor acknowledges that the liquidated damages established herein are not a penalty but rather constitute an estimate of damages that the Owner will sustain by reason of delayed completion. These liquidated damages are intended as compensation for losses difficult to estimate, and include those items enumerated in the Supplementary Conditions.

11.8.3 These damages will continue to run both before and after termination in the event of default termination. These liquidated damages do not cover excess costs of completion or the Owner's costs, fees, and charges related to re-procurement.

11.8.4 If a default termination occurs, the Contractor or his Surety shall pay in addition to these damages, all excess costs and expenses related to completion as provided by Article 14.2.9.

12. ARTICLE 12 - QUALITY ASSURANCE:

12.1 WARRANTY AND GUARANTY:

12.1.1 The Contractor warrants and guarantees to the Owner that all Work will be in accordance with the Contract Documents and will not be Defective.

12.1.2 Prompt notice of all defects shall be given to the Contractor. All Defective Work, whether or not in place, may be rejected, corrected or accepted as provided for in this Article.

12.2 ACCESS TO WORK:

12.2.1 The Owner and the Project Managers, testing agencies and governmental agencies with jurisdiction interests will have access to the Work at reasonable times for their observation, inspecting and testing. The Contractor shall provide proper and safe conditions for such access.

12.3 TESTS AND INSPECTIONS:

12.3.1 The Contractor shall give the Owner timely notice of readiness of the Work for all required inspections, tests or Approvals.

12.3.2 If Regulatory Requirements of any public body having jurisdiction require any Work (or part thereof) to specifically be inspected, tested or approved, the Contractor shall assume full responsibility therefor, pay all costs in connection therewith and furnish the Owner the required certificates of inspection, testing or Approval.

12.3.3 The Contractor shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with Owner's acceptance of a supplier of materials or equipment proposed to be incorporated in the Work, or of materials or equipment submitted for Approval prior to the Contractor's purchase thereof for incorporation in the Work.

12.3.4 The cost of all inspections, tests and Approvals in addition to the above which are required by the Contract Documents shall be paid by the Contractor.

12.3.5 The Owner may perform additional tests and inspections which it deems necessary to insure quality control. All such failed tests or inspections shall be at the Contractor's expense.

12.3.6 If any Work (including the Work of others) that is to be inspected, tested or approved is covered without written concurrence of the Owner, it must, if requested by the Owner, be uncovered for observation.

12.3.7 Such uncovering shall be at the Contractor's expense unless the Contractor has given the Owner timely notice of Contractor's intention to cover the same and the Owner has not acted with reasonable promptness in response to such notice.

12.3.8 Neither observations nor inspections, test or Approvals by the Owner of others shall relieve the Contractor from the Contractor's obligations to perform the Work in accordance with the Contract Documents.

12.4 UNCOVERING WORK:

12.4.1 If any Work is covered contrary to the written request of the Owner, it must, if requested by the Owner, be uncovered for the Owner's observation and replaced at the Contractor's expense.

12.4.2 If the Owner considers it necessary or advisable that covered Work be observed, inspected or tested, the Contractor, at the Owner's request, shall uncover, expose or otherwise make available for observation, inspection or testing as the Owner may require, that portion of the Work in question, furnishing all necessary labor, material and equipment.

12.4.3 If it is found that such Work is Defective, the Contractor shall bear all direct, indirect and consequential costs of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction, (including but not limited to fees and charges of engineers, architects, attorneys and other professional) and the Owner shall be entitled to an appropriate decrease in the Contract Amount.

12.4.4 If, however, such Work is not found to be Defective, the Contractor shall be allowed an increase in the Contract Amount or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction.

12.5 OWNER MAY STOP THE WORK:

12.5.1 If the Work is Defective, or the Contractor fails to supply suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, the Owner may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other party.

12.6 CORRECTION OR REMOVAL OF DEFECTIVE WORK:

12.6.1 If required by the Owner, the Contractor shall promptly, as directed, either correct all Defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by the Owner, remove it from the site and replace it with Work which conforms to the requirements of the Contract Documents. The Contractor shall bear all direct, indirect and consequential costs of such correction removal (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) made necessary thereby.

12.7 ONE YEAR CORRECTION PERIOD:

12.7.1 If within one year after the date of Final Completion or such longer period of time as may be prescribed by Regulatory Requirements or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be Defective, the Contractor shall promptly, without cost to the Owner and in accordance with the Owner's written instructions, either correct such Defective Work, or, if it has been rejected by the Owner, remove it from the site and replace it with conforming Work.

12.7.2 If the Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, the Owner may have the Defective Work corrected or the rejected Work removed and replaced, and all direct, indirect and consequential costs of such removal and replacement (including but not limited to fees and charges of engineers, architects, attorneys and other professionals) will be paid by the Contractor.

12.7.3 In special circumstances where a particular item of equipment is placed in continuous service for the benefit of the Owner before Substantial Completion of all the Work, the correction period for the item may begin on an earlier date if so provided in the Specifications or by Change Order.

12.7.4 Provisions of this paragraph are not intended to shorten the Statute of Limitations for bringing an action.

12.8 ACCEPTANCE OF DEFECTIVE WORK:

12.8.1 Instead of requiring correction or removal and replacement of Defective Work, the Owner may accept Defective Work, and in this event, the Contractor shall bear all direct, indirect and consequential costs attributable to the Owner's evaluation of and determination to accept such Defective Work (costs to include but not be limited to fees and charges of engineers, architects, attorneys and other professionals).

12.8.2 If any such acceptance occurs prior to Final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work and the Owner shall be entitled to an appropriate decrease in the Contract Amount.

12.8.3 If the Owner has already made Final payment to the Contractor, an appropriate amount shall be paid by the Contractor or his Surety to the Owner.

12.9 OWNER MAY CORRECT DEFECTIVE WORK:

12.9.1 If the Contractor fails within a reasonable time after written notice from the Owner to proceed to correct Defective Work or to remove and replace rejected Work as required by the

Owner in accordance with paragraph 12.6, or if the Contractor fails to perform the Work in accordance with the Contract Documents, or if the Contractor fails to comply with any other provision of the Contract Documents, the Owner may, after seven days' written notice to the Contractor, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph the Owner shall proceed expeditiously.

12.9.2 To the extent necessary to complete corrective and remedial action, the Owner may exclude the Contractor from all or part of the site, take possession of all or part of the Work, and suspend the Contractor's services related thereto, take possession of the Contractor's tool, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or approved remote storage sites or for which the Owner has paid the Contractor but which are stored elsewhere, the Contractor shall allow the Owner and his authorized representatives such access to the site as may be necessary to enable the Owner to exercise the rights and remedies under this paragraph.

12.9.3 All direct, indirect and consequential costs of the Owner or its agents in exercising such rights and remedies will be charged against the Contractor, and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work and the Owner shall be entitled to an appropriate decrease in the Contract Amount.

12.9.4 Such direct, indirect and consequential costs will include but not be limited to fees and charges of engineers, architects, attorneys and other professionals, all court and arbitration costs and all cost of repair and replacement of Work of others destroyed or damaged by correction, removal or replacement of the Contractor's Defective Work.

12.9.5 The Contractor shall not be allowed an extension of the Contract Time because of any delay in performance of the Work attributable to the exercise by the Owner of the Owner's rights and remedies hereunder.

13. ARTICLE 13 - PAYMENTS TO CONTRACTOR AND COMPLETION:

13.1 SCHEDULE OF VALUES:

13.1.1 The Schedule of Values established as provided in paragraph 6.6 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the Owner. Progress payments on account of Unit Price Work will be based on the number of units completed.

13.2 PRELIMINARY PAYMENTS:

13.2.1 Upon Approval of the Schedule of Values the Contractor may be paid for direct costs substantiated by paid invoices and other prerequisite documents required by the Contract Documents. Direct costs shall include the cost of Bonds, insurance, approved materials stored on the site or at approved remote storage sites, deposits required by a supplier prior to fabricating materials, and other approved direct mobilization costs substantiated as indicated above. These payments shall be included as a part of the total Contract Amount as stated in the Contract.

13.3 APPLICATION FOR PROGRESS PAYMENT:

13.3.1 The Contractor shall submit to the Owner for review an Application for Payment filled out and signed by the Contractor covering the Work completed as of the date of the Application for Payment and accompanied by such supporting documentation as required by the Contract Documents.

13.3.2 Progress payments will be made as the Work progresses on a monthly basis.

13.4 REVIEW OF APPLICATION FOR PROGRESS PAYMENT:

13.4.1 Owner will, either indicate in writing a recommendation of payment, or return the Application for Payment to the Contractor indicating in writing the Owner's reasons for refusing to recommend payment.

13.4.2 If the latter case, the Contractor may make the necessary corrections and resubmit the Application for Payment.

13.5 STORED MATERIALS AND EQUIPMENT:

13.5.1 If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that the Owner has received the materials and equipment free and clear of all charges, security interests and encumbrances and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect the Owner's interest therein, all of which will be satisfactory to the Owner.

13.5.2 No payment will be made for perishable materials that could be rendered useless because of long storage periods.

13.5.3 No progress payment will be made for living plant materials until planted.

13.5.4 The payment may be reduced by an amount equal to transportation and handling cost if the materials are stored offsite, in a remote location, or will require special handling.

13.6 CONTRACTOR'S WARRANTY OF TITLE:

13.6.1 The Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to the Owner no later than the time of payment free and clear of any claims, liens, security interests and further obligations.

13.7 WITHHOLDING OF PAYMENTS:

13.7.1 The Owner may withhold or refuse payment for any of the reasons listed below provided it gives written notice of its intent to withhold and of the basis for withholding:

13.7.2 The Work is Defective, or completed Work has been damaged requiring correction or replacement, or has been installed without Approval of Shop Drawings, or by an unapproved subcontractor.

13.7.3 The Contract Amount has been reduced by Change Order.

13.7.4 The Owner has been required to correct Defective Work or complete Work in accordance with paragraph 12.9.

13.7.5 The Owner's actual knowledge of the occurrence of any of the events enumerated in subparagraphs 14.2.1.1 through 14.2.1.11 inclusive.

13.7.6 Claims have been made against the Owner or against the funds held by the Owner on account of the Contractor's actions or inactions in performing this Contract, or there are other items entitling the Owner to a set off.

13.7.7 Subsequently discovered evidence or the results of subsequent inspections or tests, nullify any previous payments for reasons stated in subparagraphs 13.7.1 through 13.7.5.

13.7.8 The Contractor has failed to fulfill or is in violation of any of his obligations under any provision of this Contract.

13.8 RETAINAGE:

13.8.1 At any time the Owner finds that satisfactory progress is not being made it may in addition to the amounts withheld under 13.7 retain a maximum amount equal to 10% of the total amount earned on all subsequent progress payments.

13.8.2 This retainage may be released at such time as the Owner finds that satisfactory progress is being made.

13.9 REQUEST FOR RELEASE OF FUNDS:

13.9.1 If the Contractor believes the basis for withholding is invalid or no longer exists, immediate written notice of the facts and Contract provisions on which the Contractor relies, shall be given to the Owner, together with a request for release of funds and adequate documentary evidence proving that the problem has been cured.

13.9.2 In the case of withholding which has occurred at the request of the Department of Labor, the Contractor shall provide a letter from the Department of Labor stating that withholding is no longer requested.

13.9.3 Following such a submittal by the Contractor, the Owner shall have a reasonable time to investigate and verify the facts and seek additional assurances before determining whether release of withheld payments is justified.

13.10 SUBSTANTIAL COMPLETION:

13.10.1 When the Contractor considers the Work ready for its intended use the Contractor shall notify the Owner in writing that the Work of a designated portion thereof is substantially complete (except for items specifically listed by the Contractor as incomplete) and request that the Owner issue a certificate of Substantial Completion.

13.10.2 Within a reasonable time thereafter, the Owner, the Contractor and appropriate Consultant(s) shall make an inspection of the Work to determine the status of completion.

13.10.3 If the Owner does not consider the Work substantially complete, the Owner will notify the Contractor in writing giving the reasons therefore. If the Owner considers the Work substantially complete, the Owner will within fourteen days execute and deliver to the Contractor a certificate of Substantial Completion with a tentative list of items to be completed or corrected.

13.10.4 At the time of delivery of the certificate of Substantial Completion the Owner will deliver to the Contractor a written division of responsibilities pending Final Completion with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties which shall be consistent with the terms of the Contract Documents.

13.10.5 The Owner shall be responsible for all Owner costs resulting from the initial inspection and the first re-inspection, and the Contractor shall pay all costs incurred by the Owner resulting from re-inspections, thereafter.

13.11 ACCESS FOLLOWING SUBSTANTIAL COMPLETION:

13.11.1 The Owner shall have the right to exclude the Contractor from the Work after the date of Substantial Completion, but the Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

13.12 FINAL INSPECTION:

13.12.1 Upon written notice from the Contractor that the entire Work or an agreed portion thereof is complete, the Owner will make a Final inspection with the Contractor and appropriate Consultants and will notify the Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or Defective.

13.12.2 The Contractor shall immediately take such measures as are necessary to remedy such deficiencies.

13.12.3 The Contractor shall pay for all costs incurred by the Owner resulting from re-inspections.

13.13 FINAL APPLICATION FOR PAYMENT:

13.13.1 After the Contractor has completed all such corrections to the satisfaction of the Owner and delivered all maintenance and operating instructions, schedules, guarantees, bonds, certificates of payment to all laborers, subcontractors and Suppliers, certificates of inspection, marked-up record documents and other documents all as required by the Contract Documents, and after the Owner has indicated that the Work is acceptable (subject to the provisions of paragraph 13.16), the Contractor may make application for Final payment following the procedure for progress payments.

13.13.2 The Application for Final Payment shall be accompanied by all certificates, warranties, guaranties, releases, affidavits, and other documentation required by the Contract Documents.

13.14 FINAL PAYMENT AND FINAL COMPLETION:

13.14.1 If on the basis of the Owner's observation of the Work during construction and Final inspection, and the Owner's review of the Application for Final Payment and accompanying documentation all as required by the Contract Documents, the Owner is satisfied that the Work has been completed and the Contractor's other obligations under the Contract Documents have been fulfilled, the Owner will process Application for Final Payment.

13.14.2 Otherwise, the Owner will return the Application for Final Payment to the Contractor, indicating in writing the reasons for refusing to process Final payment, in which case the Contractor shall make the necessary corrections and resubmit the Application for Final Payment.

13.14.3 If, through no fault of the Contractor, Final Completion of the Work is significantly delayed, the Owner shall, upon receipt of the Contractor's Final Application for Payment, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by the Owner for Work not fully completed or corrected is less than the retainage provided for in paragraph 13.8, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Owner with the application for such payment.

13.14.4 Such payment shall be made under the terms and conditions governing Final Payment, except that it shall not constitute a waiver of claims.

13.15 FINAL ACCEPTANCE:

13.15.1 Following receipt of the Contractor's Release with no exceptions, and certification that laborers, subcontractors and material men have been paid, certification of payment of payroll and revenue taxes, and Final payment to the Contractor, the Owner will issue a letter of Final Acceptance, releasing the Contractor from further obligations under the Contract, except as provided in paragraph 13.16.

13.16 CONTRACTOR'S CONTINUING OBLIGATION:

13.16.1 The Contractor's obligation to perform and complete the Work and pay all laborers, subcontractors, and material men in accordance with the Contract Documents shall be absolute.

13.16.2 Neither any progress or Final payment by the Owner, nor the issuance of a certificate of Substantial Completion, nor any use or occupancy of the Work or any part thereof by the Owner, nor any act of acceptance by the Owner nor any failure to do so, nor any review and Approval of a Shop Drawing or sample submission, nor any correction of Defective Work by the Owner will constitute an acceptance of Work not in accordance with the Contract

Documents or a release of the Contractor's obligation to perform the Work in accordance with the Contract Documents.

13.17 WAIVER OF CLAIMS BY CONTRACTOR:

13.17.1 The making and acceptance of Final payment will constitute a waiver of all claims by the Contractor against the Owner other than those previously made in writing and still unsettled.

13.18 NO WAIVER OF LEGAL RIGHTS:

13.18.1 The Owner shall not be precluded or be estopped by any payment, measurement, estimate, or certificate made either before or after the completion and acceptance of the Work and payment therefor, from showing the true amount and character of the Work performed and materials furnished by the Contractor, nor from showing that any payment, measurement, estimate or certificate is untrue or is incorrectly made, or that the Work or materials are Defective.

13.18.2 The Owner shall not be precluded or estopped, not with standing any such measurement, estimate, or certificate and payment in accordance therewith, from recovering from the Contractor or his Sureties, or both, such damages as it may sustain by reason of Contractor's failure to comply with requirements of the Contract Documents.

13.18.3 Neither the acceptance by the Owner, or any representative of the Owner, nor any payment for or acceptance of the whole or any part of the Work, nor any extension of the Contract Time, nor any possession taken by the Owner, shall operate as a waiver of any portion of the Contract or of the power herein reserved, or of any right to damages.

13.18.4 A waiver by the Owner of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

13.19 DEDUCTIONS:

13.19.1 The Owner may deduct from the amount of any payment made to the Contractor any sums owed to the Owner by the Contractor including but not limited to:

- 13.19.1.1 Past due sales tax,
- 13.19.1.2 port and harbor fees,
- 13.19.1.3 property tax or rent.

13.19.2 Before making any such deductions, the Owner shall have provided Contractor written notice of the amount claimed by the Owner to be due and owing from the Contractor.

14. ARTICLE 14 - SUSPENSION OF WORK, DEFAULT AND TERMINATION:

14.1 OWNER MAY SUSPEND WORK:

14.1.1 The Owner may, at any time suspend the Work or any portion thereof by notice in writing to the Contractor. If the Work is suspended without cause the Contractor shall be allowed an increase in the Contract Amount or an extension of the Contract Time, or both, directly attributable to any suspension if the Contractor makes an approved claim therefore as provided in Article 15.

14.1.2 However, no adjustment shall be made under this clause for any suspension, delay, or interruption to the extent that suspension is due to the fault or negligence of the Contractor, or that suspension is necessary for Contract compliance, or that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor.

14.1.3 In case of suspension of Work, the Contractor shall be responsible for preventing damage to or loss of any of the Work already performed and of all materials whether stored on or off the site or approved remote storage sites.

14.2 DEFAULT OF CONTRACTOR:

14.2.1 If the Contractor:

14.2.1.1 Fails to begin the Work under the Contract within the time specified in the Contract Documents, or

14.2.1.2 Fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workmen or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 6.6 as revised from time to time), or

14.2.1.3 Performs the Work unsuitably or neglects or refuses to remove materials or to correct Defective Work.

14.2.1.4 Discontinues the prosecution of the Work, or

14.2.1.5 Fails to resume Work which has been discontinued within a reasonable time after notice to do so, or

14.2.1.6 Becomes insolvent or is declared bankrupt, or commits any act of bankruptcy or insolvency except as prohibited by 11 U.S.C. 363, or

14.2.1.7 Allows any final judgment to stand against him unsatisfied for period of 60 days, or

14.2.1.8 Makes an assignment for the benefit of creditors without the consent of the Owner, or

14.2.1.9 Disregards Regulatory Requirements of any public body having jurisdiction, or

14.2.1.10 Otherwise violates in any substantial way any provisions of the Contract Documents, or

14.2.1.11 For any cause whatsoever, fails to carry on the Work in an acceptable manner, the Owner may give notice in writing to the Contractor and his Surety of such delay, neglect, or default.

14.2.2 If the Contractor or Surety, within the time specified in the above Notice of Default, shall not proceed in accordance therewith, then the Owner may, upon written notification to the Contractor or Surety of the fact of such delay, neglect or default and the Contractor's failure to comply with such notice, have full power and authority without violating the Contract, to take the prosecution of the Work out of the hands of the Contractor.

14.2.3 The Owner may terminate the services of the Contractor, exclude the Contractor from the site and take possession of the Work and of all the Contractor's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by the Contractor (without liability to the Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which the Owner has paid the Contractor but which are stored elsewhere, and finish the Work as the Owner may deem expedient.

14.2.4 The Owner may enter into an agreement for the completion of said Contract according to the terms and provisions thereof, or use such other methods that in the opinion of the Owner are required for the completion of said Contract in an acceptable manner.

14.2.5 The Owner may, by written notice to the Contractor and his Surety or his representative, transfer the employment of the Work from the Contractor to the Surety, or if the Contractor abandons the Work undertaken under the Contract, the Owner may, at his option with written notice to the Surety and without any written notice to the Contractor, transfer the employment for said Work directly to the Surety.

14.2.6 The Surety shall submit its plan for completion of the Work, including any contracts or agreements with third parties for such completion, to the Owner for Approval prior to beginning completion of the Work. Approval of such Contracts shall be in accordance with all applicable requirements and procedures for Approval of subcontracts as stated in the Contract Documents.

14.2.7 Upon receipt of the notice terminating the services of the Contractor, the Surety shall enter upon the premises and take possession of all materials, tools, and appliances thereon for the purpose of completing the Work included under the Contract and employ by contract or otherwise any person or persons to finish the Work and provide the materials therefore, without termination of the continuing full force and effect of this Contract.

14.2.8 In case of such transfer of employment to the Surety, the Surety shall be paid in its own name on estimates covering Work subsequently performed under the terms of the Contract and according to the terms thereof without any right of the Contractor to make any claim for the same or any part thereof.

14.2.9 If the Contract is terminated for default, the Contractor and the Surety shall be jointly and severally liable for damages for delay as provided by paragraph 11.8, and for the excess cost of completion, and all costs and expenses incurred by the Owner in completing the Work or arranging for completion of the Work, including but not limited to costs of assessing the Work to be done, costs associated with advertising, soliciting or negotiating for bids or proposals for completion, and other re-procurement costs.

14.2.10 Following termination the Contractor shall not be entitled to receive any further balance of the amount to be paid under the Contract until the Work is fully finished and accepted, at which time if the unpaid balance exceeds the amount due the Owner and any amounts due to persons for whose benefit the Owner has withheld funds, such excess shall be paid by the Owner to the Contractor.

14.2.11 If the damages, costs, and expenses due the Owner exceed the unpaid balance, the Contractor and his Surety shall pay the difference.

14.2.12 If, after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, or that termination was wrongful, the rights and obligations of the parties shall be determined in accordance with the clause providing for convenience termination.

14.3 RIGHTS OR REMEDIES:

14.3.1 Where the Contractor's services have been so terminated by the Owner, the termination will not affect any rights or remedies of the Owner against the Contractor then existing or which may thereafter accrue.

14.3.2 Any retention or payment of moneys due the Contractor by the Owner will not release the Contractor from liability.

14.4 CONVENIENCE TERMINATION:

14.4.1 The performance of the Work may be terminated by the Owner in accordance with this section in whole or in part, whenever, for any reason the Owner shall determine that such termination is in the best interest of the Owner.

14.4.2 Any such termination shall be effected by delivery to the Contractor of a Notice of Termination, specifying termination is for the convenience of the Owner the extent to which performance of Work is terminated, and the date upon which such termination becomes effective.

14.4.3 Immediately upon receipt of a Notice of Termination and except as otherwise directed by the Owner the Contractor shall:

14.4.3.1 Stop Work on the date and to the extent specified in the Notice of Termination;

14.4.3.2 Place no further orders or subcontracts for materials, services, or facilities except as may be necessary for completion of such portion of the Work as is not terminated;

14.4.3.3 Terminate all orders and subcontracts to the extent that they relate to the performance of Work terminated by the Notice of Termination;

14.4.3.4 With the written Approval of the Owner, to the extent he may require, settle all outstanding liabilities and all claims arising out of such termination of orders and subcontracts, the cost of which would be reimbursable, in whole, or in part, in accordance with the provisions of the Contract;

14.4.3.5 Submit to the Owner a list, certified as to quantity and quality, of any or all items of termination inventory exclusive of items the disposition of which had been directed or authorized by the Owner;

14.4.3.6 Transfer to the Owner the completed or partially completed record Drawings, Shop Drawings, information, and other property which, if the Contract had been completed, would be required to be furnished to the Owner;

14.4.3.7 Take such action as may be necessary, or as the Owner may direct, for the protection and preservation of the property related to the Contract which is in the possession of the Contractor and in which the Owner has or may acquire any interest.

14.4.4 The Contractor shall proceed immediately with the performance of the above obligations.

14.4.5 When the Owner orders termination of the Work effective on a certain date, all Work in place as of that date will be paid for in accordance with the Basis of Payment clause of the Contract.

14.4.6 Materials required for completion and on hand but not incorporated in the Work will be paid for at cost plus 15% with materials becoming the property of the Owner or the Contractor may retain title to the materials and be paid an agreed upon lump sum.

14.4.7 Materials on order shall be canceled, and the Owner shall pay reasonable factory cancellation charges with the option of taking delivery of the materials in lieu of payment of cancellation charges.

14.4.8 The Contractor shall be paid 10% of the cost, freight not included, of materials canceled, and direct expenses only for Contractor chartered freight transport which cannot be canceled without charges, to the extent that the Contractor can establish them.

14.4.9 The extra costs due to cancellation of Bonds and insurance and that part of job start-up and phase-out costs not amortized by the amount of Work accomplished shall be paid by the Owner.

14.4.10 Charges for loss of profit or consequential damages shall not be recoverable except as provided above.

14.4.11 The termination claim shall be submitted promptly, but in no event later than 90 days from the effective date of termination, unless one or more extensions in writing are granted by the Owner upon request of the Contractor made in writing within the 90 day period.

14.4.12 Upon failure of the Contractor to submit his termination claim within the time allowed, the Owner may determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall thereupon pay to the Contractor so determined.

14.4.13 The Contractor and the Owner may agree upon whole or any part of the amount or amounts to be paid to the Contractor by reason of the total or partial termination of the Work pursuant to paragraph 14.4.

14.4.14 The Contract shall be amended accordingly, and the Contractor shall be paid the agreed amount. In the event of the failure of the Contractor and the Owner to agree in whole or in part, as provided heretofore, as to the amounts with respect to costs to be paid to the Contractor in connection with the termination of the Work the Owner shall determine, on the basis of information available to him, the amount, if any, due to the Contractor by reason of the termination and shall pay to the Contractor the amount determined as follows:

14.4.14.1 All costs and expenses reimbursable in accordance with the Contract not previously paid to the Contractor for the performance of the Work prior to the effective date of the Notice of Termination;

14.4.14.2 So far as not included above, the cost of settling and paying claims arising out of the termination of the Work under subcontracts or orders which are properly chargeable to the terminated portions of the Contract;

14.4.14.3 The reasonable costs of settlement with respect to the terminated portion of the Contract heretofore, to the extent that these costs have not been covered under the payment provisions of the Contract.

14.4.15 The Contractor shall have the right of appeal under the Owner's claim procedures, as defined in Article 15, for any determination made by the Owner, except if the Contractor has failed to submit his claim within the time provided and has failed to request an extension of such time, Contractor shall have no such right of appeal. In arriving at the amount due the Contractor under this section, there shall be deducted:

14.4.15.1 All previous payments made to the Contractor for the performance of Work under the Contract prior to termination;

14.4.15.2 Any claim for which the Owner may have against the Contractor;

14.4.15.3 The agreed price for, or the proceeds of sale of, any materials, supplies, or other things acquired by the Contractor or sold pursuant to the provisions of this section and not otherwise recovered by or credited to the Owner; and,

14.4.15.4 All progress payments made to the Contractor under the provisions of this section.

14.4.16 Where the Work has been terminated by the Owner said termination shall not affect or terminate any of the rights of the Owner against the Contractor or his Surety then existing or which may thereafter accrue because of a default.

14.4.17 Any retention or payment of monies by the Owner due to the Contractor under the terms of the Contract shall not release the Contractor or his Surety from liability.

14.4.18 Unless otherwise provided for in the Contract Documents, or by applicable statute, the Contractor, from the effective date of termination and for a period of three years after final settlement under this Contract, shall preserve and make available to the Owner at all reasonable times at the office of the Contractor, all its books, records, documents, and other evidence bearing on the cost and expenses of the Contractor under this Contract and relating to the Work terminated hereunder.

15. ARTICLE 15 - CLAIMS AND DISPUTES:

15.1 NOTIFICATION:

15.1.1 In addition to the notice requirements set out elsewhere in this Contract, if the Contractor becomes aware of any act or occurrence which may form the basis of a claim by the Contractor for additional compensation or an extension of time for performance, or if any dispute arises regarding a question of fact or interpretation of the Contract, the Contractor shall immediately inform the Project Manager.

15.1.2 If the matter cannot be resolved by agreement within 7 days, the Contractor shall, within the next 14 days, submit an Intent to Claim in writing to the Project Manager.

15.1.3 The Claim, if not resolved, shall be presented to the Project Manager, in writing, within 60 days following receipt of the Intent to Claim.

15.1.4 Receipt of the Claim will be acknowledged in writing by the Project Manager.

15.1.5 The Contractor agrees that unless these written notices are provided, the Contractor will have no entitlement to additional time or compensation for such act, event or condition.

15.1.6 The Contractor shall in any case continue diligent performance of the Contract.

15.2 PRESENTING CLAIM:

15.2.1 The Claim shall be submitted in accordance with ARRC Procurement Rule 1800.12 and shall specifically include the following:

15.2.1.1 The act, event or condition giving rise to the claim.

15.2.1.2 The Contract provisions which apply to the claim and under which relief is provided.

15.2.1.3 The item or items of Contract Work affected and how they are affected.

15.2.1.4 The specific relief requested, including additional Contract Time if applicable, and the basis upon which it was calculated.

15.3 CLAIM VALIDITY, ADDITIONAL INFORMATION, & PROJECT MANAGER'S ACTIONS:

15.3.1 The Claim, in order to be valid, must not only show that the Contractor suffered damages or delay but that those conditions were actually a result of the act, event or condition complained of and that the Contract provides entitlement to relief to the Contractor for such act, event, or condition.

15.3.2 The Project Manager reserves the right to make written request to the Contractor at any time for additional information which the Contractor may possess relative to the Claim.

15.3.3 The Contractor agrees to provide the Project Manager such additional information within 30 days of receipt of such a request. Failure to furnish such additional information may be regarded as a waiver of the Claim.

15.3.4 The Claim, if not resolved by agreement within 60 days of its receipt, will automatically be forwarded to the Owner for formal written decision.

15.4 OWNER'S DECISION:

15.4.1 The Contractor will be furnished the Owner's Decision within the next 90 days, unless additional information is requested by the Owner.

15.4.2 The Owner's Decision is final and conclusive unless fraudulent as to the Claim.

15.5 NOTICE OF APPEAL:

15.5.1 Within 14 days of receipt of the Owner's Decision, the Contractor may deliver a Notice of Appeal to the Owner in accordance with ARRC Procurement Rule 1800.13 and request a hearing.

15.5.2 The Notice of Appeal shall include specific exceptions to the Owner's Decision, including specific provisions of the Contract, which the Contractor intends to rely upon in the appeal.

15.5.3 General assertions that the Owner's Decision is contrary to law or to fact are not sufficient.

15.6 OWNER'S DECISION ON APPEAL:

15.6.1 The decision of the Owner on appeal will be rendered within 90 days after the conclusion of a hearing conducted under ARRC Procurement Rule 1800.15 or the date of receipt of the Notice of Appeal, whichever is later.

15.6.2 The time limits given above may be extended by mutual consent.

15.6.3 The decision of the Owner on appeal shall be final and conclusive unless the Contractor appeals to the superior court in accordance with ARRC Procurement Rule 1800.18.

16. ARTICLE 16 - MISCELLANEOUS:

16.1 GOVERNING LAW:

16.1.1 This Contract shall be governed by the laws of the State of Alaska and the provisions of ARRC's Procurement Rules.

16.2 CONTRACT CLAUSES:

16.2.1 If any contract clause is declared null and void, then all other clauses shall remain in force.

APPENDIX G

SUPPLEMENTAL CONDITIONS

SC – 01 Contractor Coordination:

Several contractors may be working for the ARRC within the project area. The selected Contractor for the Project shall cooperate with these other contractors. The other contractors include:

- ARRC and others perform maintenance and construction projects throughout the ARRC tracks each year. Contractor may be required to coordinate activities with nearby projects by others.
- ARRC may have tree clearing contractor personnel on site.
- ARRC can provide an EIC/flagman for 1 work location at one time. Contractor will coordinate work accordingly. Additional EIC/flagman may be available upon request.

SC – 02 Time for Completion:

1. The work which the Contractor is required to perform under this Contract shall commence within ten (10) calendar days from the date stipulated by the Owner in the Notice-to-Proceed to the Contractor.
2. Substantial Completion of all work shall be on **October 31, 2018**. Final completion of all work shall be on or before **November 30, 2018**.

SC – 03 Construction Schedule:

1. Delete General Condition Section 6.5.1. and 6.5.5. and replace General Condition Section 6.5.1. with: “ 6.5.1. The construction of the project shall be planned and recorded with a Critical Path Method (CPM) schedule. The schedule shall be used for coordination and monitoring of all work under the contact including all activity of subcontractors, manufacturers, supplies, utility companies and review activity of the Owner. The Contractor shall submit for Owner’s approval, a detailed baseline CPM schedule a minimum of five (5) days prior to the preconstruction conference. The schedule shall meet the requirements set forth below. The construction time for the entire project shall not exceed the specified Contract Time. Following the Owner’s review, if revisions to the proposed CPM schedule are required, the Contractor shall have three (3) days to make requested revisions. The CPM schedule must be finalized within ten (10) days after the Notice to Proceed.”
2. CPM Schedule Submission:

- a) The CPM schedule shall include each major task/bid item as a summary and include underlying sites/sidings where applicable
- b) The CPM schedule shall include any anticipated work stoppages (e.g. holidays that will be observed).
- c) The CPM schedule shall be resource loaded for prime and subcontractor task/bid items.
- d) The CPM schedule shall include a narrative that explains the basis for the Contractor's determination of construction logic and estimated duration and man-hours. It shall include estimated quantities and production rates, hours per shift, work days per week, weather allowances, planned holidays, winter shutdown periods, and types, number, and capacities of major construction equipment to be used.
- e) The Owner reserves the right to rely on the accuracy of completed, current, and future activities depicted in the CPM Schedule.
- f) After all contract work items are complete, the Contractor shall submit along with the final application for payment, a "record" CPM Schedule showing actual start and finish dates for all work items.
- g) Under General Conditions Section 6.5.6 change to read: "No Work shall be pursued at the site without an Owner approved CPM Schedule. The Contractor shall create a baseline schedule of the Accepted Finalized Schedule."

SC – 04 Liquidated Damages:

Liquidated damages will be assessed in the amount of \$500.00 per day, per site, for each calendar day of delay beyond the dates of Substantial Completion as stated in SC-02 Time for Completion or any extension thereof which may be granted pursuant to the General Conditions.

SC – 05 Determination of Delay Impacts:

If the latest completion time for any significant work item does not fall within the time allowed by the Contract Schedule, the sequence of work and/or duration shall be revised by the Contractor through concurrent operations, additional manpower, additional shifts, or overtime, additional equipment or alternative construction method until the schedule produced indicates that all significant contract completion, occupancy dates, and milestones shall be met. No additional costs will be allowed if such expediting measures are necessary to meet the agreed completion date or dates, except as provided elsewhere in the Contract Documents.

1. The Contractor represents that allowances have been made for all delays and hindrances incidental to the Work, including delays in securing materials or workmen, except for excusable delays.
2. Whenever the Contractor foresees any delay in the prosecution of the Work or immediately upon the occurrence of any delay which the Contractor regards as a Compensable or Excusable Delay the Contractor shall:
 - a) Give notice to the Project Manager, in writing within two (2) days, of the event causing the delay.
 - b) Take immediate actions, short of acceleration, to prevent the occurrence or continuance of the delay, or to mitigate the impact of the delay.
 - c) Submit a written proposal to the Project Manager within three (3) days after giving notice of the delay proposing the amount of adjustment in Contract Price or Contract Time with adequate documentation to support the proposal.
3. After the Project Manager is given written notice of delay, the Project Manager shall determine the length of the delay and the extent to which the prosecution and completion of the work are being delayed.
4. The Project Manager will determine whether the delay is to be considered a compensable, excusable, or non-excusable delay and shall give notice to the Contractor of its determination, or of any additional information required to make a determination.
5. If the delay is a non-excusable delay, the Contractor shall be responsible for overcoming the delay and complying with the contract time. If the delay is a compensable or excusable delay, and the Contractor has given proper notice, the contract time will be extended by the amount of the delay's impact on the critical path. If the delay is a compensable delay, the contract price will be adjusted in accordance with the procedures applicable to a Change Order. Regardless of whether the delay is excusable, non-excusable, or compensable, the Contractor shall continue performing any portion of the work that is unaffected by circumstances causing or contributing to the delay.
6. The Contractor shall make no claim for additional time or compensation for any delay unless the written notice required by SC 4.3.a, is provided to the Project Manager.
7. The Owner may withhold the granting of any time adjustment until the impact on the contract time can be determined.
8. In no event shall the Owner be liable to the Contractor for claims of additional compensation or damages arising out of, or resulting from, delays caused by or within the control of the Contractor or delays beyond the control of both the Owner and the Contractor.

9. If there are concurrent delays, one or more of which is an excusable delay and one or more of which is a non-excusable delay, the delay shall be deemed excusable. If one is compensable and the other is non-compensable, the delay will be non-compensable.
10. In no event shall a time adjustment be granted for weather conditions of normal intensity for the locality where work is performed. Time adjustments for weather delays will only be allowed for unusually severe weather.
11. Prosecution of the Work: The Contractor shall prosecute the work regularly, diligently, and uninterruptedly at such rate of progress as will insure full completion of the work within the Contract time.
12. Definitions:
 - a) Compensable Delay: A delay entitling the Contractor to a compensation adjustment if the delay causes an increase in cost and/or a time adjustment, provided that the notice provisions of the contract documents are satisfied. A delay shall be Compensable Delay if it results solely from a change order, a differing site condition, or a breach of obligation by the Owner.
 - b) Compensation Adjustment: An equitable adjustment in accordance with the contract documents that may either increase or decrease the contract price.
 - c) Excusable Delay: A delay entitling the Contractor to a time adjustment but not to a compensation adjustment. A delay shall be an excusable delay if it results from unforeseeable causes beyond the control and without the fault or negligence of the Contractor, or subcontractor(s) including, but not restricted to, acts of God, acts of a public enemy, acts of another contractor in the performance of a contract with the Owner, fires, epidemics, quarantine restrictions, industry-wide strikes, freight embargos, or unusually severe weather.
 - d) Non-excusable Delay: Any delay that is neither compensable nor excusable.
13. Unusually Severe Weather:
 - a) An unusual weather phenomenon shall be determined by comparing the weather for one calendar month of the Contract Time involved with the average of the preceding ten (10) year climatic range during the same time interval based on National Weather Service statistics for the locality where the Work is performed. The Contractor shall supply such comparison at its sole cost and expense.
 - b) The Contractor will be allowed an extension of time only for activities delayed for an entire day and the activity is on the critical path defined by the most current approved CPM update.
 - c) During periods when weather or other conditions are unfavorable for construction, the Contractor shall pursue only such portions of the work that will not be damaged by the weather conditions and can be constructed in accordance with the Contract Documents.

SC – 06 Progress Meetings and Reports:

1. A pre-construction meeting shall occur before commencing any Work. At this pre-construction meeting the Contractor shall submit the project schedule as described in SC-04.
2. There shall be a weekly progress meeting, date and time to be determined, at the Owner's Job Office location or as otherwise agreed upon. Attendance at this meeting by Contractor supervisory personnel is mandatory. Other contractor or sub-contractor personnel may be invited to discuss specific issues. The weekly progress meeting shall begin with input from the Owner stakeholders that are invited. This input will serve as an opportunity to communicate positive and negative work performed.
3. The CPM schedule shall be updated monthly prior to the 7th of each month..
4. The Contractor shall give the Owner 7 days' notice prior to any changes in the Contractor's shifts, hours or days of operation.
5. The Contractor shall provide 24 hours' notice to the Project Manager to schedule required Quality Assurance testing.
6. The Contractor shall submit a daily report to the Project Manager at the end of each workday. This report shall cover:
 - a) Description of project tasks accomplished that day including work of each subcontractor by station and type of work accomplished. Include Pay Item Number for the work performed.
 - b) Materials installed.
 - c) List of major equipment utilized and hours worked
 - d) Estimate of quantities of materials excavated and material hauled. (Provide copy of load counts)
 - e) Personnel who worked on the project and hours worked.
 - f) Any major equipment repairs started or underway. Status of repair and/or removal from Project.
 - g) Weather to include amount of precipitation.
 - h) SWPPP related activity, inspection, documentation and/or reporting.
 - i) Details of problems encountered.
 - j) Next day's planned activities.
7. A required weekly work plan shall be submitted to cover the current week and the following two (2) weeks, three (3) weeks total. The work plan presented shall be a time scaled Two Week Look Ahead bar chart based and correlated by activity number to the current schedule. In the event portions of the Work affecting critical milestone dates or contract completion dates are in danger of being delayed, or actually are delayed, the Contractor shall develop and present a plan for remedial action. Include all active subcontract work. This plan shall detail the following:

- a) work activities;
 - b) manpower involved by trade;
 - c) work hours;
 - d) equipment involved; and
 - e) the location of the work to be performed.
8. Monthly Progress Report: The Contractor shall submit a monthly Progress Report consisting of a written narrative and various schedule reports and plotted charts. This report will be reviewed in a meeting between the Contractor, Subcontractors, Engineer and Owner. The narrative report shall describe overall progress of the Work, the percentage completion status based upon actual physical work completed, and provide a critical path analysis. The narrative report shall also discuss significant problems including current and anticipated delaying factors and proposed corrective actions. The report shall describe all revisions to the schedule logic, sequence, and activity duration, with reasons/justification for each change. This report shall be submitted no later than the 7th of the month following, effective as of the last day of the month in described in the report.

SC – 07 Progress Payments:

- 1. The Contractor shall submit monthly pay applications on the forms provided by the Owner. A digital copy in Microsoft Excel format shall accompany the hardcopy application.
- 2. The Contractor and the Project Manager shall establish a schedule of values for each major bid item prior to the first pay estimate.
- 3. Monthly pay applications shall be accompanied by:
 - a) Monthly reports
 - b) Monthly record drawings updates.
 - c) Required copies of certified payroll
 - d) Updated CPM schedule per SC-04.
- 4. Pay applications shall not be processed until the above documents are provided to the Project Manager.
- 5. The submitted bid schedule of unit values will serve as the schedule of values for this project. Monthly pay applications will reflect the schedule of values.

SC – 08 As-Built (Record) Drawings:

Contractor will photo-document and provide drawings showing the routing of all cables and noting locations where other cable are encountered. Delivery of these photos and drawings will be coordinated with ARRC to meet ongoing regulatory requirements.

SC – 09 Permit Requirements:

1. The Contractor shall fully comply with all laws, regulations and permits issued by agencies or the United States and the Owner when working in, over or adjacent to wetlands, tidelands, anadromous fish streams, eagle nests, navigable waters, or coastal waters.
2. The Contractor shall ensure that all work in, over or adjacent to navigable water is conducted so that free navigation of the waterways is not obstructed and that existing navigable depths are not impaired, except as allowed by the U.S. Coast Guard and the U.S. Army Corps of Engineers.
3. All work performed by the Contractor must conform to the various permit conditions and stipulations contained therein. The Contractor is responsible for permits that are required to complete the project that are not acquired by the Owner.
4. Contractor shall provide the Owner with a copy of all Contractor obtained permits prior to performing the work associated with the permit.

SC – 10 Equipment:

1. Determination of Time and Material Rates:
 - a) Within fourteen (14) days of Award of Contract, the Contractor and Project Manager will meet and determine a schedule of rates for labor and equipment to be used by the Contractor for potential Change Order work accomplished on a Time and Materials basis. The resulting schedule of rates will be approved by the Owner and the Contractor.
 - b) For Time and Materials work, the Owner will not pay premium time for overtime work or holiday work unless it is authorized in advance in writing by the Owner. The Contractor shall provide certified payroll records for all labor included in requests for a Time and Materials payment.
2. Provision of equipment: The Contractor shall:
 - a) clean all equipment prior to entering the project limits to mitigate the spread of nonnative invasive plants.

SC – 11 Traffic Control:

A traffic control plan shall be required whenever the Contractor, subcontractor or vendor has equipment entering or exiting a public roadway or crossing an identified trail crossing. Traffic control plans shall meet the requirements set forth in Section 643 of the Alaska Department of Transportation and Public Facilities Standard Specifications for Highway Construction, 2004 edition.

Additionally, the Contractor must not impede train traffic. If work is to be conducted that may be near active track, special permission must be granted by ARRC. The Contractor shall provide the Project Manager with at least 72 hours of warning prior to commencing work that may be near active track.

SC – 12 ARRC General Construction Requirements:

1. Definitions of Terms:

Contracting Officer: The person authorized to enter into and administer the Contract on behalf of the Owner. He has authority to make findings, determinations and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract.

Railroad's Director of Signal – The person employed by the ARRC as head of the Signal Department (also referred to as Signal).

Project Manager – The person authorized to act for the Director of Signal and ARRC on site during field operations.

Environmental Site Officer – The person authorized to act for the Director of Project Management and ARRC on site during field operations for CGP compliance and Owner and Contractor obtained permit compliance.

Railroad or ARRC – The Alaska Railroad Corporation, Post Office Box 107500, Anchorage, Alaska 99510-7500.

Owner – Railroad, ARRC or its authorized representative(s).

AREMA – American Railway Engineering and Maintenance-of-Way Association.

2. General Requirements:

a) All construction, reconstruction, operation and maintenance on Railroad property shall be performed in compliance with these specifications. For the purposes of this contract, the project limits within the existing or new ROWs shall be considered Railroad property.

b) Personal Protective Equipment (PPE) All contractor employees working on ARRC property in a field environment are required to wear ANSI Z81.1

approved safety glasses with side shield, hard hats and above the ankle, lace up boots with a defined heel that meet ASTM F2413-05 standards. Reflective vests are required to worn by any employees working outside the confines of an equipment cab or job office as specified by the Project Manager. If reflective vests are required they must meet or exceed ANSI/ISEA 107-2004, Class 2 and Level 2 standards or Class 3 and Level 3 standards if working along a highway. During inclement weather, proper clothing to protect against frostbite, etc. will be worn. Particular attention to footing and the use of proper footwear is essential when working in snow or other slippery conditions. Hearing protection, fall-arrest or fall-protection and respirators will be worn as required by state and federal regulations.

- c) Whenever in the opinion of the Project Manager, the construction may cause a hazard to the safe operation of the Railroad, he may place at the site of the work the required number of qualified employees to protect the Railroad's operations. All ARRC cost and expense for providing such additional employees shall be collected from the Contractor.
- d) Bridge Worker Safety Standards. The Contractor shall comply with Federal Railroad Administrations CFR Title 49, Part 214 Railroad Workplace Safety, Subpart B-Bridge Worker Safety Standards when working on bridges.

3. Protection of Railroad Traffic and Property

- a. False work and shoring plans must be prepared and stamped by an engineer licensed in the state where the work is to be done, and will be forwarded to the Project Manager for final authorization.
- b. The Contractor shall follow Federal, State and local governmental guidelines and suggestions for notification and location of utility locations before proceeding with work.
- c. The Contractor shall, before entering onto the property of the ARRC or project limits for the performance of any construction work or work preparatory thereto, secure permission from the Project Manager for the occupancy and use of the ARRC property and shall confer with the Project Manager relative to the requirements for railroad clearances, operation, Contractor's temporary construction crossing and general safety regulations.
- d. The Contractor shall, upon the completion of the work, remove from the property of the ARRC, all machinery, equipment, surplus materials, false work, rubbish or temporary buildings made necessary by the contract operations, and to leave said property in a neat condition satisfactory to the Project Manager.

4. Access Roads and Construction Roads

- a. No payment will be made to the Contractor by the Owner for any work done in constructing, improving, using, repairing or maintaining any road or structure thereon for use in the performance of the work. The Owner assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the Contractor in performing the work or in traveling to and from the site of the work.
- b. If no pay item is identified in the Contract Documents then all costs involved in the development and implementation of the traffic control plan(s), including but not limited to flagging, signs, and roadway maintenance shall be borne by the Contractor.
- c. The Contractor shall be responsible for maintaining sight triangles at all road crossings within the project limits and at any road crossing outside the project limits that is designated and used as an alternative route for traffic. Site triangles shall be maintained free of vegetation and other obstructions within the area designated by the Owners Representative.
- d. No payment will be made to the Contractor by the Owner for any work done in constructing, improving, repairing or maintaining any road or structure thereon for use in the performance of the work. The Owner assumes no responsibility for the condition or maintenance of any road or structure thereon that may be used by the Contractor in performing the work or in traveling to and from the site of the work.
- e. All haul routes and access roads within the project property shall be reviewed and approved by the Project Manager.
- f. Existing roads and trails shall be used whenever possible for access to the work. Construction of steep hillside roads shall be avoided. Construction of new access roads or use of existing roads shall be subject to approval by the Project Manager or landowner. Temporary access roads shall be rehabilitated upon termination of the use of the road. The roads shall be graded to conform to original topography to the degree possible. Cut slopes shall be reduced to a grade consistent with adjacent topography, erosion protected, and revegetated. All cost associated with leasing, using, maintaining and rehabilitating roads and/or trails shall be at the Contractor's expense.

5. Underground Facilities.

- a. Utility Locates: The Contractor or its Subcontractor shall be required to provide a locate confirmation number from Alaska Digline and identify in the field, utility locates prior to any ground disturbance activities deeper than 6 inches.

- b. All underground utilities, including culverts, pipelines and underground power and communication lines, on railroad property shall conform to the current AREMA specifications.
- c. Commercial fiber cables exist in the ARRC ROW at all work locations on this project. Contractor will coordinate installation of all underground cables and all excavations with fiber cables.**

6. Excavations

- a. No water shall be allowed to stand in open excavations in the track area.
- b. Bridging and shoring shall be adequate to safely carry Railroad traffic.
- c. All open excavations shall be continuously protected by flags, barricades, or watchmen as directed by the Project Manager.
- d. No excavation shall be left open more than three (3) days, unless authorized by the Project Manager, except that no excavations adjacent to active tracks will be left open for the night.
- e. Ditches, culverts and roadways shall be kept clean and free of rock, gravel, construction debris and equipment at all times.
- f. The Contractor shall obtain an appropriate permit from the state and have the concurrence of the ARRC prior to any dewatering activities.

7. Personal Injury Reporting

- a. Owner is required to report certain injuries as a part of compliance with Federal reporting requirements.
- b. Any personal injury sustained by a Contractor employee while on ARRC property must be reported immediately (by fax or email if unable to contact in person) to the Project Manager in charge of the project. The injury report form provided by the Railroad is to be completed and given to the Project Manager, no later than the close of shift on the date of injury.
- c. The Contractor shall submit a one page typed report to Project Manager within seventy-two (72) hours of incident. The report shall be a brief narrative describing details of the incident, root cause as developed during injury investigation and corrective measures recommended to prevent re-occurrences.
- d. Non-Injury Incident Reporting. Any non-injury incident involving a Contractor employee or equipment while on ARRC property must be reported

immediately (by fax or email if unable to contact in person) to the Project Manager in charge of the project. The incident report form provided by the Railroad is to be completed and given to the Project Manager, no later than the close of shift on the date of the incident.

SC – 13 Start-up and Commissioning:

Refer to Specifications for start-up and commissioning services that shall be provided by the contractor.

SC – 14 Warranty:

Refer to Specifications for warranty services that shall be provided by the contractor.

SC – 15 Hazardous Materials Handling:

Hazardous materials may be encountered on this project. Contractor will provide employees with awareness level training so that they can recognize if hazardous materials are encountered, and what to do if they are.

If hazardous materials are encountered during the course of the work, the Contractor shall notify the ARRC immediately. ARRC and the Contractor shall inform employees and subcontractors of all possible dangers while working around these materials. Contractor may arrange for abatement of hazardous materials at the direction of ARRC on a reimbursable basis.

END OF SUPPLEMENTAL CONDITIONS

APPENDIX H

CONSTRUCTION QUALITY CONTROL (CQC) PLAN

1. SUBMITTAL AND GENERAL REQUIREMENTS

- 1.1. Section 6.26 of the General Conditions requires a CQC Plan. This section provides further information about CQC Plan requirements.
- 1.2. The Contractor shall establish and maintain an effective quality management system. The quality management system shall consist of plans, procedures, and the organization necessary to provide material, equipment, and workmanship that comply with the requirements of the contract documents. The system shall cover operations both onsite and offsite, and shall be keyed to the proposed sequence of the work.
- 1.3. The Contractor shall prepare a Construction Quality Control (CQC) plan in conformance with the requirements of this appendix and all other contract documents. A complete detailed CQC plan shall be submitted to the Project Manager within 10 days of intent to award and shall be approved in writing by the Project Manager prior to proceeding with the work.

The Contractor's CQC plan shall include. The CQC plan shall include detailed description of how manufactured materials will be stockpiled and protected prior to incorporation into the project.
- 1.4. The CQC plan shall be capable of ensuring that the procurement, shipping, handling, fabrication, installation, cleaning, inspection, construction, testing, storage, examination, repair maintenance, and required modifications of all materials, equipment, and elements of the work comply with the requirements of the contract documents and that all materials incorporated in the work will perform satisfactorily for the purpose intended.
- 1.5. If Contractor does not provide an acceptable CQC plan, ARRC may, at its sole discretion, elect to award the contract to others.

2. AUTHORITY AND RESPONSIBILITY

- 2.1. Authority: The persons and organizations performing quality control and quality assurance functions shall have sufficient authority and organizational freedom to identify quality problems and to initiate, recommend, provide, and verify implementation of the solution.
- 2.2. Changes in Plan or Personnel: The Contractor shall not revise the CQC or the quality staffing levels or replace any of the key personnel specified herein without prior written approval from the Project Manager.
- 2.3. Contractor's Responsibility: The Contractor is solely responsible for achieving project quality and shall have overall responsibility for the quality of all construction work. The contractor shall conduct quality management

activities, which include inspection, materials testing, and other activities specifically developed and/or chosen by the Contractor.

- 2.4. Owner's Responsibility: ARRC reserves the right to, and will, conduct inspections, testing, sampling, and evaluation associated with quality assurance and independent quality assurance. ARRC's role in construction is to provide the following.
 - 2.4.1. Quality assurance and independent assurance of construction activities, inspection, and materials testing. ARRC will do this with either its staff or a consultant acting as the Project Manager.
 - 2.4.2. Oversight of the Contractor's quality management activities to ensure adherence to the CQC plan and compliance with the contract documents.
 - 2.4.3. Notifying the Contractor promptly of irregularities or deficiencies observed in the work.
 - 2.4.4. Oversight of the Contractor's construction management, including but not limited to scheduling, invoicing, shop drawing review, submittal review and processing, document control, measurement of pay item quantities, and SWPPP implementation and maintenance and etc.

3. CONSTRUCTION QUALITY CONTROL (CQC) PLAN

- 3.1. Objectives: Quality in the construction phase is the program of policies, procedures, and responsibilities required to provide confidence that the desired characteristics have been obtained to help ensure the project will perform its intended function for its design life. Quality control in the construction phase shall consist of those actions necessary to assess production and construction processes so as to control the level of quality being produced in the end project. The Contractor's quality control actions shall include examining, checking, and inspecting in-process and completed work, and materials sampling and testing during production and construction, as a means of controlling and measuring the characteristics and conformity of an item, process, or feature to contract requirements.
- 3.2. The Contractor's CQC plan shall be capable of:
 - 3.2.1. Ensuring that the design, procurement, shipping, handling, fabrication, installation, cleaning, inspection, construction, testing, storage, examination, repair, maintenance, and required modifications of all materials, equipment, and elements of the work comply with the requirements of the contract documents.
 - 3.2.2. Ensuring that all materials incorporated in the work, all equipment, and all elements of the work will perform satisfactorily for the purpose intended.

- 3.3. Contents of the CQC Plan: The CQC plan shall delineate the type and frequency of inspection, sampling, and testing deemed necessary to measure and control the various properties of material and workmanship of all construction processes within the tolerances governed by the drawings and specifications, applicable codes and regulations, permit conditions, and other contract requirements as contained herein. The CQC plan shall include the following, at a minimum.
- 3.3.1. Construction activity and item inspection plans.
 - 3.3.2. Schedule of materials control including materials to be tested, test methods, and frequency of testing. The CQC Plan shall reference and match any test methods or frequencies described in the Contract Documents.
 - 3.3.3. Sampling techniques, and methodology, such as the use of random number tables, for selecting representative testing and or sampling locations.
 - 3.3.4. Control of workmanship.
 - 3.3.5. Identification and qualifications of key quality control personnel, including the quality control manager, inspectors, and technicians. Include an organization chart with reporting lines.
 - 3.3.6. Name and location of testing laboratories.
 - 3.3.7. Documentation procedures, including inspection and test records; accuracy and calibration checks; nature, number, and type of deficiencies found; nature of corrective actions; and quantities of work tested and sampled.
 - 3.3.8. Inventory of the field and laboratory equipment (along with calibration certifications) that will be used to perform the testing.
 - 3.3.9. Mandatory inspection points.
 - 3.3.10. Description of the quality control process that will be employed to ensure that any items manufactured off-site, including but not limited to multi-plate pipes, piles, bridge girders and structural steel meet contract requirements. If quality control is performed by subcontractors, manufacturers, or suppliers, provide their item-specific quality control processes as part of the CQC plan.
 - 3.3.11. Description of the quality control processes that will be employed to ensure installation of all structural items, including but not limited to utility crossings, culverts, multi-plate pipes, piles, structural concrete, and steel erection results in a product that conforms to contract requirements.
 - 3.3.12. Description of how and where manufactured materials will be stockpiled and protected prior to incorporation into the project.

4. CONSTRUCTION QUALITY ORGANIZATION

- 4.1. The construction CQC shall describe the Contractor's quality management organization for all of the project construction processes. At a minimum, the CQC shall identify the following positions.
 - 4.1.1. Construction Manager or Superintendent: The Construction Manager shall be the individual responsible for the overall project construction, quality management, and contract administration for this project.
 - 4.1.2. Construction Quality Manager: The Construction Quality Manager may work directly for the Contractor or may be contracted from an independent firm or organization. The Construction Quality Manager shall work under the direct supervision of the Construction Manager. The Construction Quality Manager and the Construction Manager or Superintendent shall not be the same person. It shall be the responsibility of the Construction Quality Manager to perform workmanship inspections, implement quality planning, oversee quality control testing, and coordinate with Owner's QA testing and independent assurance testing. The Construction Quality Manager shall also cooperate with the Project Manager in compiling a statistical correlation of materials and workmanship data. The Construction Quality Manager shall be responsible for submitting requested inspection, testing, and other data to the Project Manager on a daily basis or as determined by the Construction Quality Manager and ARRC's field representative.. The Construction Quality Manager shall have at least two years (within the last five years) of experience in inspection and materials testing for similar projects.
 - 4.1.3. Construction Testing Technicians: The construction testing technicians may work directly for the Contractor or may be contracted from an independent firm or organization. They shall work under the direct supervision of the Construction Quality Manager and perform testing and inspections as indicated in the CQC plan. Each Construction Testing Technician shall have training and/or technical certification, as appropriate, for the specific type and level of work that they will be testing, including sampling methods appropriate to the type of material being tested. Appropriately trained Construction Testing Technicians shall perform all contract required tests for excavation and embankment materials, selected embankment materials, subbase and base materials, asphalt pavement, concrete, welding, structural steel bolting, painting and coating, and any other materials or work for which the Contractor is responsible under the Contractor's quality management system.

5. **PRECONSTRUCTION MEETING:** Before the start of construction, the Contractor shall meet with ARRC or its authorized representative in a pre-construction meeting. A topic of the pre-construction meeting shall be the Contractor's proposed quality

management system. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the Contractor's quality control operations, control activities, testing, administration of the system for both onsite and offsite work, and the Contractor's quality control program. Minutes of the meeting shall be prepared and signed by both the Construction Manager and the Project Manager. The minutes shall become a part of the contract file. Additional conferences may be called at any time to reconfirm mutual understandings.

6. INSPECTIONS AND TESTS

- 6.1. Except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity, the Contractor shall provide inspections, tests, and similar quality control services in accordance with the approved CQC plan. Costs for these services shall be included in the contract price, whether performed by the Contractor's personnel or an independent firm.
- 6.2. Associated Services: The Contractor shall cooperate with organizations performing required inspections, tests, and similar services and shall provide reasonable auxiliary services as requested. Auxiliary services required include, but are not limited to:
 - 6.2.1. Providing access to the work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
 - 6.2.2. Taking adequate quantities of representative samples of materials that require testing or assisting the Owner in taking samples.
 - 6.2.3. Providing facilities for storage or curing of test samples, and delivery of samples to testing laboratories.
 - 6.2.4. Providing the Owner with a proposed mix design for use for each materials mix that requires control. The mix design shall be for the current year, and shall be accompanied by current year test results from a materials testing laboratory with current AASHTO accreditation in the test methods required for the respective mix design. All source materials used for preparing the mix design shall be the same as those materials that will be used for the project.
 - 6.2.5. Security and protection of samples and test equipment at the project site.
- 6.3. Coordination: The Contractor, the Project Manager, and any independent testing agencies shall coordinate the sequence of activities to accommodate required inspection and testing services with a minimum of delay. In addition, the Contractor and ARRC shall coordinate activities so that removing and replacing construction to accommodate inspections and tests will not be required.
- 6.4. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

- 6.5. Mandatory Inspection Documentation Points: Documentation points are mandatory verification and inspection points that shall be identified in the CQC plan and the project schedule, and specifically approved by the ARRC. Documentation points should be points at which critical characteristics are to be measured and documented by the Construction Quality Manager. It will be the responsibility of the Construction Quality Manager to certify that the construction has met the requirements of the plans and specifications and to sign all inspection documentation. Inspection documentation shall be submitted to ARRC or its representative when requested. It shall be the responsibility of the Contractor to determine inspection documentation point criteria and required documentation.
- 6.6. ARRC shall be notified a minimum of 48 hours prior to any mandatory inspection.
 - 6.6.1. The mandatory inspection points for this project shall be established through coordination between the contractor and the Project Manager.
- 6.7. Completion Inspection: At the completion of all work or any increment thereof established by a completion time stated in the schedule or in the CQC plan, the Construction Quality Manager shall conduct a completion inspection of the work and develop a punch list of items that do not conform to the contract documents. Such a list of deficiencies shall be included in the QC documentation as required herein, and shall include the estimated date by which the deficiencies will be corrected. The Construction Quality Manager shall make a second completion inspection to make certain that all deficiencies noted on the punch list have been corrected and so notify ARRC. The completion inspections and any deficiency corrections required by this paragraph shall be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

7. DOCUMENTATION

- 7.1. The Contractor shall maintain daily records of quality control operations, activities, and tests performed, including the work of suppliers and subcontractors. These records shall be on an acceptable form and shall include factual evidence that required activities or tests have been performed, including, but not limited to, the following.
 - 7.1.1. Type and number of control activities and tests involved.
 - 7.1.2. Results of control activities or tests.
 - 7.1.3. Nature of nonconformance's, defects, and/or causes for rejection.
 - 7.1.4. Proposed corrective action.
 - 7.1.5. Corrective actions taken.

- 7.1.6. List of trades and subcontractors working on the project, and the number of personnel working.
- 7.1.7. Description and inventory of materials delivered by suppliers for future incorporation into the work, including identification of supplier.
- 7.1.8. Description of weather and site conditions encountered any delays, and acknowledgement of any instructions given by ARRC.
- 7.2. The daily quality control report records shall cover both conforming and non-conforming work and shall include a statement that supplies and materials incorporated in the work and workmanship comply with the contract. The Construction Quality Manager shall sign the daily quality control report and furnish legible copies to ARRC by the end of the following workday.
- 7.3. Monthly quality control reports that summarize project status, work completed related to funds expended, any nonconformance, and subsequent corrective actions shall be provided.

APPENDIX I

PROJECT COMMUNICATIONS

The following describes the required procedures for submitting project communications, submittals, and requests for information (RFIs).

Correspondence and Submittals from the Contractor

- Must be addressed to Alaska Railroad Corporation, 1224 Whitney Road, Anchorage, AK 99501; Attention PTC Wayside Project Manager
 - Samples and submittals shall be delivered to the ARRC1224 Whitney Road, Anchorage, AK 99501; Attention PTC Wayside Project Manager.
 - ARRC and/or the Project Manager will generally respond to RFIs or Submittals within several days, but may take up to two weeks.
- All written communications shall reference the ARRC Contract number and be dated.

Designated Representatives

- The Contractor shall submit resumes for key personnel (Project Manager, signal engineer, or foreman) for approval by ARRC. The Contractor shall submit new resumes if these personnel are replaced on the project.
- Field office and cellular telephone number and fax numbers.
- Contractor shall have a Signal Engineer on site while railroad signal work is being performed who is fully authorized to make decisions binding on the Contractor to receive instructions and information from the Project Managers.
- All letters of correspondence from the Contractor to the RE shall be numbered in the top right corner as C-RE-XXX starting at 001; CM shall be numbered in the top right corner as C-CM-XXX starting at 001. All letters of correspondence with the PM shall be numbered C-PM-XXX starting at 001.
- All letters will be serial numbered for document control and ease of reference.
- Electronic file names shall contain the following:

- Serial Number, Subject, Contract#, Date;

Example:

C-CM-001_ProjSuperintendents_ContactInfo_62608_010112.pdf

Do not include spaces, but rather use an underscore to separate words. Refrain from using symbols in file naming. Refrain from using conjunctions to enhance the search capabilities of the system.

- Abbreviation Definitions:
 - C - Contractor
 - CM - Construction Manager
 - RE - Resident Engineer
 - PM - Project Manager
 - CO – Construction Observer

Submittals

- Shall reference the Bill of Materials (BOM) numbers shown in the plans.
- Submittals shall not be combined. Each submittal shall be submitted separately and be identified separately. If submittals are combined and one element of the submittal package is rejected, then the entire submittal will be rejected.
- Re-submittals shall have a new review cycle under the original submittal number.
- Electronic file names shall contain the following:
 - Document Type, Serial Number, Subject, Contract#, Date;
Example: S001_SWPPP_62608_10112.pdf
 - Resubmit
Example: S001A_SWPPP_62608_10112.pdf

RFI's

- Shall reference the ARRC Contract number.
- All RFI's shall be noted on the document and the file name. They shall also be serial numbered in sequential order as submitted (i.e. RFI001_ContentSubjectmatter_YYMMDD).
- RFI's shall not be combined. Each RFI shall be submitted separately.
- Re-submitted RFI's shall be identified by a letter following the re-submittal serial number. Example: RFI 001A (would be a first resubmit), RFI 001B (would be a second resubmit) and so on.
- Electronic file names shall contain the following:
 - Document Type, Serial Number, Subject, Contract#, Date;
Example: RFI001_SubstitutionofXforY_62608_010112.pdf
 - Resubmit
Example: RFI001A_SubstitutionofXforY_62608_010112.pdf

APPENDIX J

TECHNICAL SIGNAL SPECIFICATIONS

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GENERAL SIGNAL REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Section includes general procedures and requirements for the planning, manufacturing, installation, removal, relocation, modification, testing, placing in service, and documentation of as built plans as provided.

1.2 GENERAL

- A. Provisions of the General Signal Requirements apply to all of the sections within the signal requirements section of these specifications.
- B. The contractor may be required to modify existing equipment and material as shown on the Contract Drawings to interface with the existing and proposed signal system.

1.3 REFERENCE STANDARDS

- A. Electrical equipment, unless specifically excluded herein, shall conform to the standards of the National Electrical Manufacturers Association (NEMA), The Underwriters' Laboratories Inc., (UL), the Electrical Testing Laboratories (ETL), the National Electrical Testing Association, Inc. (NETA), or the Electronic Industries Association (EIA), wherever applicable. Unless specifically excluded herein, materials and workmanship shall conform to the requirements of the National Electrical Code; Alaska Railroad Signal Standards, and any applicable local ordinances.
- B. The following parts of the Code of Federal Regulations, Title 49, Transportation, shall apply:
 - 1. Part 212 State Safety Participation Regulations
 - 2. Part 214 Railroad Workplace Safety
 - 3. Part 219 Control of Alcohol and Drug Use
 - 4. Part 220 Railroad Communications
 - 5. Part 236 Rules, Standards, and Instructions for Railroad Signal System
- C. In addition, the Contractor shall be responsible for adherence to all of the above rules and reporting requirements, including those regulations which require pre-employment drug testing and random drug testing of employees engaged in the installation and testing of signal facilities, and the reporting and tracking of employees injured in the performance of work on a railroad.
- D. In addition to the regulations and code requirements specified in this Section, materials and equipment for the signaling systems shall conform to the standards and recommendations of the Communications and Signals Manual of Recommended Practices of the American Railway Engineering and Maintenance of Way Association (AREMA), hereinafter referred to as the AREMA C&S Manual, except that where the Manual uses the word "should" the Contractor shall substitute the word "shall".

1.4 SYSTEM DESCRIPTION

- A. As required by this contract, the contractor shall provide all materials and installation services required for complete working signal systems, as described herein, and as shown on the Contract Drawings, including any equipment not designated as being relocated or designated as ARRC furnished.
- B. All materials and equipment for installation and for interconnection of the various signaling systems shall be fabricated, furnished, and installed as indicated on the Contract Drawings and specified herein.
- C. The Contract Drawings represent a final design utilizing systems, components, and materials that meet the Contract Specifications. The Contractor may provide equivalent systems, components, and materials subject to the approval of the Engineer. If equivalent systems, components and materials are provided, the Contractor shall provide an alternate detailed final design as specified herein under Design Submittals.
- D. As required by this contract, the contractor shall provide systems that are compliant with applicable rules and regulations of 49CFR, parts 234, 235, and 236. Refer to Design Submittals herein for Contractor's responsibility to indicate any corrections or modifications to the Contract Drawings final design that the Contractor may determine are required to conform to these rules and regulations.
- E. The Contractor shall be represented at all design meetings held with the Engineer by a signal engineer qualified in the design and application of the signaling equipment the Contractor proposes for use on this project.
- F. No circuit is considered to have met the requirement of these Specifications for function and safety until it has been properly tested and verified in the field. All circuit changes made to meet the functional and safety requirements of these Specifications shall be considered as included as part of the Work.
- G. The contractor shall provide continuous train control and highway grade crossing warning during all phases of rail construction. At no time shall the work of the Contractor cause delay to train operations, cause an unsafe signaling condition to exist, or reduce the effectiveness or quality of the existing or new grade crossing warning systems.
 - a. The Contractor is responsible and shall submit plans for providing wayside signaling and highway crossing warning systems protection during the Work and plans for point protection and fouling when crossovers are installed or removed. Alternate methods shall conform to CFR 49, Part 234, Part 236 and all local ordinances.
- H. The contractor shall provide rail bonding, as necessary, to maintain existing systems during construction.
- I. The contractor shall protect existing signal cabling when and where necessary. The contractor shall record the final as-built conditions of the signal systems for each system.
- J. The contractor shall perform and document all tests and inspections in accordance with CFR 49 regulations, the AREMA C&S Manual, the ARRC Signal Department Test and

Instruction Manual and these Specifications.

- K. The Contractor shall furnish all labor, superintendence, materials, plant, power as needed on a site to site basis, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits necessary for the work, other than those permits which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.
- a. The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.
 - b. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.
 - c. The contractor shall provide at least one qualified signal person to accompany any on track equipment, and remove, relocate, or disconnect and reconnect any signal equipment that could be damaged by on track equipment.
- L. The contractor shall coordinate installation, inspection, and testing of all material with the Engineer. They must notify the Engineer in writing 30 days prior to any installation, inspection, and testing as part of this coordination.
- M. The Contractor shall perform, along with a representative of the Alaska Railroad, all acceptance testing and commissioning of the PTC Wayside system as a normal part of the Work.
- N. The Contractor shall provide all new software and components which must be manufacturer certified.
- O. The Contractor shall remove, salvage, retire, relocate, furnish, and install project related devices as indicated in the Contract Documents and as required to complete the Work.
- P. The contractor shall excavate material encountered within the limits of the work, to the lines, grades, and elevations as indicated on the Contract Drawings and as specified herein.
- a. General construction excavation shall not exceed 1 vertical to 1 horizontal slope.

If this cannot be accomplished, provide temporary shoring, sheeting and bracing as necessary to retain excavations, maintain banks securely, withstand water pressure, and prevent cave-ins.

- b. Perform excavation and placement of fill in a manner and sequence that will provide proper drainage at all times. Surfaces shall be level, or sloped if required, clean, and clear of loose soil. Maintain in good condition until overlying materials are placed. Perform measures to correct over-excavation due to error or careless excavation procedures.
 - c. When backfill is placed, remove sheeting and bracing in stages so that the walls are supported by the shoring or by newly placed backfill.
- Q. Details of signal cable runs, conduit runs, and pull box installations including number, size, and type of cable are shown in the signal drawings of the Contract Drawings. In the event of conflict as to placement of equipment, the Engineer will determine the correct placement.

R.

1.5 FAILSAFE DESIGN REQUIREMENTS

- A. As used in these specifications, the fail-safe principle shall mean that whenever an equipment failure, human error or failure to act, or adverse environmental condition affects the specified operation of a system involved with the safety of life or property, that system shall revert to a state known to be safe.
- a. Failure of a circuit or equipment that results in an indication of a dangerous or restrictive condition, whether or not there is in fact actual danger, shall have met the fail-safe requirements. Conversely, a failure that results in an indication of safe or nonrestrictive condition when, in fact, a dangerous condition may exist shall not have met the fail-safe requirements.
 - b. Vital applications, such as detector locking of switches, shall be based on the following principles that permit the attainment of fail-safe operation in all known or discovered failure modes:
 - c. Closed Loops: Fail-safe circuits shall employ the closed loop principle and shall protect against open circuits, shorts, or any combination thereof.
- B. Vital Relays: Relays used in vital circuits
- a. Vital Circuits: All line circuits, which energize a vital relay, shall be two wire, double break circuits and shall be energized from an ungrounded direct current (dc) power supply line circuits are defined as any circuit that leaves the housing in which the relay or microprocessor input is controlled by that circuit from the relay or microprocessor input to the energy that controls that input.
- C. Grounds: Components or wires becoming grounded shall not cause an unsafe condition.
- D. Spurious Oscillations: Any amplifier, generator, or device element, active or passive,

breaking into spurious oscillations shall not cause an unsafe condition.

- E. Filters: Filters used in fail-safe circuits shall be designed to prevent undesired signals from appearing at the filter output at levels which could cause an unsafe condition.
- F. Equipment failures and conditions which shall be considered in producing a fail-safe design shall include the following, at minimum:
 - a. Relays (non-vital): Open coil, fused contacts, high contact resistance, shorted coil, armature sticking, contacts sticking, or broken spring
 - b. Relay (vital as defined by the AREMA C&S Manual): Open coil, shorted coil, or high contact resistance
 - c. Transformers: Open primary, open secondary, shorted turns, primary-to - secondary shorts, or combinations thereof
 - d. Capacitors: Short, open, or leakage
 - e. Resistors: Increase or decrease in resistance
 - f. Transistors: Short, open, leakage, or loss of Beta
 - g. Diodes: Short, open, or reverse leakage
 - h. Coils: Open or shorted turns
 - i. Loss or degradation of power sources
 - j. Appearance of abnormal signal levels, electrical noise levels, and delays
 - k. Effects of electrical interference
 - l. Absent or abnormal input signals
 - m. Opens or shorts in internal circuitry at inputs and at outputs
 - n. Mechanical vibration or shock
 - o. Drift or instability of amplifiers, receivers, transmitters, oscillators, switching circuits, and power supplies
 - p. Deterioration of contacts, connectors, terminals, solder connections, printed circuits, circuit adjusting devices, and mechanical devices
- G. Fail-safe equipment proposed for vital signaling applications shall have been proven with a minimum of 5 years of successful rail service operation in the United States of America.

1.6 ENVIRONMENTAL PARAMETERS FOR EQUIPMENT

- A. Contractor provided material and equipment shall be fully operable with no impairment resulting from the effect of the environment throughout the range of worst values indicated below. The general operating environment shall be considered to be in salty atmosphere and in generally sunny weather.
 - a. Ambient outdoor temperature range: From minus 40 degrees F (minus 40

- degrees C) to plus 160 degrees F (70 degrees C).
- b. Relative humidity range: From zero to 100 percent.
- c. Maximum rainfall: 2.4 inches in 24 hours and 1.0 inches in 1 hour.
- d. Maximum wind velocity: 100 miles per hour.
- e. Seismic Zone Location of Work Site: Seismic Zone 4 as defined in the United States Seismic Zones map.
- f. Isokeraunic Level: Five per year.

1.7 DESIGN SUBMITTALS

- A. Undertake no work without the prior submittal to and approval by the Engineer of the relevant plans and procedures.
- B. Alternate Detailed Final Design: Equivalent systems, components, and materials, if proposed, shall be submitted for Engineer's approval no later than 90 days after Notice to Proceed. Utilize, at a minimum, the symbols, nomenclature, and CADD standards depicted on the Contract Drawings and ARRC Communications/Signal Design Standards. The Contractor's alternate final design drawings shall be approved and stamped by a professional electrical engineer registered in Alaska. The Engineer will render a decision concerning alternative design within 60 days of the Contractor submittal.
- C. Submit marked up Contract Drawings for approval, indicating any corrections or modifications to the final design that the Contractor may determine are required to conform to rules and regulations. Submit these revised drawings for the Engineer's approval within 60 days after Notice to Proceed.
- D. Submit proposed plans, procedures, data sheets of proposed materials, application logic, installation details, shop drawings, mechanical drawings, proofs of compliance with applicable standards, and other pertinent data required to fully demonstrate the Contractor's proposed plan for the manufacture, installation, testing, and maintenance of the various signaling systems. Submit for Engineer's approval within 60 days after Notice to Proceed. Plans shall include:
 - a. Proposed plan for providing alternate methods of wayside signaling and highway crossing warning systems protection when signal components are relocated, deactivated, altered, or modified in order to accommodate construction work.
 - b. Plan for point protection and fouling when crossover or turnouts are installed or removed.
- E. Plans submitted for approval may be submitted in 11" x 17" size. Submittals shall include four printed hardcopies and two electronic copies in pdf format. All final drawings and designs shall include CADD files in AutoCAD formats. Signal circuit drawings shall conform to the ARRC CADD standards. Submit final electronic files on CDROM.
- F. As part of the Site Specific Work Plan (SSWP) submission for review and approval by

the Engineer, prepare and submit a detailed Signaling Construction Sequencing Plan (SCSP) for each location where a signal system is to be modified, installed, or removed. The Plan, at a minimum, shall contain sequencing for each wire to be disconnected and/or connected. Drawings may be used to illustrate The Plan. The following, as a part of SCSP, shall be enforced:

- a. A narrative description of the work to be undertaken at the designated location.
 - b. A step-by-step sequence of work description which identifies those steps during which the existing system will be disabled, and a description of what steps will be taken to assure that the signal system will be tested and returned to full operation without causing a delay to any train movement.
 - c. An estimate of time to complete the critical steps in the sequence specified in step-by-step sequence of work description.
- G. Submit circuit drawings indicating any required modifications to new systems or existing circuits where only a segment of the new work can be completed or the complete system must be placed in operation in phases. Submit these temporary interface drawings for the Engineer's approval a minimum of 30 days prior to the scheduled cutover.
- a. Revisions to existing circuit plans shall use the "Xs" and "Os" convention to show changes. Encircling the change with "Xs" shall identify deletions. Encircling the change with "Os" shall identify additions. The Contractor may, with the prior approval of the Engineer, alternately use the "Yellow Out"/"Red In" convention if Contractor provides colored copies of the drawing.
- H. Request approval from the Engineer prior to making any deviation, modification, or changes to the approved design drawings. During the field testing/cut-over period, no deviations, changes, or modifications are to be made to the design drawings without the approval of the Engineer's representative on site.

1.8 SUBMITTALS

A. Submit product information, references, shop drawings, and test data as detailed

1.9 DELIVERABLES

- A. Submit manufacturers' warranties, instruction sheets, and part lists supplied with materials to the Engineer prior to Final Acceptance.
- B. Operation and Maintenance Manuals: A minimum of 30 days prior to placing any system in-service, submit to the Engineer 10 sets of application, installation, operating, and maintenance manuals of all new equipment and systems utilized under this Contract which are provided by the Contractor. Include complete material ordering reference numbers for each type of product.

1.10 QUALIFICATIONS AND DUTIES OF SIGNALING PERSONNEL

- A. Key employees of the Contractor engaged in the final adjustment and testing of the various signaling systems shall be qualified and have had experience on an operating railroad in the type and level of signal installation and testing work as required herein.

- B. Signal Engineer as used herein shall be understood to mean Contractor's railroad signal engineer or engineers approved by the Engineer. Signal Manager as used herein shall be understood to mean Contractor's railroad signal manager or managers approved by the Engineer.
- C. Signal construction and installation personnel shall work under the authority of the Signal Engineer. The Contractor's signaling construction forces shall work under the authority of a Signal Engineer.
 - a. Signal Engineer shall, in coordination with the ARRC engineer, plan, direct, and oversee the adjustment, installation, and testing of signal related work and shall assist in the coordination of the signal work with related track construction work.
 - b. Signal Engineer shall be responsible for all work under his charge and must have the authority to remove any personnel from the project who are not performing the work in a satisfactory manner.
 - c. Signal Engineer shall be on site whenever signal related work or track construction work is in progress in the vicinity of existing wayside signaling equipment, highway grade crossings, and/or cabling.
- D. The Signal Managers shall report to and work under the direct authority of the Signal Engineer and shall supervise and direct the work of all signal construction and installation personnel. The Signal Managers shall not perform major and critical activities, such as cutovers unless they are under the direct supervision of the Signal Engineer.
- E. Signal Engineer shall direct and organize the performance of all tests on signaling equipment and systems, under direction of the Engineer, prior to releasing the systems for service. The Signal Engineer shall be responsible to ensure that all applicable test documentation other than that documentation provided by the Engineer, is completed prior to, or immediately after, in-service testing is completed.
- F. The proposed Signal Engineer shall demonstrate experience in the philosophy, application, and testing requirements of the various signaling systems. The proposed Signal Engineer shall have a minimum of 10 years signal supervisory or management related experience on a Class I railroad. The proposed Signal Engineer shall also demonstrate knowledge of the governing General Code of Operating Rules (GCOR), including FRA regulations and procedures. This demonstration shall be by interview of the proposed Signal Engineer by the ARRC Engineer prior to commencement of any work that may affect the signal system. The work of this project includes working within tight windows on a live railroad consisting of freight trains, and passenger trains. The proposed Signal Engineer shall have a similar level of working experience to the ARRC system. The Engineer's decision concerning the candidate's qualifications will be final. The proposed Signal Engineer shall begin no signaling related work prior to obtaining Engineer's approval. Should additional Signal Engineers be required for the job, approval shall be required depending upon the level and type of work being performed. In addition, the Contractor shall obtain the Engineers approval of each Signal Engineer

prior to beginning any work that may affect the signal system. The Contractor shall propose alternate personnel if the original candidate is found unacceptable.

- G. The proposed Signal Managers shall demonstrate experience in the philosophy, application, and testing requirements of the various signaling systems. The proposed Signal Managers shall have a minimum of 3 years signal supervisory or management related experience on a Class I railroad. The proposed Signal Manager shall also demonstrate knowledge of the governing General Code of Operating Rules (GCOR), including FRA regulations and procedures. This demonstration shall be by interview of the proposed Signal Manager by the ARRC Engineer prior to commencement of any work that may affect the signal system. The work of this project includes working within tight windows on a live railroad consisting of freight trains, and passenger trains. The proposed Signal Manager shall have a similar level of working experience to the ARRC system. The Engineer's decision concerning the candidate's qualifications will be final. The proposed Signal Manager shall begin no signaling related work prior to obtaining Engineer's approval. Should additional Signal Managers be required for the job, approval shall be required depending upon the level and type of work being performed. In addition, the Contractor shall obtain the Engineers approval of each Signal Manager prior to beginning any work that may affect the signal system. The Contractor shall propose alternate personnel if the original candidate is found unacceptable.
- H. Previous qualification as a Signal Engineer or Manager on other ARRC projects does not necessarily constitute qualification as a Signal Engineer or Manager for this Contract.
- I. The Engineer reserves the right to disqualify any Signal Engineer or Signal Manager at any time during the course of the Work. This right is at the sole discretion of the Engineer and is not subject to protest or appeal.
- J. The Contractor shall be responsible for the safety and training of the employees and shall ensure that:
 - a. The necessary steps are taken to protect the health and ensure the safety and physical well-being of all its employees, agents, sub-contractors and sub-contractors' employees working at the site;
 - b. Any and all licenses and certificates required in connection with the work being performed at the site are obtained and maintained for the entire duration of this agreement;
 - c. Any and all notices, forms or other types of documentation required by any federal, provincial and municipal authority or agency are prepared and submitted to the appropriate authority or agency;
 - d. Any order or decision from any federal , provincial and municipal authority or agency with respect to the work being performed at the site is complied with immediately upon receipt thereof;
 - e. Sufficient and qualified manpower is supplied;
 - f. All its employees, agents, subcontractors and subcontractor's employees working at the site follow the preset procedures;

- g. Training, including but not limited to appropriate safety, wildlife, first aid training, RWP and fall protection are provided to all its employees, agents, subcontractors and subcontractor's employees working at the site;
- h. Competent supervision is provided for all its employees, agents, subcontractors and subcontractor's employees working at the site;
- i. Work is carried out in the manner described and with the appropriate personal protective devices, measures and procedures established;
- j. New employees, agents or subcontractors are provided with timely notice of the measures and procedures to follow for their protection while on the job site;
- k. Protection of the public is maximized and inconvenience caused by the work is minimized;
- l. First aid kits are available at the site;
- m. Any employee injured receives the necessary medical attention required to ensure a speedy, safe return to gainful employment;
- n. If an accident occurs, appropriate reports are prepared and submitted to the appropriate authority;
- o. Accidents are thoroughly investigated;
- p. The Engineer is notified of all safety inspections or any direction to comply, as soon as possible after any occurrence.

1.11 TESTING

- A. Tests and inspections shall be made both during the progress of this Contract and after completing installation of equipment, and shall consist of factory tests, subsystem testing and field testing of Contractor furnished equipment.
- B. The work shall include all tests required to ensure proper and safe operation of all systems and subsystems, and to prove the adequacy and acceptability of the total installation specified herein. Tests to be performed shall cause each system and subsystem to be sequenced through its required operations, including imposition of simulated conditions to prove that the installation complies with all specified failsafe requirements.
- C. Each Contractor furnished component and unit of the wayside signal system shall have an inspection performed at its point of manufacture and evidence of this inspection and acceptability shall be indicated on the item where practicable.
- D. The Contractor shall conduct an acceptance test on all Owner furnished equipment prior to loading at the warehouse and provide certified acceptance reports with each unit at time of delivery. The ARRC will provide oversight for factory acceptance testing of equipment. The contractor will give the ARRC 30 days' notice before the factory acceptance testing and if the testing fails the contractor will provide the ARRC airline, lodging and food cost for the second trip.
- E. Test equipment of proper type, capacity, range, and accuracy shall be supplied by the Contractor to perform required tests and inspections. Test equipment used shall be in good working order and properly calibrated within 6 months of the date of the tests. This equipment shall display a sticker indicating its calibration date and the agency that performed the calibration.

- a. Calibration of each instrument shall be certified by a recognized testing facility. Instruments with out of date calibrations will be considered noncertified. Tests conducted with noncertified instruments will be rejected.
- F. In the event that the system does not meet requirements, necessary corrections and retesting shall be made by the Contractor. The Contractor shall successfully complete all tests and inspections possible prior to performing final in service tests.
- G. Work shall include all necessary disconnecting and reconnecting in order to perform the specified tests.
- H. Field tests shall be coordinated with the Engineer. As many tests and inspections as possible shall be completed prior to the final cutover to avoid train delay, inconvenience to the traveling public, and cost to the Owner. The Contractor shall place systems in-service in phases where possible, thus reducing the actual cutover period.
- I. Tests shall ensure conformance with CFR 49, Part 236, and shall be recorded on forms provided by the Engineer and signed by the Contractor's Signal Engineer directing each test and inspection.
- J. Tests and inspections shall conform to the ARRC's Test and Instruction Manual. Three copies of this Manual will be provided to the Contractor. The Contractor shall request guidance from the Engineer where the test and inspection requirements written herein conflict with the FRA Part 236 specifications.
- K. Testing, including pretesting shall include operating all switch machines and lighting all signals. The use of lamp simulators in lieu of, or in parallel with signal lamps will not be allowed in pretesting. An exception may be authorized by the Engineer where a signal or switch machine is in service and will be reconfigured for final cutover, or cannot be installed or wired until final cutover.
- L. Test and inspection procedures shall be subject to Engineer's acceptance and shall comply with all regulatory requirements and the manufacturer's recommended test procedure.
- M. The Contractor shall notify the Engineer in writing at least 48 hours prior to each field test. No part of the signal system shall be placed in service without an authorized representative of the Engineer being present and witnessing the in-service tests.
- N. The Contractor shall submit the following pretest information to the Engineer for acceptance:
 - a. Pretesting authorization request 15 days in advance of proposed pre-testing. Such request shall include:
 - b. Names of Contractor's Signal Engineer in charge of pretesting.
 - c. Other personnel assigned to the pretest that will be performing the tests or assisting with the tests.
 - d. The assigned location(s) of the Contractor's personnel and their designated duties during the pretest.
 - e. An outline of the tests to be performed on each type of component, unit, or system, together with samples of the corresponding test records. The outline shall be arranged to indicate the proper sequence of each test to be performed on each component or unit. In addition, the date and time will be shown for each test.

- f. Description of each test to be performed, including the operating parameter to be tested. Test equipment to be used for the test, including the model number, serial number, calibration period, last calibration date and a brief description of the purpose of the test equipment.
 - g. Description of equipment to be used for communication purposes.
 - h. Schedule of pretesting Contractor proposes to perform which includes beginning and ending dates, times, and locations in a timeline format.
 - i. Identify any test or operation that may disrupt or disarrange the existing signal circuits or systems. Include description of proposed safety provisions and backup contingency plans.
- O. At the conclusion of the test, the Contractor shall record the results of each test, as herein specified, and submit copies of the field test reports to the Engineer immediately at the completion of the cutover testing. The Contractor shall prepare a final typewritten test report as indicated herein and submit to the Engineer within five (5) days after the completion of each test. The final typewritten test report shall include complete details of the test results and corrections or adjustments performed or which remain to be completed. The typewritten test reports shall be signed and dated by the Contractor's responsible employee.
- P. Where required in this Section, submit test results on completed ARRC test record forms.
- Q. All wiring and equipment shall be checked to verify conformance to the Contract Drawings and the Specifications.
- R. Each PTC equipment shelter shall be tested to verify that it functions properly before it is shipped to the field for installation. These tests shall involve connecting all control systems (excluding switches, and similar equipment) that make up a PTC wayside or any other signal equipment shelter; applying power; and then exercising each function of the system and verify proper result.
- S. Perform as many pretests as possible in advance of in-service testing. Include, at a minimum, the adjustment of tunable couplers, microprocessor based coded track circuits, verify signal aspects against received and transmitted codes. In order to have a successful cutover, it is essential that as much pretesting and advance wiring be completed on the Main tracks before in-service testing begins.
- a. Condition precedent for in-service testing and cutover will be the completion of pretesting with the Engineer's acceptance of the results. Complete pretesting and submit the results to the Engineer not less than one (1) week prior to the proposed cutover date.
- T. As Built Drawings shall be kept in the instrument enclosure at a location and in a manner approved by the Engineer. As-built drawings shall be clean and legible. The as-built drawings shall not be removed from the field location after the location is placed in service. The field tests performed shall cause each installed system and subsystem to be sequenced through its required operations, including the imposition of simulated conditions, to demonstrate that the installation complies with all specified failsafe design requirements and operational functions.
- U. Demonstrate the quality of installation by field tests for continuity, insulation resistance, resistance of ground connections, circuit breakdown, visual inspection, and any other tests required by these specifications. Perform these tests prior to any operational

testing of systems or subsystems.

- V. The Contractor's test procedures shall consist of preprinted data sheets or inspection forms. Where applicable, results of test results shall be recorded on ARRC forms. These forms will be provided by the Engineer. When completed by the field test personnel and checked for accuracy and completeness, submit the sheet as the test report.
- W. When tests require specific meter or test instrument readings, the preprinted data sheet shall show the allowable range of values, for each part of the test. The test report shall also contain a check off system for each action and a blank space adjacent to the expected value in which to record the test readings.
- X. All test reports shall be dated and signed by the responsible employee of the Contractor or subcontractor on the day the test is performed. Space also shall be provided for the signature of the witnessing inspector.
- Y. The report shall show the specific test instruments used on each test, with instruments identified by name, type, serial number, calibration date, and calibration due date.
- Z. Should an error be discovered during field testing due to field wiring and connections that do not agree with the accepted circuit plans, the Contractor may not correct such errors without prior acceptance of the Engineer. The Contractor shall not make any changes that deviate from the Contract Drawings without prior acceptance and concurrence of the Engineer.
- AA. The Engineer will make all final determinations as to whether only a part, or the whole test, shall be rerun when any specific field test does not meet the requirements specified for the test.
- BB. Any changes made after completion of test procedure shall be retested in accordance with the applicable test procedure and regulatory requirement.

1.12 AS-BUILT DOCUMENTATION

- A. After a location is placed in service, submit as-built documentation as follows:
 - a. Detailed circuit drawings within 10 working days.
 - b. Submit four copies of as-built corrections to the Engineer within 5 working days.
 - c. Civil Drawings which show the physical location of all signal apparatus and conduits, both along the tracks and perpendicular to it, and heights of all signal structures within 60 calendar days.
- B. Annotate as-built drawing sets to show all approved circuiting and wiring changes made during installation and testing of the location prior to placing it in service, and any approved changes made after placement in service. Clearly identify all changes on the drawings using the "Yellow Out"/"Red In" convention. Changes shall be dated and initialed by the Contractor's responsible Signal Engineer. Identify the date that the location was tested and placed in service in the revision block of the drawings.
- C. In addition to the as-built drawings provided to the Engineer, one set shall be bound and without the prior written approval of the Engineer.
- D. The final as-built drawings shall be 11 inches by 17 inches, unless authorized by the Engineer to substitute another size.

- E. Each circuit that continues on another drawing shall be annotated with drawing number and routing information for the continuation of the circuit.
- F. The circuit drawings shall show all individual circuits. Typical circuits will not be accepted.
- G. The location plans shall show all cable installed with the number of conductors, the size of conductors, the type of cable, termination points of conductors, and the circuit on each conductor. Separate cable plans shall be drawn if cable information cannot be shown in a neat and organized manner on the location plans.
- H. The shop drawings shall be detailed equipment drawings for each type of equipment installed.

1.13 TRACK AVAILABILITY REQUIREMENTS

- A. Work during the high season (May – September) may be required to be performed during the night hours to avoid unnecessary delay to the ARRC passenger trains. Work may be performed under traffic provided it will not cause delays to the system and it will require approval from the Engineer.
- B. ARRC Revenue Service may not be interrupted by the Work of this Contract, except as approved by the Engineer.
- C. Signal Cutovers may be required under traffic.
- D. Signal Cutovers under traffic will require coordination between the Contractor, the Engineer and the Train Control Dispatcher to keep train delays to a minimum.

1.14 WARRANTY

- A. Provide warranties for all equipment and material covering parts and labor for two years from the date equipment or material is "placed in service".
- B. Two-year, complete system-level warranty for the no-cost replacement of any defective component required for a safe and reliable system operation from the date the system is placed into service.
- C. Two-year, complete software warranty for the no-cost revision or rework for operational deficiencies found in the original "in-service" application software from the date the system is placed into service.

PART 2 PRODUCTS

2.0 SYSTEM REQUIREMENTS

2.1 GENERAL

- A. These Technical Provisions specify the functional and system requirements of a new signal system including the various sub-systems. The details for providing these systems shall be determined and guaranteed by the Contractor, subject to the requirements of this Request for Proposal and the written approval of the Engineer.
- B. All aspects of the system design, material, installation, documentation, testing, and operation shall conform to the following:
 - a. Code of Federal Regulations, Title 49 Parts 234 and 236.
 - b. The American Railway Engineering and Maintenance-of Railway Association (AREMA) Communications and Signals Manual, which supersedes the former Association of American Railroads C&S Division, the American Railway Engineering Association and former standards and recommended practices of the predecessor Associations.
 - c. The Institute of Electrical and Electronic Engineers.
 - d. The Electronics Industries Association.
 - e. The National Electrical Code.
 - f. ARRC Railroad Standards.
 - g. Generally accepted North American Railroad signaling practice.
 - h. ANSI software standards.
- C. In the event of a conflict, the more restrictive standard shall apply unless otherwise directed by the Engineer.
- D. All communication and signal apparatus furnished under this Contract shall be suitable for operation without adjustment between the temperature limits of minus 40° to plus 70° Centigrade and humidity levels of 0-95% non-condensing. No additional heating or cooling of the apparatus shall be required to meet this operating requirement.
- E. The Contractor shall supply new equipment only. The use of refurbished or re-built material, components or sub-systems is not permitted.
- F. The Contractor shall provide a complete material reference list for all assemblies and components supplied on this contract. The Contractor shall submit the format to be used to the Engineer for approval. The list shall be organized by type and include all information necessary for preparing an order to the manufacturer's supplier for replacement of such apparatus. The material reference list shall be provided by the Contractor at the completion of design. The material reference item number shall be in a circle as shown in the Typical Plans.
- G. The Contractor is responsible for furnishing all apparatus required for the proper operation of the systems supplied except were otherwise explicitly indicated in these Technical Specifications and Contract Drawings.

- H. The pre-wired instrument housings and cases covered by this specification shall be used to provide for the safe operation of the signal system, including, but not limited to, interlocking signals, switches, local control panels and the PTC system.
- I. The systems supplied shall not impact existing ARRC radio, information technology, signal and other communications systems. All applicable FCC requirements apply.
- J. Batteries specified herein shall not be shipped within the housings. They are to be shipped separately and directly from the manufacturer within 30 days' notice from the Engineer.
- K. The Contractor shall supply a system that is immune to all levels of conducted, induced and radiated interference that may be encountered. The systems supplied shall not impact existing ARRC radio, information technology, signal or communications systems. All applicable FCC requirements apply.
- L. Actual routing of energy supply wires, relay connections to the vital and non-vital microprocessor circuit cards or any other connections to the microprocessor systems shall be done in a manner that eliminates any electromagnetic noise interference from conducted, induced or radiated sources. Factory tests shall be performed to demonstrate that the systems are not susceptible to any interference.
- M. The Contractor is responsible for any ARRC costs associated with field changes due to electromagnetic interferences.

2.2 SIGNAL SYSTEM PERFORMANCE REQUIREMENTS

- A. The Contractor shall provide all necessary hardware and systems required to validate the performance metrics. The Contractor shall formally validate all performance metrics through calculations and actual testing of the systems and subsystems being provided under this Contract. This validation shall be performed on the actual hardware and with the actual software provided for this Contract. The validation shall be performed prior to the Factory Test where practical. The Factory test shall not be considered successful unless all metrics have been validated.
- B. The Contractor's system design shall minimize propagation delay, such that the required operational performance levels are achieved without reducing safety by encroaching on the safe braking reaction time / free running factor.
- C. The Contractor's system shall support communication port prioritization, such that communications affecting safety and operations can be performed ahead of non-safety critical communications.

2.3 SIGNAL SYSTEM TO BE FURNISHED

- A. The proposed signal system shall include, but not limited to the following elements:
 - a. Pre-wired houses and cases complete with all equipment as defined in the contract drawings
 - b. Vital/Non-vital Microprocessor-based PTC System with event recorder. This shall, under normal operation, provide all the vital functions of PTC logic.

- c. All outside cases within the PTC location for the control of track circuits, switch position, and equipment.
 - d. All cases and houses are to be provided with power supply, battery chargers, surge suppression, and other associated equipment per approved plans.
 - e. Pre-wired housings complete with all equipment for PTC with the necessary software, where applicable per approved site plans.
 - f. Pre-wired racks complete with all equipment per approved site plans.
 - g. Battery backup for signaling circuits to extend operation of the devices to 72 hours in the event of a power failure at PTC locations as specified herein and indicated on Drawings.
 - h. Training as specified.
 - i. Spare parts as specified.
- B. The Contractor shall submit a list for approval of spare equipment. The contractor shall provide the backup equipment, as listed below but not limited to, for the support of Railroad operations and the environment of the Railroad. The Contractor shall supply a minimum of 10% reliability back up equipment for all components (no less than one) provisioned with the exception of the houses and SOFC units.
- a. Electronic Track Circuit Chassis
 - b. Electronic Track Circuit Cards
 - c. Fuses (all types)
 - d. Equalizers
 - e. Vital Relays
 - f. Track Surge Protection
 - g. Vital/Non-Vital Processor Chassis
 - h. Vital Input Cards
 - i. Vital Output Cards
 - j. Vital Lamp Driver Cards
 - k. CPU Cards
 - l. Conditional Power Supplies
 - m. Surge Protections
 - n. Non-Vital Input Cards
 - o. Non-Vital Output Cards
 - p. Battery Chargers (low voltage)
 - q. Power Supplies
 - r. B110 Power Units for Switches
 - s. AC Line Protectors
 - t. Battery Line Protectors

- u. Voltage Surge Protections
 - v. Isolation Transformers and modules
 - w. Rectifiers
 - x. Circuit Breakers
 - y. DC Surge Protections
 - z. DC to DC Converters
 - aa. Batteries
 - bb. All LCP Push buttons Types
 - cc. All LCP LED Colors & Types
 - dd. Non-Vital Relays
- C. The Contractor shall be responsible for furnishing all apparatus required for proper operation of the system supplied except where explicitly indicated in these Specifications.
- D. The Contractor shall provide a signal system which has a proven record in implementation and operation within the rail environment. All product submissions required by these Specifications shall include data to prove that the signal equipment provided will operate reliably within the ARRC rail environment with minor revisions/substitutions.
- E. The Contractor shall provide the Engineer with four copies of all documentation as required by the Technical Specification, each on CD-ROM media and one paper copy of user-defined software and application programs of the microprocessor processor systems.
- F. The wired instrument housings, cases and racks, covered by this specification, shall be used to provide for the operation of the switch and O.S. monitoring for PTC.
- G. ARRC uses the following typical cable sizes for the applications identified below:
- a. 60 Hz Hotel Power – 3-1C #2
 - b. Track Leads – 2-(1C-#6) Twisted
 - c. Switch Circuit Controller 7C #14, or 7C #9
- H. The Contractor shall design a signal system such that the maximum cable lengths will be supported:
- a. Power Switches: 1,000 feet
 - b. Color Light Signal: 1,200
 - c. Track Leads: 200 feet
- I. The Contractor shall review the cable layout plans and verify that they adequately support the needs of the signal system that the Contractor is to provide. The Contractor shall notify the Engineer of any comments or concerns on the proposed cable plan within 90 days of NTP.

- J. The Contractor shall furnish signal instrument housings with apparatus wired in place, in accordance with plans prepared by the Engineer.
- K. Actual routing of energy supply wires must be in accordance with the latest surge control practices and be approved by the Engineer.
- L. Power shall be supplied for heating and ventilation, lighting and convenience outlets. The load shall be equally shared between each incoming hot lead and common.
- M. A separate circuit breaker shall be supplied for each equipment case or house power feed from the CIL or intermediate interface house and wired for 150% of its load calculations. The loads attached to the busses shall be balanced.
- N. The utility wiring for the lights, HVAC and fire suppression system, etc., shall be run in conduit. The wire shall be THW or THHN and sized in accordance with the NEC.

The Contractor shall provide pre-wired instrument houses, cases and junction boxes as described within these Specifications

2.4 MATERIAL - GENERAL

- A. All Electronic products including the vital and non-vital microprocessor-based control system that shall be furnished as part of this Contract shall be proven products that have been "Grandfathered In" as to the requirements of the Code of Federal Regulations, Title 49, Part 236, Subpart H – Standards for Processor-Based Signal and Train Control Systems. (49 CFR 236, Subpart H)
- B. Should the Contractor propose a "new or novel product" as defined within 49 CFR 236, Subpart H, or should an existing proven "Grandfathered product" be significantly modified for use on the Contract, all provisions of 49 CFR 236, Subpart H, shall apply and the Contractor shall be required to submit all documentation including the Product Safety Plan defined within 49 CFR 236.907.
- C. The term "Grandfathered In" as used within this Specification refers to existing microprocessor-based products which have been in service with a proven record of reliability and safety as of the publication date of the 49 CFR 236 Subpart H, Final Rule which is March 7, 2005.
- D. The Contractor shall provide system, subsystem and component training.
- E. The Contractor shall perform factory testing including simulation of switch position and O.S. occupancy and systems testing to the satisfaction of the Engineer.
- F. The Contractor shall provide all required documentation.
- G. The Contractor shall provide support for installation and connection of equipment, including on site assistance at field pretesting, cut over and in-service testing.
- H. The Contractor shall provide training on the theory of operation, adjustment, maintenance, trouble-shooting and modification of vital microprocessor interlocking control systems, non-vital microprocessor code systems, track circuits, communication hardware and system.

PART 3 SIGNAL ENCLOSURES

3.0 CONSTRUCTION OF ENCLOSURES

3.1 GENERAL

- A. The requirements in this section apply to all signal instrument enclosures (CILs, houses, cases and cabinets) to be supplied under this Contract. Signal equipment enclosures shall be products manufactured by PTMW, Inc., Invensys (Siemens) Systems, or approved equal.
- B. The signal equipment enclosures described in this section are shown in the Contract Drawings as listed in these Technical Specifications and Contract Drawings.
- C. Permanent vendor name plate, or equivalent, complete with vendor name, address, model number, serial number, and date of manufacture or equivalent shall be located on front.
- D. The Contractor shall submit for review and approval detailed Shop Drawings for each enclosure provided under this Contract. The Shop Drawings shall include but not be limited to material lists, fully dimensioned plans, section details, structural details, welding or fastening details, caulking, painting, insulation, shelves, main terminal boards, apparatus boards, HVAC, fire suppression, entry alarm and electrical details. The Contractor shall submit both hard copies and electronic copies of the Shop Drawings as defined within these Technical Specifications.
- E. The Contractor shall provide enclosures that are watertight, insulated and sealed against entrance to rodents, bugs and other wildlife.
- F. All houses shall be equipped with telescoping foundations complete with galvanized bolts, washers, nuts and miscellaneous products and shall conform to AREMA C&C Manual Part 15.3.1.
- G. The Contractor shall provide the CILs, houses, cases and cabinets that meet the following minimum required sizes:
 - a. PTC House 6' x 6' (with a minimum inside height of 10' to Peak).
 - b. Case (high single door case) 41" x 24" (with minimum height of 73").
- H. The Contractor shall provide larger sized enclosures or additional enclosures as necessary to meet the requirements of these Technical Specifications, Contract Drawings and the Contractor's design.
- I. Instrument enclosures shall have exterior surfaces (roof, walls, doors, inner floor and outer floor) of sheet Aluminum, in accordance with ASTM B209 (Specification for Aluminum and Aluminum-Alloy Sheet and Plate).
- J. Any structural member whose surfaces, edges, corners or seams are exposed to the outside environment of the enclosure shall be made of stainless steel or other weathering steel suited for the application. The Contractor shall identify any materials and locations within the enclosures where this application exists.

- K. The undersides of the enclosures shall be painted with a black mastic covering.
- L. The exterior of the enclosures shall be de-greased, primed and painted Aluminum/Silver in accordance with the requirements of AREMA Signal Manual of Recommended Practices Part 2.4.30.
- M. Standing seams, necessary for joining segments of house panels or other elements, shall not be formed externally. They shall be formed facing inward and fully caulked on the exterior with a flexible waterproof caulking material. The caulking shall be compatible with the interior and exterior painting materials.
- N. Cases and cabinets shall be constructed without any standing seams. Continuous panels are required.
- O. No penetrations, vents or other components are permitted on or through the roof of any enclosure.
- P. The Contractor shall paint the interior surfaces of all enclosures with approved primer and finish with two (2) coats of flame resistant paint, as approved by the Engineer.
- Q. Each enclosure shall be fitted with screened and adjustable ventilator openings. Each opening shall be provided with replaceable air filters. The filters shall be commercially available and standard sized. Quantity, size and placement of the ventilator openings shall be submitted to the Engineer for approval.
- R. The Contractor shall submit the maximum weight of each enclosure before delivery.
- S. Each enclosure shall have sufficient structural strength to permit lifting by overhead crane or lifting from below, with all equipment installed, without additional bracing. Eye bolts, or suitable arrangement shall be provided for lifting including but not limited to structural skid pads under the enclosure to permit lifting and sliding into place.
- T. Each enclosure shall have main terminal boards constructed of a 3/4" sheet of marine grade fire retardant plywood painted with fire retardant white paint after fabrication and drilling. All terminal boards shall have the drilled holes painted after drilling.
- U. All terminals and equipment shall be installed on the front facing side of the main terminal board or apparatus board. No terminals or equipment shall be installed on the rear of the boards.
- V. A full complement of shelves shall be provided for the CILs, houses and cases. The width of the shelves shall be a minimum of 12 inches. Wider shelves shall be provided for equipment deeper than 12 inches. No equipment shall overhang any shelf. The shelves shall be of 3/4" fire resistant, marine grade plywood, or other approved material, painted with fire retardant white paint shall be furnished on the sides of all houses. Any holes drilled in the boards for wiring or cabling shall be painted after drilling.
- W. A full complement of apparatus boards of 3/4" fire resistant, marine grade plywood, or other approved material, painted with fire retardant white paint shall be furnished on the sides of all houses. Any holes drilled in the boards for wiring or cabling shall be painted after drilling.

- X. The apparatus boards shall be securely fastened to the walls in such a manner to permit mounting of battery charging equipment, transformers, terminals and other equipment.
- Y. Sufficient space shall be maintained at the rear of the terminal boards and apparatus boards to allow easy access to the cables, wiring and connections.
- Z. The Contractor shall submit for review and approval the design proposed for the following:
 - a. Main terminal board structural design, mounting methods and layout.
 - b. Apparatus boards and shelves structural design, spacing, mounting methods and layout.
 - c. Details concerning the work space behind apparatus boards, wire chases, wire management and tagging mounting hardware, overhead cable trays and all other related material.
- AA. The surface of the main terminal boards, apparatus boards, hardware and fittings shall be primed and then finished with two (2) coats of flame resistant White ASA No. 61 paint. All surface preparation should be carried out in accordance with good painting practices. All dirt, grease, oil, wax and other foreign matter must be removed with a detergent, rinse surface thoroughly with clear water and allow to dry. Cracks, holes, and other surface irregularities are not permitted. All glossy or smooth surfaces shall be dulled with sandpaper. New wood surfaces shall be sealed with 3001 Alkyd Primer.
- BB. The Contractor shall provide mounting studs, in each enclosure, used for mounting equipment to the apparatus or main terminal boards. The studs shall consist of carriage bolts mounted through the mounting boards and shall be independently secured to the backboard with flat and lock washer and hex head nut. The minimum size for the studs shall be ¼-20. The stud shall remain captured in place when the equipment removed. The use of lag bolts or wood screws is not permitted.
- CC. Interior insulation shall be painted after installation with a fire-retardant white paint. The fire-retardant paint shall be compatible with the proposed insulating material. Insulating material, detailed methods of installation and the proposed fire-retardant white paint shall be submitted to the Engineer for approval.
- DD. Design of all poured concrete house and CIL foundation piers shall be submitted for approval. Pre-cast foundations shall be submitted for approval by the engineer. If approved, they shall be delivered soon after the CIL, house, case and cabinet enclosure sizes have been approved. The Engineer will authorize delivery of the foundations.
- EE. The Contractor shall provide a detailed foundation layout plan for each location. The design of the foundation locations shall accommodate the cable vaults beneath each CIL and the hatch provided within each. The plan shall clearly indicate the foundation location and reference pull boxes and CIL hatches. All dimensions shall be in feet and inches.
- FF. The Contractor shall furnish insulated mounting pads to separate the instrument house or case from the concrete foundation upon which it is to be installed. Mounting pads for

each support point shall be of minimum 3/16" thickness of No. 60 Dura Neoprene as manufactured by Syntex Rubber Co. of Bridgeport, Connecticut, or approved equal.

- GG. Instrument houses and case floors shall be designed to hold 500 lbs. per square foot minimum with not more than 1/4" deflection. Should this requirement not be adequate to properly support the weight of the batteries to be provided under this Contract, the Contractor shall provide additional structural support or thicker floors or structural members to prevent the over stressing of the instrument house or case floor and meet this criteria.
- HH. Each enclosure shall have a sufficient number of aerial cable entrances and a sufficient number of underground cable entrances at the rear of the main terminal boards.
- II. Entrance hardware shall be included to provide weatherproof entrance of cables. The Contractor shall provide cable risers to enclose the cable from the ground into the house. The cable risers shall be made of 4" or 6" SCH 40 PVC with a minimum length of 36". The PVC shall extend a minimum of 24" below ground line. All cable entry void spaces shall be filled with a weatherproof sealant to prevent water and animals from entering the instrument house.
- JJ. The cable entry shall be located so that cable pulling tensions and bending radiuses for cables installed therein is not exceeded.
- KK. Cable supports shall be provided behind terminal boards for tie wrapping of incoming cables. The Contractor shall provide commercially available wire and cable management systems to accommodate the internal and external wires and cable.
- LL. On the basis of final cable plans, the Contractor shall provide sufficient quantity and size of cable entrances.
- MM. The Contractor shall provide a sufficient quantity of complete entrance hardware for each enclosure including cable risers, gaskets, aerial cable entrances, and fastening hardware. A minimum of 30% spare capacity is required in the entrance facilities once all cables have been installed.
- NN. The application of two or more newly wired houses or cases mounted side-by-side, and connected by cable or conduit, is not permitted.

3.2 CILS AND HOUSES

- A. The Contractor shall provide CILs and houses in quantities and sizes necessary and required to meet the requirements of these Technical Specifications and Contract Drawings.
- B. The Contractor shall provide each house with rubber floor mats (ANSI/ASTM D 178-81 Class 0). The mats shall cover all exposed floor areas.
- C. Houses shall have gable end roofs. The use of hip roofs is not permitted.
- D. The interior and under floor of each CIL or house shall be lined with high efficiency "Thermax" insulation, or approved equal. Insulation shall be 2 inches thick on the walls

and doors with an R value of 13 and 3 inches thick on the ceiling and under floor with an R value of 19. Ceiling insulation shall not be suspended, but shall be mounted directly to the house ceiling. After installation under the floor, the insulation shall be covered by sheet steel conforming to the same material used on the enclosures walls and floor. Access through the floor for the hatch and cable chutes shall remain unaffected.

- E. Each housing door shall be 36 inch wide and equipped with three-point drawbar style vandal resistant locking arrangement. Doors shall be gasketed so that they will provide a dust proof and weatherproof seal. The three-point drawbar latching arrangement shall be operated by a door handle with a bronze bushing, and will require at least an 80° rotation to unlatch it. Hasps shall be provided to apply railroad padlocks to front doors.
- F. Doors shall contain ventilating openings, which shall be provided with replaceable air filters and protected by caps, to prevent entrance of moisture.
- G. All cable entrance racks or terminal boards shall be accessible from within the house and not require an outside access door.
- H. The Contractor shall provide a minimum of a 36 inch walkway between each finished rows or racks and equipment. The walkways shall be clear from top to bottoms and not permit offsets due to irregular shaped equipment or chassis.
- I. The Contractor shall provide all electrical work within the enclosure to be compliant with the National Electric Code. The Contractor shall submit for review and approval all details of the electrical work. All electrical wiring shall be installed within conduit.
- J. Each CIL shall be electrically wired and equipped with a minimum of two (2) 120 volt, industrial duplex style convenience outlets. These outlets shall have a Ground Fault Circuit Interrupter. These outlets shall be grounded in accordance with the National Electrical Code.
- K. A load center for power shall be provide in each CIL and house. The load center shall not be mounted on the main terminal board.
- L. The Contractor shall provide 50% spare circuit breaker space in all load centers. Of the 50% spare space, the Contractor shall provide 25% spare breakers.
- M. A sufficient quantity of fluorescent lighting fixtures shall be supplied so as to provide floor level luminance of not less than 400 lux in any open area of the enclosure. Fluorescent lighting fixtures shall be placed such that they do not obstruct the overhead wire ways.
- N. The Contractor shall provide heaters for each house. Each heater shall be wired to the approved load center and shall be thermostatically controlled.
- O. Wiring between apparatus racks and terminal boards shall be carried overhead at rack-top level in metal or fiberglass ladder wire chases. Wire chases shall be free of sharp edges. All ladder rungs shall be insulated, and insulating grommets shall be applied to all cutouts in racks through which wires may pass. The overhead chase system shall be appropriately grounded.

- P. Interior surfaces of each house, hardware and fittings shall be finished in accordance with AREMA Signal Manual of Recommended Practices, Part 1.5.10.
- Q. Each CIL and house shall be equipped with a quantity of wall mounted, 120 Volt AC, thermostatically controlled exhaust fans. The fans shall have the capacity to exchange the air 7 times per hour. Exhaust fans shall be approved by the Engineer prior to installation. Sufficient inlet vents with replaceable air filters shall be provided in the floor of each house. Internal winter covers shall be supplied for both exhaust fans and air inlets. The Contractor shall submit all elements of the ventilation system to the Engineer for approval.
- R. Each CIL and house shall be equipped with a fire extinguisher with mounting brackets. The size shall be a minimum of 20 pounds each and they shall be rated ABC.
- S. Each CIL and house shall be provided with 20% spare floor space, 20% spare space for racks and 20% spare space for wall mounted apparatus.
- T. Each instrument house shall have racks for mounting apparatus. The apparatus shall be placed in a bay style arrangement. The Contract Drawings depict the layout of a house and rack arrangement. Standard 19-inch EIA racks shall be used for all equipment.

3.3 CASES

- A. The Contractor shall provide cases in quantities and sizes necessary and required to meet the requirements of these Technical Specifications and Contract Drawings.
- B. Except as required within these technical Specifications, the Contractor shall only proposed cases that meet the AREMA recommendations for constructions and sizes.
- C. Each case shall be designed and equipped to be lifted from above. Permanent lifting eyes shall be provided on each case.
- D. Each equipment case shall have hinged doors both front and back. Each front case door shall contain ventilating openings at top and bottom, which shall be provided with replaceable air filters and protected by caps, which to prevent entrance of moisture.
- E. Each door shall be equipped with three-point drawbar style vandal resistant locking arrangement. Doors shall be gasketed so that they will provide a dust proof and weatherproof seal. The three-point drawbar latching arrangement shall be operated by a door handle with a bronze bushing, and will require at least an 80° rotation to unlatch it.
- F. Cases shall be provided with a sloped roofs permitting water to shed toward the rear of the case.
- G. Hasps shall be provided to apply railroad padlocks to front and back doors.
- H. All equipment shall be mounted and serviced from the front of the case. All cables shall be terminated on the front of terminal boards in all cases.
- I. All equipment provided within the cases shall be wired to standard terminal strips with test links.

- J. All cases shall be provided with a minimum of two porcelain lamp fixtures per door (front and rear) controlled from pull chains. All cases shall be provided with a minimum of one duplex convenience outlet with an appropriate fuse or circuit breaker
- K. All equipment provided with the case shall be mounted on the main terminal board. Mounting equipment on the side walls, doors or rear of the main terminal board is not permitted.
- L. The Contractor shall provide each instrument case with approved rubber floor mats (ANSI/ASTM D 178-81 Class 0) to cover all exposed areas of the floor.
- M. Each case shall be designs and equipped to permit the installation of Contractor provided cable chutes behind the main terminal board. The number and size of the chutes shall be provided for review and approval.
- N. The interior and under floor of each case shall be lined with high efficiency "Thermax" insulation, or approved equal. Insulation shall be 2 inches thick on the sides, top, bottom and doors with an R value of 13. After installation under the floor, the insulation shall be covered by sheet steel conforming to the same material used on the enclosures walls and floor. Access through the floor for the cable chutes shall remain unaffected.
- O. The Contractor shall furnish and install a metal wall mounted plan holder in each case to file field circuit plans. The plan holder shall be sized to hold the locations 11" x 17" circuit plans. Design of the wall mounted plan holder shall be submitted to the Engineer for approval.
- P. Interior surfaces of each case, hardware and fittings shall be finished in accordance with AREMA Signal Manual of Recommended Practices, Part 1.5.10.
- Q. Each case shall be provided with 10% spare floor space and 20% spare space for main terminal board apparatus. This requirement shall not be met by utilizing the unusable space required for equipment elsewhere in these Technical Specifications and Contract Drawings.

3.4 GROUNDING, SURGE AND LIGHTNING PROTECTION

- A. The Contractor shall provide for fusing, lightning arresters, equalizers and surge protection for all circuits as indicated on the Contract Drawings. This will include, but is not limited to, AC power supply primary and secondary, track circuits, audio frequency overlay track circuits, aerial cables and DC bus surge protection for all electronic devices.
- B. The Contractor shall submit a complete plan showing the grounding requirements for the systems supplied. The grounding system shall be furnished as follows:
 - a. Four external ground studs are to be installed at the four corners of each CIL or house.
 - b. Each case shall be supplied with two ground studs.
 - c. All ground studs shall feed through the wall of the housing and shall be made of a non-rusting material such as silicon bronze.

- C. Grounding bus bars for each CIL, house, case and cabinet shall be furnished. They shall be made of a hard-drawn pure copper bar having a minimum conductivity of 98 percent per ASTM B187-73. Each bar shall measure 1/8-inch by 3 inches by 12 inches minimum, and shall be insulated from the housing. Each bus bar shall have a minimum of 15% spare capacity. The ground buss for the cabinets shall be sized according to the requirements of the apparatus within the cabinet. Each grounding bus shall have a smooth flat surface drilled to accept the following connectors furnished by the Contractor:
 - a. Connectors suitable for connecting the ground bus to the racks within the housing.
 - b. Connector suitable for connecting the ground bus to all grounded components on terminal boards or apparatus boards.
 - c. Connector suitable for terminating the ground bus to the housing ground studs. Grounding shall be a minimum four-point grid type.
- D. Grounding wire shall not be less than #10 AWG stranded green insulated copper wire, unless specified or approved otherwise.
- E. No ground wire shall be run in any wire way with any other wires or cables.
- F. The ground wires must be:
 - a. kept as short as practicable,
 - b. located as far from any other wires as possible,
 - c. not be run parallel to other wires or wire ways,
 - d. have no sharp bends and have the fewest number of gentle bends possible.
- G. The following devices or apparatus shall be grounded to the main ground bus:
 - a. Battery charger chassis.
 - b. Transformer chassis.
 - c. Power distribution panel.
 - d. Each equipment rack (ground stud).
 - e. Track circuit, aerial cable, and any other lightning arresters.
 - f. Local control panel
 - g. Terminal space for cable shields.
 - h. Network equipment.
- H. Number 6 stranded copper wire with green insulation is to be installed from each stud to the main ground bus.
- I. Grounding of microprocessor-based equipment shall be in accordance with manufacturers' specifications.
- J. Grounding system shall not exceed five (5) ohms to ground for all made grounds.
- K. Ground wiring shall be run along the bottom of the housings.

- L. Ground rods shall be furnished by the Contractor for installation and exothermically connected.
- M. Ground rods shall comply with the standard of UL 467 and the recommendations of the AREMA Signal Manual of Recommended Practices, Part 11.3.4.
- N. Ground rods shall be manufactured of copper-clad steel.
- O. Ground rods shall be a nominal three-quarter inch diameter, not less than eight feet in length.
- P. No loops or daisy chains of ground wires are permitted where surge control can be compromised.
- Q. Each battery charger or other electronic device shall be wired with an appropriate surge protection device on the AC power side and on the DC side. The rating of each device shall be submitted to the Engineer for approval and shall comply with the approved power calculations.
- R. Each individual piece of electronic equipment, such as the ground detectors, vital microprocessor interlocking system, non-vital microprocessor code system, audio frequency overlay track circuit equipment, power supplies/chargers and DC-to-DC converters and network devices, shall have separate DC surge protection.
- S. Transient voltage surge protectors for AC power shall be provided with one internal form C contact for indication to the operations control center. All surge protection shall be in accordance with the manufacturer's standard.
- T. AC and DC surge protection devices shall be as manufactured by Erico Inc., EPD series or Engineer approved equal.

3.5 RELAY AND EQUIPMENT RACKS

- A. Relay racks shall be furnished by the Contractor for all instrument housings.
- B. The type and size of the racks shall be as required for the purpose for which they will be used, and shall be approved by the Engineer. In general, the width of the racks and depth of the section used for the side rails shall be of the manufacturer's standard and as approved by the Engineer. The maximum rack width shall not exceed nineteen (19) inches. The overall height of the rack shall not exceed seven (7) feet six (6) inches in height. Racks installed in new enclosures shall have overhead support. Wire entrance to racks shall be by means of overhead chase and/or conduit.
- C. Swing-out type relay or equipment racks shall not be utilized unless existing space constraints in existing houses make it necessary to do so. For swing-out racks be considered, a written request to the engineer must be submitted by the contractor explaining why a swing-out rack is required and a proposed drawing of the swing-out rack application in the existing house.
- D. Relays, track circuit equipment, microprocessor equipment or wire terminations shall not be placed less than 12 inches or more than 72 inches above the floor.

- E. Terminal boards for energy busses shall be provided at the top of the rack. In general, wiring between pieces of equipment on the same rack, shall not be required to be terminated other than on the pieces of equipment. The arrangement of the terminal board shall, in general, be in accordance with the Contractor's standards, but the Engineer may require changes in the location of the terminal boards and the method of terminating wires to meet the requirements of the signal system, and the physical layout of signal equipment.
- F. The Contractor shall provide means whereby each individual rack can be individually grounded to a common ground bus. Means of insulating the racks from each other and from any supports shall be provided by the Contractor and shall be as approved by the Engineer.
- G. All materials, including the insulating materials described above, needed to assemble the racks one to another to form complete units shall be furnished by the Contractor.
- H. The Contractor shall submit drawings of each proposed type of rack for the approval of the Engineer.
- I. The Contractor shall prepare detailed drawings showing arrangement of equipment on racks, for each type of rack and for each application, which shall be submitted, to the Engineer for approval prior to fabrication of racks.
- J. New racks and supporting braces shall be installed so that each individual rack shall be insulated from each other. The Contractor shall furnish and install all equipment and material required to insulate the racks. Racks shall be grounded in accordance with manufacturer's standard.
- K. The Contractor shall submit a detailed plan defining the wire and cable management to be used for all rack mounted systems. The plan is to include but is not limited to how ground wires, clean and dirty wiring will be managed and what products will be employed.
- L. Means shall be provided to suspend and hold cables in place and to provide slack. Each rack shall be individually grounded to a common ground bus or as required by the manufacturer's standard. Each common ground bus shall be grounded at not less than two (2) separate points. The racks shall be insulated from each other, and from the floor, all as approved by the Engineer.
- M. The Contractor shall furnish and install all materials required to make the racks level and plumb. The method and manner of performing this work shall be submitted to the Engineer prior to installation of the racks.

PART 4 WIRING AND TERMINALS

4.0 WIRING

4.1 WIRE

- A. The Contractor shall furnish all wire, terminal and connectors in accordance with the requirements of these Technical Specification and Contract Drawings.
- B. The Contractor shall size all wire in order to assure proper operation of the apparatus on the basis of equipment loads and the operating parameters for the systems described in this specification. Conductors shall be sized in accordance with Article 310 of the National Electrical Code, where applicable. In no event shall conductor size be less than that specified.
- C. All wire and cable shall be less than three years old at the time of delivery. The Contractor shall submit a complete list of the manufacture of each type of wire and cable complete with specifications for each type and the year manufactured.
- D. Inside wire shall be 600-volt rated wire, insulated with ethylene tetrafluoroethylene (ETFE) fluorocarbon resin, clean stripping, continuous temperature rating of 150 degrees C and minimum insulated wall thickness of 15 mils (.015 inches). Wires shall be tinned and sized as follows within the instrument houses and cases.
 - a. Vital circuits #16 AWG, 19 strands.
 - b. Non-vital circuits #20 AWG, 19 stranded, twist where indicated shall be one (1) turn per inch.
 - c. Signal Lighting circuits #10 AWG, 37 strands.
 - d. Switch machine motor control #10 AWG, 37 strands.
 - e. All power supply wiring between main buses and rack buses, #10 AWG, 37 strands.
 - f. All 60 Hz power supply wiring from the CIL to the field location cases and houses shall be 2 C #4, 133 strands twisted 1 to 2 turns per foot.
 - g. All incoming power supply wiring to the CIL houses from external signal power transformers, 3 C #2 for 60 Hz utility power.
 - h. All power supply wiring from battery or source to all main buses, 2 conductor #6, 133 strand twisted 1 to 2 turns per foot.
- E. 1,000 volt insulated wire
 - a. Track circuits #10 AWG, 37 strand, black and white twisted 1 to 2 turns per foot.
 - b. All power supply wiring from battery or source to all main buses, 2 C #6, 133 strands twisted 1 to 2 turns per foot.
- F. Where load conditions or operational reliability may prohibit the use of these designated wire sizes, based on the Contractor's detailed design, the Contractor shall size the necessary wire to meet the load and reliability requirements and submit to the Engineer at no additional cost to ARRC.

- G. All wires shall have printed on the jacket, with permanent ink, the manufacturer, date of manufacture, plant i.d. and wire gauge at no greater than 36-inch intervals.

4.2 INTERIOR WIRING

- A. All apparatus wiring shall be neatly bundled so as to provide a clear reference to the device which the wire is connected.
- B. All wall-mounted apparatus shall have the wiring fed through the plywood-mounting panel. Sufficient clearance shall be supplied for routing wires between the wall-mounted apparatus and the wall of the CIL and houses.
- C. All rack-mounted apparatus shall have all wiring run in a neat bundle, and securely fastened to the rack. The Contractor shall submit the proposed method of wiring to include the wire management products to be used to manage clean, dirt and ground wiring. All wires to a specific relay or device shall be held securely and separate from adjacent relay or device wiring.
- D. Twisted pair wiring configuration shall be used to reduce EMI or EMC conditions. The number of turns per inch shall be determined by the Contractor to ensure maximum benefit.
- E. Sufficient slack shall be provided in all wiring or cabling adjacent to their terminals to permit movement of the equipment and to permit opening of the chassis or cabinet.
- F. Wire chassis, conduits and other wire trough supplied in houses or cases shall be of sufficient size to leave one-third of the wire space free after the full number of wires or cables required for the installation are in place.
- G. No splices shall be made in any wire.
- H. The wiring shall be cabled and held in place so as to present a neat and orderly appearance.
- I. All wiring in excess of 230 volts shall be placed in conduit. Conduit shall be rigid steel with hot dipped galvanizing or other corrosion resistant coating.
- J. All service entrance wiring shall be placed in conduit. Conduit used for service entrance wiring shall be rigid steel with hot dipped galvanizing or other corrosion-resistant coating. Wiring for signal and hotel power supply rated at less than 230 volts shall also be placed in metallic conduit. Electric Metallic Conduit (EMT) Conduit shall be used for this application.
- K. Where conduits enter threaded box openings, they shall be securely fastened to provide both a watertight seal and electrical continuity.
- L. Where conduits enter non-threaded boxes, they shall be secured in place with a galvanized locknut outside the box and a galvanized locknut, plus bushing inside the box.
- M. Conduit ends shall be reamed to remove all burrs. Conduits shall be properly supported. The cable termination arrangement shall be laid out by the Contractor to locate spare

wire conductors of a cable on a dedicated terminal post in-line with, and grouped with, the working conductors of that cable.

4.3 TERMINALS FOR WIRES AND CABLES.

- A. The Contractor shall specify each type of connector, terminal or wiring device to be used. The Contractor shall submit a complete listing of each type of connector, terminal, terminal strip, fastener and termination hardware to the Engineer for approval. In addition, the Contractor shall specify the tooling used to attach each device.
- B. Solderless, crimp-on type insulated ring eye connectors shall be used. All solderless terminals shall be in accordance with the AREMA Signal Manual of Recommended Practices, Part 14.1.1. The Contractor shall submit samples of each solderless terminal for approval.
- C. Spade lug, fork lug, and fasten style terminals and wire terminations shall not be used.
- D. All signal cable terminals shall consist of a double column of vertical terminals equipped with Safetran Insulated Test Links #024620 or approved equal (insulated nut on cable side). Cables will be brought through the terminal board to the left of the terminals and house wires on the right. Test Links, nuts and washers shall be furnished but not installed and shipped with the house or case. The Contractor shall provide a minimum of 5% spare test links, nuts and washers beyond the full complement required.
- E. Terminal blocks for use in the top of all electrical equipment racks shall be Push Release cage clamp type DIN rail mounted terminal blocks as manufactured by Wago or screw type DIN rail mounted terminal blocks as manufactured by Weidmueller Inc., Phoenix Contact or approved equal with testing capability. The proposed terminal blocks shall be submitted to the Engineer for approval.
- F. The Contractor shall only submit for review and approval cage clamp products that do not require special tools to release the clamp. Each cage clamp shall be released with a standard flat blade screwdriver on a tab outside of the connector. Thumb release, lever or quick release connectors shall not be used.
- G. Screw post and Push Release style terminal blocks shall be in accordance with the recommended practices of AREMA Manual Part 14.1.2.
- H. Screw post and Push Release style terminal blocks used for vital circuit applications shall be grouped together and of the single tier type, and in accordance with the recommended practice specific to vital circuit use of AREMA Manual Part 14.1.2.
- I. Screw post and Push Release terminals shall be provided with a bayonet lug or latching device, that shall open the circuit when activated, permitting circuit testing. The bayonet or latch shall be provided with a visual indicator to easily ascertain if the device is opened or closed.
- J. Where solid state devices such as diodes or resistors are used in conjunction with Screw post and Push Release terminals for non-vital circuits, they shall be self-contained within the terminal block. Solid state devices used in vital circuits shall be mounted on AREMA style terminal posts.

- K. Screw post and Push Release terminal blocks shall be so assembled as to permit the removal of one individual terminal block from an assembly of others without disturbing the other terminal blocks in the assembly.
- L. Screw post and Push Release terminal blocks shall be provided with a method of busing an assembly of terminal blocks together. The bus strips used for this purpose shall be insulated to prevent the undesired bridging of adjacent terminals. The method shall be easy to modify by the insertion or removal of screws or plugs and shall not require the removal of any wiring when changing the configuration of a bus. The busing method for screw post and Push Release type terminals shall be submitted to the Engineer for approval.
- M. All DIN rail mounted terminals, blocks, and equipment shall be inspected, and all seating devices and screw posts shall be re-tightened after delivery of the CIL, instrument house or wayside case by the Contractor.
- N. All Screw post and Push Release terminals are subject to the approval of the Engineer.
- O. All Screw post and Push Release terminal blocks shall be mounted on DIN 35 mounting rail.
- P. End caps shall be used on the ends of all rows of Screw post and Push Release terminals.

4.4 TERMINATION WIRING

- A. Terminal posts shall be provided for all signal cable conductors, including spares. Cable termination shall start top to bottom on main terminal boards. The top terminal post in each column shall be designated as number one and shown as such on circuit plans. No terminations shall be permitted within 12 inches of the bottom of the main terminal boards, racks or other installation.
- B. Signal cable termination lineups shall be arranged to match the conductor assignment at the adjacent location. Where the adjacent location is an existing location, for which the new location must interface to the old, it shall be the Contractor's responsibility to insure that the cable conductor assignment of the new terminal board matches the actual existing conductor assignment of the cable to be terminated. The Contractor shall provide properly sized holes for the various conductor diameters.
- C. The cable termination arrangement shall be laid out to locate spare wire conductors of a cable on a dedicated terminal posts in-line with, and grouped with, the working conductors of that cable.
- D. The cable termination arrangement shall be laid out by the Contractor to leave at minimum two spare terminal post rows below track and power wire pairs where external power surges or faults can inadvertently damage adjacent circuits.
- E. All terminal posts used to terminate 120 volt circuits, shall be provided with a protective insulator. Insulators shall be individual for each terminal post, Type 023408-7X as manufactured by Safetran Systems Corporation, or approved equal.

- F. Additional 20% spare terminal posts shall be provided on all entrance racks.
- G. The manufacturers numbering system shall be provided for all Screw post and Push Release terminals. The numbering system shall be mounted in such a way as to be clearly visible from the front. The numbering system shall not interfere with the insertion or removal of wires.
- H. All terminals shall be attached to the ends of the conductor in such a manner that the flexibility of the conductor is not destroyed and the possibility of breakage at the terminal is reduced to a minimum.

4.5 TOOLING

- A. Terminals shall be for attachment to the wire with a tool made by the manufacturer of the terminal and recommended for the terminals being furnished.
- B. The tools shall be equipped with a ratchet device to insure proper compression of the terminal and which will not release until proper compression is complete. Three such tools shall be furnished.
- C. Tools for crimping terminals shall be new and factory calibrated at least every six (6) months. Calibration stickers shall be required on each tool.
- D. The wiremen shall be instructed not to proceed with any wiring should there be a noticeable problem with the tools or cable. The kit number and employee's name shall be recorded on a Cable Termination Report and shall be submitted to the Engineer for review.
- E. The Contractor shall submit all termination hardware to the Engineer for approval.

PART 5 EQUIPMENT AND WIRE IDENTIFICATION

5.0 GENERAL

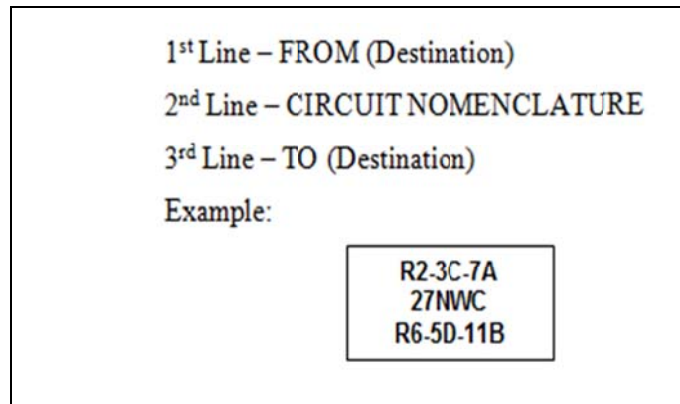
5.1 TAGGING

- A. The Contractor shall provide tagging and equipment identification for all elements of the systems, subsystems and component provided.
- B. The identification and tagging shall include but not be limited to all equipment, racks, shelves, cabling, wiring, devices and other elements supplied as part of the requirements of these Technical Specifications and Contract Drawings.
- C. The Contractor shall provide for review and approval all nomenclature, tagging materials and procedures. Samples of each type shall be provided. The font type and size shall be selected to provide superior legibility within the pre-wired houses and cases provided for this contract.
- D. All tagging and labeling shall be produced by machine. No handwritten tagging or identifications are permitted.
- E. All material used in the tagging shall be permanent, indelible and smudge proof.
- F. The materials shall meet all temperature and humidity requirements and have a proven record of satisfactory performance in comparable applications.

5.2 IDENTIFICATION REQUIREMENTS

- A. A black identification number shall be stenciled along the top and sides on the front and rear of the frame of each rack, denoting the row and column location. The minimum size of figures shall be one and one-half inch.
- B. There shall be an identifying nameplate for each relay, rectifier, transformer, track circuit module, event recorder, network devices, vital and non-vital microprocessor or related component mounted on the instrument racks or mounting boards. Identification shall be provided on the mounting area, not on the equipment.
- C. The front and back of relay plug boards as well as the relay itself shall be equipped with a tag, or other approved means of identification to indicate the nomenclature of the relay for which it is wired.
- D. All apparatus, cables, cable wires and internal wiring shall be tagged.
- E. For vital circuits, the Contractor shall furnish tags on every wire at each termination point showing termination designation.
- F. The Contractor shall tag vital circuits to relays and all other vital circuits with a plastic, sleeve type tag, which designates terminations. Every bus shall be identified. Wires for a specific device shall be bundled together.
- G. Microprocessor input and output circuits shall also be tagged with a sleeve tag in a similar manner.

- H. All tagging shall have permanence and legibility. Sleeve tags shall be readable in an upright position and located on the conductor next to the terminal. All jumper wires on the same relay plug board shall be provided with tags.
- I. Split sleeve wire tags shall not be used.
- J. Sleeve tags shall be small enough to be captured by the wire terminal.
- K. The Contractor shall tag vital circuits to relay and all other vital circuits with a plastic, sleeve type tag, which designates wire nomenclature, origin of wire and destination of wire in three separate lines. Every bus shall be identified. Wires for a specific device shall be bundled together. Tag designation shall read as:



- L. For non-vital circuits, color coding or equivalent means of identification of wires shall be used. The Contractor shall submit his proposed method of tagging to the Engineer for approval.
- M. All apparatus including, but not limited to, relays, transformers, breakers, fuses, and energy buses shall be identified with a tag showing circuit nomenclature.
- N. Jumper wires on the same component shall be provided with tags.
- O. All material used for tagging shall be designed to be used in the temperature ranges specified in this specification and shall provide good aging properties.
- P. Apparatus and cable terminations shall be tagged with nomenclature shown on drawings. All energy buss wiring and terminals shall be labeled with the appropriate buss nomenclature (Example B12, N12, BX110, NX110, etc.).

PART 6 MISCELLANEOUS COMPONENTS AND PRODUCTS

6.0 GENERAL

6.1 CIRCUIT BREAKERS, FUSES AND FUSE CLIPS:

- A. Fuses and circuit breakers shall be of suitable capacities to protect the various pieces of signal apparatus from the effects of short circuits or overloads. Circuit Breakers for AC Power shall be rated to provide calculated protection.
- B. Circuit fuses shall be non-renewable, and shall be of the fiber-case, time-lag, fusion type. The circuit breakers and fuses shall be the correct size and rating for circuit current interruption and shall protect the electrical equipment and circuits from short-term and long-term overloads.
- C. Fuse clips shall be so constructed that they shall retain their resilience under all installation and service conditions to assure a positive contact between the clips and the fuse. Tron type fuse clips shall be provided. Fuse clips for circuits of 120 volts or higher shall be provided with a removable cover, which shall also serve, as a manual disconnect of the circuit.

6.2 PRINTED CIRCUIT CARDS AND CONNECTORS:

- A. Printed circuit (PC) cards shall be of glass epoxy construction. Card material shall meet the requirements of NEMA Type FR-4. Cards shall have sufficient thickness to permit easy insertion and removal, and shall be physically keyed to protect against incorrect interchange. Circuits shall be formed by etching. Conductor material shall be copper and shall be protected from exposure to air.
- B. PC cards shall be color coded by type and indexed to the back plane of the chassis to prevent insertion into incorrect card slots.
- C. PC cards containing components that may be damaged in the event a plug connector or plug-in unit is removed while the equipment is energized shall be clearly marked or labeled with a warning note and means provided to remove power to the PC cards.
- D. Components mounted on the PC card, weighing more than one-half ounce or with a displacement of more than one-half cubic inch, shall have a mechanical supporting attachment to the card, which is separate from all electrical connections.
- E. Stacking or piggy-backing of printed circuit card sections, in order to accomplish changes or modifications to wiring or components or printed circuit cards shall not be allowed.
- F. Connectors shall have plating a minimum thickness of 0.000050 inch.
- G. PC cards shall be provided with LEDs to demonstrate that the card is functioning properly, diagnostic messages are portrayed, and inputs or outputs are energized.
- H. PC card types shall be combined where possible to limit the number of different cards required.
- I. All PC cards shall be supplied with a non-proprietary bar tag showing at a minimum the part number and manufacturer's name.

6.3 RESISTORS

- A. Current limiting resistors shall not be used in DC branch circuits.

- B. Resistors and reactors for electronic equipment shall be in accordance with the applicable requirements of AREMA Signal Manual of Recommended Practices Part 14.2.40.
- C. All resistors, other than those required for electronic circuits, shall be in accordance with AREMA Signal Manual of Recommended Practices Part 14.2.15.

6.4 DIODES

- A. All diodes to be furnished under this Contract shall carry a JEDEC number or shall be available from more than one manufacturer and shall be used within the published specifications for such number. All diodes shall be silicon type, unless otherwise approved by the Engineer.

6.5 CAPACITORS

- A. Capacitors for electronic circuits shall be in accordance with the applicable requirements of AREMA Signal Manual Part 14.2.40

6.6 EQUALIZERS AND ARRESTERS

- A. Equalizers shall be heavy duty. Equalizers shall be the manufacturer's standard for the application. Equalizers shall be submitted to the Engineer for approval.

6.7 HARDWARE

- A. All common steel mounting hardware exposed to the elements and used for signal equipment, cases, junction boxes, conduit, hangers, brackets, clamps, etc., shall be hot-dip galvanized, except as otherwise approved by the Engineer.
- B. The hot-dip process of galvanizing shall be used. All parts shall be pickled so that all scale and adhering impurities will be removed. The zinc coating shall be of commercially pure zinc, and shall be continuous and thorough. It shall not scale or blister or be removable by any of the processes of handling or installation. The finished surface shall be free from fine line cracks, holes, or other indications of faulty galvanizing. It shall be smooth and free from adhering flux and other impurities. The edges and ends of parts shall be free from lumps and globules. Parts shall be coated with at least two ounces of zinc per square foot of galvanized surface, after all bending, cutting, drilling and final fabrication.
- C. In order to avoid destruction of resilience encountered in the hot-dip process of galvanizing, all lock-washers shall be cadmium plated.
- D. All nuts, bolts, and washers used for the mounting of equipment within finished enclosures shall be cadmium plated or stainless steel. As an alternate, the Contractor may submit another type of plating or non-corroding metal for the Engineer's approval.
- E. Cadmium plating shall be an impervious, dense, hard, fine grained, continuous, closely adhering coating of commercially pure cadmium, free from capillaries and shall completely cover the surface of the part in a smooth, bright layer. Plating on raised or prominent portions shall show no evidence of blackness or loose crystalline structure. It

shall have a minimum thickness of six ten-thousandths of an inch and shall withstand the salt spray test for at least 1000 hours or an equivalent test approved by the Engineer.

6.8 PADLOCKS

- A. Padlocks shall be provided for all instrument houses and cases. The Contractor shall keep all instrument houses and cases locked at all times. Instrument houses and cases shall be shipped with a Contractor-installed and owned lock in place. Upon arrival at the shipping destination, the Contractor shall open all houses and cases for inspection by ARRC and then shall install the Contractor-supplied ARRC locks.

6.9 EXTERIOR APPARATUS ENVIRONMENTAL PROTECTION

- A. Protection, as herein specified, for machined-finished surfaces, threaded rods and nuts and other parts that are susceptible to rusting, shall have a corrosion-preventive compound, "RUST VETO HEAVY" by E. F. Houghton, Valley Forge, PA, or approved equal, which must have sufficient body to resist weather and rusting for at least six months. Corrosion preventative compound shall be submitted to the Engineer for approval. This material shall be furnished by the Contractor, for installation by ARRC.

PART 7 RELAYS

7.0 GENERAL

- A. The Contractor shall furnish vital and non-vital relays as shown on the Contract Drawings and as necessary to implement the microprocessor-based signal system. Relays shall be plug-in, rack mounted except where the application calls for a relay that is not available in a rack mount base configuration.
- B. All vital and non-vital relays specified herein to be furnished under this project shall be designed, manufactured, and tested in accordance with the applicable recommended practices presented in the AREMA Signal Manual of Recommended Practices, Part 6. All relays shall be newly manufactured and not reconditioned. Relays performing the same function shall be from the same manufacturer.
- C. Vital relays shall be shipped separately from the instrument house or case, in a sturdy corrugated cardboard carton with the drawing number and name of the relay printed on the outside of the carton. The relay carton shall be identified with the instrument location, mounting location and relay name.
- D. Non-vital relays shall be protected from damage during shipment and shall be stored in a protected area until tested and installed.
- E. The Contractor shall submit a detailed list of all relays and the application in which they are used to the Engineer for approval.
- F. Plug boards for plug-in relays shall include unique indexing plate or pins and shall be equipped with self-retained contacts, which are removable by use of relay manufacturer's tool. The method of connecting a maximum of two (2) wires to contact shall be submitted to the Engineer for approval. The plug board shall be designed so that the self-retained contact has a direct connection with the relay coil and contact prongs.
- G. The Contractor shall perform factory tests on all vital relays for all mechanical and electrical performance characteristics, including pick-up and drop-away values and contact resistance. Records of all vital relays, showing serial numbers, test date and test values shall be retained by the Contractor and submitted to the Engineer. Relay testing shall be performed prior to the factory test. Relays used for the factory test shall be reinstalled in the same position that they were in during the factory test, in the field by ARRC.

7.1 VITAL RELAYS

- D. The contractor shall furnish all vital relays.
- E. All vital relays of a given type shall be furnished by a single manufacturer unless approved by the Engineer.
- F. Vital relays shall be quick detachable plug-in type as manufactured by Ansaldo-STIS (Formerly US&S), ALSTOM (Formerly GRS), or approved equal.

- G. Vital plug-in type relays shall be rack mounted and have a transparent dust cover made of nonflammable composition, meeting the applicable requirements of AREMA Signal Manual of Recommended Practices Part 6.2.1. Each type of relay shall include a unique registration plate or pins.
- H. All vital plug-in relays, except vital time-element relays, and special application relays shall be equipped with front testing facilities.
- I. All commonly used vital relays shall have a minimum of six (6) front-back-dependent contacts. The Contractor shall furnish all required relays.
- J. Vital relay contact assignments for final design shall be such that each vital relay-repeater combination shall have at least one (1) spare dependent front/heel/back contact, or one (1) spare independent heel/front and one (1) spare independent heel/back contact.
- K. Vital relays with greater than six stacks of contacts shall be used to reduce or eliminate repeater relays when required. The standard contact arrangement for these double size relays shall be eight front-back dependent, four front and two back contacts.
- L. Relays (except time-element) with a nominal operating voltage of 12 volts shall operate continuously, and successfully without resultant damage within a voltage range of 7 to 21 volts inclusive, applied to their operating coils.
- M. All relays shall be biased-neutral relays, except where application requires that they not be biased.
- N. Contacts must be clearly viewed from the front of the relay without distortion.
- O. Vital relay repeaters shall not be wired in multiple.

7.2 BIASED NEUTRAL RELAYS

- A. Biased neutral relays shall be such that their armature will not pick up with the permanent magnet demagnetized or when no current is applied to coils or due to an interruption of the normal magnetic circuit.
- B. Biased neutral relays shall be such that when 50 times the working energization is applied for two seconds, at both normal and reverse polarity, it will not affect the operating characteristics of the relay by more than two percent, and will not pick up the armature on reverse polarity.
- C. Slow acting relays, either slow pick-up or slow release, shall have their slow acting characteristics obtained by the use of copper or aluminum washers or slugs applied to the relay core.

7.3 NON-VITAL RELAYS

- A. Non-vital relays shall be manufactured by Relco using the Relco S9-m base or approved equal of the plug-in type. Non-vital timer relays shall be manufactured by Macromatic part# TR60226 and SS61926 or approved equal.

- B. Each non-vital relay shall be equipped with a minimum of four front-back contacts. Stationary contacts shall be bifurcated silver, palladium, or approved equal. Movable contact shall be bifurcated silver, palladium with gold overlay, or approved equal.
- C. Each non-vital relay shall meet or exceed the following requirements:
 - a. Maximum Temperature Rise: 55 degrees C at 30 vdc.
 - b. Insulation Resistance: 1.5 X 10 ohms.
 - c. Ambient Operating Temp: Minus 40 degrees C to ±85 degrees C.
 - d. Dielectric Strength: 500 volts RMS, 60 Hz between all mutually insulated parts.
 - e. Mechanical Life: 100 million cycle operation.
 - f. Electric Life: 10 million operations (.05 ampere resistive load at 25 degrees C.)
 - g. Contact Resistance:
 - h. Before Life: 100 milliohms max, at 6 vdc, 100ma.
 - i. After Life: 200 milliohms max, at 6 vdc, 100ma.
- D. Non-vital relays shall be rack mounted on DIN 35 mounting rails and shall have removable transparent front covers that will not support combustion.
- E. Non-vital relays shall be provided with mounting bases, which shall be used for attaching to the DIN 35 mounting rails, and which shall also indicate through illumination of an LED or mechanical indication flag that the relay coil is energized. A contact of the non-vital relay will not be used to light the LED. A push to test feature shall be incorporated into the module. The mounting base shall be in accordance with the AREMA Manual of Recommended Practices, Part 14.1.2.
- F. Non-vital relays shall be plug-in with positive latching devices, DC neutral relays with a nominal operating voltage of 12 volts. These relays shall pick up with 9 volts or more applied to their operating circuits, and must drop out when this voltage decreases below 1 volt. These relays shall operate continuously with up to a maximum of 21 volts applied to their operating circuit. Non-vital relays shall pick up in less than 25 milliseconds when energized with 9 volts, and shall drop out when de-energized from 14 volts in less than 50 milliseconds. These times shall be measured as a front contact closure or opening from the instant the switch removing the voltage opens.
- G. When three non-vital relays, suppressed as required, are connected in parallel and operated from 12 volts, a non-vital relay front or back contact that breaks this load shall withstand at least ten million operations at this load without the contact resistance, measured with a 10 ma current, exceeding five ohms. All non-vital relays shall be identical by type and class, or function.

PART 8 INTERLOCKING MICROPROCESSORS

8.0 GENERAL

- A. The Contractor shall provide an Interlocking Microprocessor System (IMS) to meet all requirements of these Technical Specifications and Contract Drawings.
- B. The IMS, as herein specified, shall be designed on the basis of closed loop principles, software diversity and use of proven vital hardware design techniques to achieve safety.
- C. The IMS shall consist of but not be limited to chassis, cabinets, CPU circuit cards, I/O circuit cards, power supplies, cabling, terminations, serial communications links, Ethernet network links, executive software, application software, diagnostic software, remote monitoring software and all other subsystems and components related to the system.
- D. The Contractor shall provide product from manufacturers that provide a complete set of required circuit cards. Mixing and matching multiple vendors is not permitted.
- E. The IMS shall be applied in a non-redundant configuration as defined within these Technical Specification and Contract Drawings. The Contractor shall only furnish systems with a proven record of in-service applications that meet these requirements.
- F. The IMS shall be rack mounted within a house-type enclosure only. Installation within a case, cabinet or other enclosure is not permitted.
- G. All IMS provided for a specific interlocking, intermediate location or location shall be housed within a single enclosure. No distribution of the IMS is permitted across multiple enclosures for a single location. No slave IMS shall be permitted.
- H. Interlocking Microprocessor Systems shall meet all performance requirements as defined within these Technical Specifications.
- I. The Contractor shall provide a vital microprocessor-based interlocking control system that is neither a culprit nor victim to the effects of any expected electromagnetic or electrical interference generated from within or outside the signal enclosures.
- J. All input and output circuit cards or other components within the microprocessor system shall be designed in a manner that will not generate any system false alarms or spurious data responses when the inputs or outputs of the circuit cards or wiring to and from the card are exposed to expected electromagnetic fields developed during the operation of vital relays, non-vital relays or signal line circuits.
- K. Protection devices external to the circuit card or to external wiring or relays shall be limited to surge arresting devices for protection when components are exposed to conducted over-voltage or induced over-current field gradients. The location of signal equipment and normal wiring practices shall be permitted, without any restrictions, for future additions or modification of the system after delivery and commissioning.
- L. The Contractor shall develop methods to test and verify that the application or designs proposed meet these requirements. The Contractor shall submit a test plan to the

Engineer for approval to prior to the factory test to validate the design, placement of relays and wiring.

- M. The vital processor system shall not use a multi-processor voting type scheme to evaluate the correctness of outputs.
- N. The vital microprocessor-based system shall incorporate self-checking features and diagnostic tests to ensure that the equipment and program where applicable, are functioning properly. These checks shall be integral parts of both the hardware and software to provide for a secure system.
- O. Vital processors shall not allow falsely permissive information to be transmitted to external devices which may result in a hazardous condition; non-vital processors and carrier systems shall minimize the possibility of false information being transmitted to external devices. In no case may false permissive information persist long enough to allow an unsafe condition to occur.
- P. Transmission of false information from a non-vital to a vital subsystem shall in no way affect the safety of the system. Non-vital visual indications, such as LED lamps, shall demonstrate that the system is functioning properly; similarly, failure and diagnostic indications shall be provided. Indications shall isolate a failure to a particular function, or to the interface between two functions.
- Q. PROMS, EPROMS and EEPROMS used shall be checked, as part of program execution, during each cycle, to ensure they have been unaltered during processor execution. Benchmarks shall be created for blocks of memory to implement these tests. Executive and SSAL PROMS, EPROMS and EEPROMS shall be plug-in type and shall not be soldered to the board.
- R. The vital microprocessor system shall interface with the non-vital logic and code system equipment. If the non-vital processor should fail, then the Local Control Panel shall function as unit-lever via the vital processor.
- S. Vital inputs shall be buffered and shall be immune to contact bouncing and shall be electrically and physically isolated from one another. Access to inputs must be unique in the sense that under failure, reading of the incorrect input circuit will not result in a falsely permissive input being utilized in vital processing. Processor communication with each input shall vitally assure that the proper input and input state (on or off) is read. A non-vital visual indication, such as an LED lamp, shall be provided for each input on the input boards to indicate when the input is activated.
- T. A falsely permissive non-vital input shall not adversely affect the safety of the vital function processing.
- U. Outputs shall be electrically and physically isolated from one another. A vital means of verifying the proper state of the output shall be provided. Access to the outputs shall be unique in the sense that under failure, writing to the wrong output circuit will not result in a falsely permissive output being generated. Processor communication with each output shall vitally assure that the proper output is in the proper state (on or off). A non-vital

visual indication, such as an LED lamp, shall be provided on the output boards for each output to indicate when the output is activated.

- V. The output states of the processor shall be verified at least every second to ensure correspondence between the actual and requested values. The system shall shutdown in the event that an output that should be off is on.

8.1 MICROPROCESSOR HARDWARE:

- A. The interlocking Microprocessor System shall have the ability to be expanded when the I/O capabilities have been expended for controlling devices. The expansion architecture shall be designed such that it will not adversely affect the total bit time throughput from adjacent locations. Where excessive voltage drop in a signal lighting cable would require the addition of a microprocessor for lighting purposes only, the Contractor shall design as described below, if at all possible, rather than install an additional microprocessor.
 - a. Use an independent common return wire for each signal lighting bulb.
 - b. Boost battery voltage to the lamp driver output boards keeping within the vital microprocessor's specified equipment supply range. Vital Lamp Driver output board range shall be 7 volts to 10 volts. Signal voltage shall be 8.5 VDC at the filament. Losses from the signal cable lengths shall be taken into account.
- B. Spare input and output board slots are required. Interlocking Microprocessor motherboards shall allow the addition of inputs and outputs by the purchase of input/output boards and simple installation by ARRC. A minimum of 25% of all of the inputs and 25% of all of the outputs used at an interlocking shall be provided as spare at each interlocking.
- C. Engineer-approved labels shall be provided by each input and output indication which clearly denote the respective function of each, for the ease of maintenance and troubleshooting.
- D. Power for the input/output circuits shall be supplied through a vital cut-off circuit. This circuit shall be driven by a vital clock signal generated by the processor checks and diagnostics. The vital clock signal shall pass through filters tuned to prevent a false signal from energizing the relay. The signal frequency shall be chosen such that it could not be generated by any other device in the equipment housing: for example, 60 Hz power supplies or battery chargers, audio frequency overlay equipment, or harmonics of these devices. The vital cut-off circuit shall remove the vital clock signal and de-energize the vital cut-off relay.
- E. The vital processors shall control several output devices, which shall be energized with 12V DC, i.e., vital signal control relays, signal lamps, etc. Output boards shall withstand without damage, the shorting of the output to ground or the opposite DC polarity. Such a short shall register an alarm to the control center.

- F. Vital lamp driver output boards shall operate lamps at voltages between 8.5 and 10 Volts DC at a current not exceeding 3 Amps, measured at the lamp utilizing standard ARRC signal lighting cable and maximum length.
- G. The flashing signal aspects shall flash at 60 pulses per minute, with a 50% duty cycle and shall provide a flashing signal display without unnecessary alarming or processor shutdown due to inrush currents exceeding normal lamp current thresholds
- H. The Contractor shall certify in writing that the equipment provided under this Section, including software and future software revisions, both executive application, and user-defined, shall be available and will be serviced and supported for a period of ten (10) years after Contract completion.
- I. All power for the interlocking Microprocessor interlocking shall be properly isolated from the effects of electromagnetic interference, lightning, noise, current surges, and grounds. Surge suppressor units to further enhance this isolation are required by this Contract and shall be provided by the Contractor.
- J. An Engineer-approved vital means of indexing PCBs, either mechanically or in software, shall be implemented to ensure that only the proper PCBs are inserted in card slots. In addition, PCB card edge holders or ejectors shall be color-coded.
- K. All components of the system shall operate at temperatures of minus 40 degrees Centigrade to plus 70 degrees Centigrade, and humidity levels of 0 - 95% non-condensing without any external environmental controls.
- L. All 'dirty' wiring (wiring not protected or isolated from the effects of electromagnetic interference, lightning, noise, current surges and grounds) shall be kept clear of the interlocking Microprocessor as far as is practical and where that is not possible, the wiring methods shall utilize other means to protect against induced interference.
- M. All monitoring equipment shall allow it to be connected or disconnected from the microprocessor system while it is in operation.
- N. All major assemblies, subassemblies, circuit cards and devices shall be permanently marked with the manufacturer's part identification number.
- O. All ICs, PCBs, components, etc., which are subject to revision (such as PROMs) and/or are removable from assemblies, should have the revision level identified on the component.
- P. The Contractor shall be responsible and verify that the Equipment functions as manner intended in the environment in which it is to be installed and operated.
- Q. The non-vital microprocessor system shall interface to the Local Control Panel. The system shall perform the logic for all controlled signal system functions for entrance/exit routing and associated indications, provide simplified line-of-light type route display with indication for each discrete track circuit, and provide for the required panel operation and alarm functionality as defined in the Contract Drawings.

- R. Operating programs and database definition shall be stored in nonvolatile memory so that automatic power fail/restart can be provided.

8.2 EVENT RECORDER

- A. Each house shall be provided with a microprocessor-based event recorder that shall contain solid-state memory for data storage at the field locations. It shall be a multi-channel, multi-speed system which contains self-test capability and delay time by-pass. It shall accept inputs from both the vital and non-vital processor systems.
- B. All aspects of the Event Recorder system to be provided shall be submitted for review and approval by the Engineer.
- C. The event recorder shall allow printing and viewing of data in the English language with a time stamp to include .10-second increments. Data shall be retrievable, viewable and printable in real-time or in time selectable blocks down to .10-second increments.
- D. The retrieval software shall be Windows-based graphic front-end and menu-driven; shall permit downloading and remaining on-line while continuing to monitor events.
- E. The unit memory shall be cyclical. When memory storage capacity is reached, the oldest data shall be erased and replaced with the data containing the newer information. The unit to be furnished and installed shall store all of the data needed for a minimum of fourteen days before recycling. The event recorder shall be provided with a time of year clock. The event recorder shall have the ability to set and recall time both locally and remotely.
- F. Event Recorder nonvolatile memory battery shall be monitored and alarmed prior to failure to prevent loss of recorded data.
- G. It shall be possible for ARRC to reprogram the description associated with each data point. The Contractor shall provide all software and equipment required to accomplish all software modifications.
- H. The event recorder shall have the ability to remotely "dump" all memory contents or selected blocks of data via new fiber optic network from the field locations to the Operations Control Center or any other location identified by ARRC.
- I. The event recorders shall have the ability to connect to a diagnostic network for remote monitoring of wayside data from the Operations Control Center.
- J. Each event recorder shall monitor a minimum of 32 different inputs corresponding to "On", "Off", or "Flashing" status.

PART 9 LOCAL CONTROL PANELs (Deleted)

PART 10 SWITCH AND LOCK MOVEMENTS (Deleted)

PART 11 SWITCH HEATERS(Deleted)

PART 12 SIGNALS (Deleted)

PART 13 TRACK CIRCUITS

13.0 GENERAL

- A. The Contractor shall provide vital track circuits for applications as required by these Technical Specifications and Contract Drawings. The track circuits shall include all apparatus necessary to operate as designed and applied for this project.
- B. This section describes the requirements for:
 - a. DC/AFO Track Circuits for train detection and broken rail detection within interlocking limits and as shown on the contract drawings.
 - b. Electronic Coded Track Circuit System for train detection, broken rail detection and signal control outside of interlocking limits and between Wayside Intermediate Locations as shown on the contract drawings.
- C. All track circuit equipment shall be in accordance with the requirements of the AREMA Signal Manual of Recommended Practices Part 8.1.1, Recommended Functional/Operating Guidelines for Track Circuits and Part 8.6.1, Recommended Instructions for Vital Track Circuits and these Technical Specifications. Where a conflict occurs between the specified AREMA recommendations and these Technical Specifications, the more stringent requirement shall be used.
- D. 15.1.4 Track circuit equipment shall be mounted to provide easy access to test points, indicators, and adjustments.
- E. 15.1.5 All track circuits shall be double rail, configured as shown on the Contract Drawings.

13.1 STEADY ENERGY DC TRACK CIRCUITS

- A. DC track circuits shall be in accordance with the AREMA Signal Manual of Recommended Practices, Part C, Section 8.1.1 and 8.6.1.
- B. Steady energy DC track circuits shall be double rail and shall use 0.5 ohm high release value, biased neutral plug-in track relays. Track relays shall be Alstom drawing no 56001-961GR1 Catalog No. A62-633, Ansaldo STS (formally US&S) PN-150BH, Model No N322511-001, Safetran Systems (Siemens) Part No 400510 or approved equal.
- C. Adjacent track circuits shall have opposite polarities on the same running rail.
- D. Steady Energy DC track circuit components shall have a demonstrated service history of 5 or more years as applied in cab-signaled applications on equivalent mainline freight or passenger rail environments in North America.
- E. Steady energy DC track circuits shall be so designed such that the track relay shall be in the de-energized position whenever any of the following conditions exist:
- F. When a shunt of 0.25 ohm resistance is connected across the running rails in any part of the track circuit, including the fouling sections of crossovers and turnouts.
- G. Rail is broken, including rail within the fouling section of the turnout, or rail or switch frog removed, except when rail is broken or removed between the end of rail and track circuit connector or within the limits of rail joint bond, appliance or other protective device.

Contractor shall validate that cross bonding depicted in the contract drawings will provide broken rail protection. If Contractor's design requires any changes to cross-bonding as shown, an alternative design shall be provided that complies with all ARRC's cross-bonding criteria.

- H. A train, engine or car occupies any part of a track circuit including the fouling section of turnouts and crossovers.
- I. A ten second time delay pickup function, realized utilizing the interlocking Microprocessor logic, shall be provided for loss of shunt protection on all interlocking track circuits. External timer relays shall not be used to provide this loss of shunt protection.
- J. The track circuits shall function satisfactorily with a ballast resistance of 2 ohms per 1000ft of track.
- K. Track circuit equipment shall be mounted to provide easy access to test points, indicators and adjustments.
- L. Steady energy DC track circuit DC to DC converters shall be in accordance with Section 18.3 of these Specifications.
- M. Design and furnish equipment to form complete and operational steady energy track circuits, including the standard railroad variable resistors specifically manufactured for this type of circuits of suitable rating and of sufficient ohmic value to allow adjustments to track circuits.
- N. Minimum track circuit length of the track circuit shall be 100 feet.
- O. Limit the track battery leads to a maximum of 800 feet to allow for proper adjustment.

13.1.5 AUDIO FREQUENCY TRACK CIRCUITS

Contractor must provide audio frequency (AF) track circuits for train presence detection where required for track circuit locations, as indicated on the Plans. The AF track circuits must provide vital fail-safe train detection. AF track circuits must be Safetran Systems Phase Shift Overlay 4000 (PSO 4000) or approved equal. The AF track circuit equipment to be provided must meet or exceed the following criteria and characteristics:

- A. The track circuits must function over the distances as shown in the Plans with ballast resistance of 3 ohms or greater per 1,000 feet.
- B. The track circuits must be capable of functioning properly and reliably under the EMI/RFI conditions that may be present.
- C. AF track circuit frequencies must be coordinated with ARRC signal and communications equipment frequencies.
- D. Track circuits must function to provide continuous train detection throughout the length of the circuit whenever a shunt of 0.06 ohms is applied to the rails, including turnouts.
- E. The AF track circuits must be designed and constructed so that at any point in the circuit, the rail-to-rail train detection signal potential is not less than 250 millivolts peak-to-peak.
- F. AF track circuits must be immune to improper operation due to crossed or grounded wires or any other influences such as capacitive and inductive coupling or stray currents.

- G. No combination of frequencies and/or coding may produce a signal that may improperly energize a track relay.

13.2 ELECTRONIC TRACK CIRCUITS

- A. The work to be done under this section consists of the final design, furnishing and technical assistance in installation and testing of Microprocessor based coded track circuits system as per Contract Drawing for train detection to operate with the signal system, traditionally implemented with vital track relays. It shall operate without the use of line wires normally found between block signals and eliminate relays at intermediate locations.
- B. The microprocessor track circuit shall not generate relay output with any level of audio frequency or RFI energy applied to the track circuit input.
- C. The Microprocessor track circuits, as herein specified, shall be designed on the basis of closed loop principles, software diversity and use of proven vital hardware design techniques to achieve safety. The Microprocessor track circuits shall have a “Quick Shunting” feature.
- D. The equipment shall not use any custom built or semi-custom built integrated circuits.
- E. The Contractor shall submit to the Engineer all elements of the proposed microprocessor based equipment for train detection, vital communication through the rails and cab signaling. This includes, but is not limited to, hardware, software, electrical, software editing, testing, training and version control.
- F. Equipment shall have the capability to vitally link into the fiber optic network using a serial or Ethernet interface.
- G. Equipment shall have a built in recorder to log and time stamp vital and non-vital events. Recorder shall be accessible both remotely and locally.
- H. Equipment shall operate from a nominal input voltage of 12 VDC and over the range of 9.5 VDC to 16.5 VDC. Equipment shall operate over the specified input voltage range without requiring any adjustment.
- I. Equipment shall provide automatic restart of operation after a DC power failure. As the battery voltage gradually increases, the equipment shall not try to resume normal operation until the battery voltage reaches the lower limit of the operational voltage range.
- J. Equipment shall operate with a ripple voltage of up to 1.0 volt peak to peak on the DC voltage supply.
- K. Equipment shall operate with the DC battery positive grounded, battery negative grounded, or with the battery floating ungrounded.
- L. Equipment shall be protected against damage resulting from accidental application of incorrect polarity of the DC voltage supply.

- M. Equipment shall neither incorporate nor require gas tube lightning arresters, capacitors, or surge suppressors between battery lines and ground.
- N. The Contractor shall provide all necessary lightning, surge suppression, and filter equipment.
- O. Equipment shall be designed with convection cooling such that heat generating components (e.g., transistors with heat sinks and large wattage resistors) shall not be located next to other components that are affected by temperature.
- P. The Electronic Track circuit microprocessor shall be equipped with on-board diagnostics. These diagnostics shall quickly and reliably identify failed printed circuit cards. Indications shall isolate a failure to a particular function, or to the interface between two functions.
- Q. All terminations, cable materials and methods shall be of commercially available types and be suitable in all respects for the purpose intended. All terminals for the direct connection of underground single or multiple cable shall be the standard AREMA terminal configuration and shall have an insulating test device enabling the circuit to be opened for meggering or testing without removing the wire from the terminal post.
- R. Wiring harnesses within the equipment case shall be arranged so that any printed circuit board may be easily removed for troubleshooting or testing without interference.
- S. All vital software shall have complete identification on the individual ROMS or other storage devices stating the software number, revision number, location, and all other information required to prevent the application of software to the wrong location.
- T. All connections to external track circuit apparatus and DC power shall be AREMA terminal posts, or approved equivalent, except for interconnection of equipment by dedicated cables provided by Contractor.

13.3 APPLICATION

- A. Equipment shall operate normally and provide required shunting and broken rail detection for all values of ballast resistance between 3.0 ohms/1000 feet and 50 ohms/1000 feet, or higher, without requiring any re-adjustments.
- B. Equipment shall upon detection of broken rail cause the appropriate outputs to be de-energized.
- C. Equipment shall provide shunting such that a 0.25 ohm resistance connected across the rails, anywhere within track circuit boundary, shall be detected and cause the appropriate outputs to be de-energized.
- D. Equipment shall operate on rail sections as used by ARRC, both jointed and continuous welded types. Jointed rail shall require only one bond wire, either welded or long web bond, around each joint.
- E. Equipment shall be operate reliably and safely on track circuits having interference of up to 5 VAC RMS rail-to-rail voltage from 60 Hz power lines operating at 60 Hz with harmonics up to 1200 Hz.

- F. Equipment shall operate reliably and safely on track circuits utilizing the existing executive and application software programs and with minimum hardware changes subject to the approval of the engineer.
- G. The Contractor shall provide a system that is immune to levels of internal and external electrostatic and electromagnetic conducted or radiated interferences to be encountered. The Contractor shall design and furnish a system such that levels of EMI generated shall not adversely impact existing ARRC radio and communications systems. Applicable FCC requirements shall apply.
- H. Equipment shall be designed such that circuit boards shall be accessible and removable:
 - a. From the front of the equipment
 - b. Without requiring interface wiring to be removed or disconnected
 - c. Without requiring the removal of other circuit boards
- I. Equipment shall be designed so that the Printed Circuit Boards (PCBs) cannot be inserted upside down and so that no damage or unsafe operation will occur if the circuit board is plugged into the wrong slot.
- J. Equipment shall interface with vital relay and interlocking Microprocessor circuits.
- K. All components shall have provisions for both mounting in a 19" E.I.A. rack or on a wall or panel.

13.4 OPERATION AND USE

- A. Equipment shall have the capability of providing directional stick logic for a following train movement.
- B. Equipment shall have the capability of detecting and resetting stick lockup caused by any combination of train movements or by noise.
- C. Equipment shall operate reliably and safely on the same track with Audio Frequency Overlays (AFOs), Motion Detectors (MDs), Constant Warning Time Devices (CWT), and all other non-DC track circuit equipment without:
- D. Interfering with the operation of the AFO, MD, CWT, or other non-DC track circuit equipment of different frequency.
- E. Being affected by AFO, MD, CWT, or other non-DC track circuit equipment of different frequency.
- F. Equipment shall provide, at a minimum, nine different codes/decoding capabilities, including:
 - a. One vital code for vital train detection
 - b. One non-vital code for tumble-down
 - c. One non-vital code for block indication or special applications
- G. Equipment shall interface to relay systems, as well as serially interface with the solid state interlocking equipment at the CP's, at siding ends without any intervening relays.

- H. Track circuit shall be immune to false energy as a result of a failure of the insulated joint separating the adjacent track circuit.
- I. Track circuits shall have proven immunity to the effects of track circuit operation on adjacent tracks.
- J. Status of the various code inputs, code outputs from each track, track occupancy, directional stick status shall be indicated by LED's and shall be located in the equipment such that the maintainer can readily observe while conducting the routine tests.

13.5 TEST UNITS

- A. The Contractor shall provide two (2) stand-alone test units for checking Electronic Module installations.
- B. The test unit shall generate all the electronic modules codes for the North track, the South track or both tracks simultaneously.
- C. The test unit shall receive and decode all codes and illuminate LED's on the CPU board indicating the codes that have been decoded.
- D. The test unit shall operate from the vital signal battery which powers the Electronic Module under test.
 - a. Three pairs of test (one black and one red for each pair) with spade lugs on one end and alligator clips on the other are to be provided with each test unit.
 - b. The test units shall have the same transmit and receive impedance as the track circuits and require no changes to the track circuit installation.

PART 14 POWER SUPPLIES

14.1 AC POWER SERVICE - GENERAL

The Contractor shall provide all necessary AC and DC power equipment, termination and distribution systems and related apparatus within the pre-wired CIL's, houses cases and cabinets provided under this contract.

For the incoming AC power source, the Contractor shall furnish circuit breakers in accordance with the Contract Drawings. Ungrounded signal power supply shall utilize two pole common trip circuit breakers which shall interrupt both legs of all energy buss feeds and all branch circuits supplied by these busses, as depicted on the Contract Drawings and in compliance with the National Electrical Code.

The AC power distribution transformers will be furnished by others in the vicinity of each PTC CIL.

14.2 POWER DISTRIBUTION PANELS

- A. Power distribution panels shall be metal-enclosed with dead-front distribution.
- B. Single phase signal power and hotel power distribution panels shall be rated for 240 volt, ungrounded three wire, 60 Hz service; however, panels shall be designed for maximum system voltage of 600 volts.
- C. Panelboards shall be complete with circuit breakers, copper buses, connections for incoming and outgoing cables, wiring and nameplates.
- D. Electrical connections shall be bolted, with lock washers and ring tongue type, solderless connectors.
- E. Distribution panel bus structure and main breakers shall have suitable current ratings. Such ratings shall be established by heat rise tests, conducted in accordance with UL standard 67.
- F. The panelboard bus assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel to be as specified in UL standard 50 for cabinets. Wiring gutter space shall be in accordance with UL standard 67 for panelboards. The box shall be fabricated from galvanized steel or equivalent rust resistant steel. Each front shall include a door and have a flush, cylinder tumbler-type lock with catch and spring-loaded stainless steel door pull. Fronts shall not be removable with door in the locked position. A circuit directory frame and card with a clear plastic covering shall be provided on the inside of the door.
- G. The panels shall be mounted directly to the walls of the instrument houses using fasteners as detailed on the approved installation arrangement drawings. All panels shall be mounted with sides plumb, and tops and bottoms level. Rigid electrical raceways shall be terminated inside the panel wiring troughs using approved conduit bushings. Conduits shall be supported and fixed to the wall within six inches of the panel using approved hardware. Power distribution installation drawings including raceway and conduit shall be submitted to the engineer for approval.

14.3 CIRCUIT BREAKERS

- A. Breakers shall be UL and CSA listed, IEC 157-1 rated, meet NEMA standard AB1-latest edition and Federal Specification W-C-375B/GEN, when applicable.
- B. Breakers shall have over center toggle-type mechanisms, providing quick-make, quick-break action.
- C. Breakers shall be calibrated for operation in an ambient temperature of 40 degrees C.
- D. Each breaker shall have trip indication by handle position and shall be trip free.
- E. Two and three pole breakers shall be common trip.
- F. Each breaker shall have a permanent trip unit containing individual thermal and magnetic trip elements in each pole.
- G. Breakers shall have removable lugs. Lugs shall be UL listed for copper conductors only. Breakers shall be UL listed for installation of mechanical type lugs.
- H. Signal power will have double pole breakers and hotel power will have single pole breakers.

14.4 BATTERY CHARGERS AND POWER SUPPLIES

- A. The Contractor shall furnish DC shelf or wall mounted battery chargers in the instrument houses and cases, as required in these Technical Specifications and in accordance with the Contract Drawings
- B. Each type of battery charger and all associated equipment shall be submitted to the Engineer for approval.
- C. The actual operating voltage and current shall be set by the Contractor, for each application. The chargers shall be temperature compensated automatic current limiting, constant potential types. Chargers shall be current limiting to prevent damage during overload conditions. Chargers shall be compatible with ultra-low-maintenance Nickel-Cadmium Alkaline Storage Batteries as per this specification.
- D. The battery chargers and power supplies shall withstand 600 volts, 60 Hz applied for one minute between both input leads connected together and the case; between both output leads connected together and the case; between both output leads connected together, and both input leads connected together.
- E. Input voltage shall be 115 VAC plus or minus 15 percent, 60 Hz, single-phase, two wire.
- F. The contractor shall submit to the engineer the capacity of the charger and the power supplies with a minimum of 125 percent over the calculated capacity.
- G. Power supplies shall be designed so that the filter capacitors can be replaced without removing the supply from the rack on which it is mounted.
- H. The power supplies shall be designed for continuous operations.

- I. The current rating of each battery charger to be supplied shall be adequate to fully charge a completely discharged set of batteries within ten (10) hours while carrying the full current requirement.
- J. All external wiring for the power supplies and battery chargers shall be terminated on AREMA style terminal posts.
- K. Protection Requirements:
 - a. The power supply shall be so designed that it will not be damaged by an input voltage range between zero and 140 VAC.
 - b. A separate output filter and high frequency bypass capacitor shall be located on the load side of the isolating diode.
- L. The power supply output terminal shall contain a non-conducting device or insulated safety shield to protect personnel from electrical hazards. The device shall protect and be rated not less than 4 times the output voltage of the power supply.

14.5 MECHANICAL REQUIREMENTS:

- A. The power supply shall be a panel-chassis combination with a perforated protective cover. The design shall be such as to provide natural convection cooling. Fans for cooling shall not be permitted.
- B. The front mounting shall be designed to mount on a wall, a shelf, or a standard 19-inch rack space with EIA hole spacing.
- C. The power supply front panel shall contain one AC input voltmeter, one output ammeter and output voltmeter. Meter accuracy shall be plus or minus 2 percent with nominal voltage readings at center scale.
- D. Terminal binding posts for input and output and alarm circuits shall be provided. Each terminal shall be insulated from the frame of the unit.
- E. All power supplies shall be clearly and permanently labeled with the manufacturer's name, serial number, part or model number, and the input and output rating, in such a fashion so that it is legible after mounting.

14.6 SECONDARY SURGE PROTECTORS

- A. All Secondary surge protection shall be ERICO Protection Devices for Railway Signaling (EPD), as required, or approved equal.
- B. Secondary surge protectors intended for application in vital signal circuits shall be designed with terminal posts spaced on 2-3/8 inch centers. Binding posts, nuts, and washers, if provided, shall conform to AREMA Manual Part 14.1.11, Recommended Design Criteria for Binding Posts, Nuts and Washers.
- C. Secondary signal surge protector shall have a dielectric breakdown voltage from any circuit component to metal housing or mounting surface in accordance with AREMA Manual Part 14.2.50, Recommendations for Dielectric Requirements for Signal Equipment.
- D. Secondary signal surge protector assembly, covers, and accessories shall not ignite or melt, nor cause ignition of adjacent surfaces, when surge protector is used within rated operating and surge conditions.

- E. Exposed metal parts of secondary signal surge protectors shall be suitably protected against corrosion to maintain design electrical and leakage parameters.
- F. Secondary signal surge protector shall meet all above requirements over a temperature range of -40°C to +70°C, and relative humidity of 0 to 95 percent, non-condensing within a signal housing.
- G. Equalizers shall be heavy duty. Equalizers shall be the manufacturer's standard for the application.

14.7 PRIMARY SURGE PROTECTORS

- a) All Primary surge protection shall be ERICO Protection Devices for Railway Signaling (EPD), as required, or approved equal.
- b) Primary surge protectors intended for application in vital signal circuits shall be designed with terminal posts spaced on 2-3/8 inch centers. Binding posts, nuts, and washers, if provided, shall conform to AREMA Manual Part 14.1.11, Recommended Design Criteria for Binding Posts, Nuts and Washers.
- c) Primary AC surge protector shall have a dielectric breakdown voltage from any circuit component to metal housing or mounting surface in accordance with AREMA Manual Part 14.2.50, Recommendations for Dielectric Requirements for Signal Equipment.
- d) Primary signal surge protector assembly covers, and accessories shall not ignite or melt, nor cause ignition of adjacent surfaces, when surge protector is used within rated operating and surge conditions.
- e) Exposed metal parts of Primary AC surge protectors shall be suitably protected against corrosion to maintain design electrical and leakage parameters.
- f) Primary AC surge protector shall meet all above requirements over a temperature range of -40°C to +70°C, and relative humidity of 0 to 95 percent, non-condensing within a signal housing.
- g) Equalizers shall be heavy duty. Equalizers shall be the manufacturer's standard for the application.

14.8 STORAGE BATTERIES

- A. The Contractor shall furnish Lead-Acid Flooded Batteries 4KS25P Type, as manufactured by Rolls Surette (or approved equal) with accessories for 12 volt DC supply, as necessary. All batteries proposed for this application shall have a satisfactory record of continuous service in similar operating railroad environments for a minimum of 5 (five) years, reliably providing the originally specified standby capacity under actual and/or test circumstances throughout this period. Batteries, racks, accessories and covers shall be submitted to the Engineer for approval.
- B. The Batteries shall operate in ambient temperatures from -40°C (-40°F) to +70°C (+160°F), and shall withstand prolonged float operations at 2.20 V/cell at 20°C without any loss of capacity.
- C. Batteries shall be sized to provide a minimum of 72 hours of standby power at the computed normal loads. The battery capacity shall be calculated at the 8-hour discharge rate to 1.90 volts per cell at a temperature of +25°C (+77°F) when tested in accordance with IEEE Standard 1106-1987, Recommended Practice for Maintenance, Testing, and Replacement of Nickel-Cadmium Storage Batteries for Generating Stations and Sub-Stations.

- D. Each cell shall be completely assembled, sealed and charged ready for service.
- E. Each cell shall contain permanent legible markings indicating the Manufacturer, Manufacturer's type number and serial number, capacity and date of manufacture or an equivalent accepted date code to identify the date of manufacture.
- F. Batteries shall be installed in floor-mounted steel racks within the instrument housing.
- G. The Contractor shall supply all fuses, resistors, surge arresters and circuit breakers necessary to adjust voltages and protect the power supply and equipment. Fuses shall be of the replaceable link cartridge design and shall be submitted to the Engineer for approval.
- H. The Contractor shall submit to the Engineer the proposed type and manufacturer for all equipment in this Section of the Specification.

PART 15 RAIL BONDING

15.0 GENERAL

- A. Rail track joints shall be bonded with welded railhead bonds per AREMA Manual of Recommended Standards Part 8.1.30
- B. Track switch, frog fouling bonds, and track connections shall be stranded bonds and shall conform to AREMA Manual for Railway Engineering, Part 8.1.20, Recommended Application Criteria for Track-Circuit Bonding.
- C. Crimped sleeves shall not be used for any fouling or frog bonding.
- D. The Contractor shall install and test the track bonds in accordance with all applicable requirements of CFR 49, Part 236 and the recommendations of the AREMA Manual of Recommended Standards, Part 8.30.
- E. The Contractor shall submit Product Data: Manufacturer's catalog cuts, material specifications, installation and maintenance instructions, and other data pertinent to the bonding material, staples, and circuit connections, specified herein and as shown on the Contract Drawings.
- F. Track bonds shall conform to the following:
 - a. Railhead bonds shall be 3/16-inch in diameter with steel terminals welded to the conductors. They shall have a nominal length of 6 1/2 inches.
 - b. Web Bonds shall be 3/16-inch, 12-inch long welded to the web.
 - c. Track Circuit Rail Connectors: Track circuit connectors shall be 3/16-inch stranded bronze conductor, 1-inch tap for welded connection on one end and compression sleeve on the other end for a direct crimp type connection to the track wire, and shall have a nominal length of 4 inches.
 - d. Bond strand for fouling wires shall be 3/16-inch single strand with 1/16-inch black PVC insulation.
- G. Bonds must be applied to the rail in accordance with the manufacturer's instructions.

APPENDIX K

**COST SCHEDULE
Wayside OS Install: Girdwood to Potter, AK
ITB No. 17-29-206050**

A Bidder's failure to provide the information requested in this Appendix may be cause for rejection of the bid on the basis on non-responsiveness. Cost shall be bid in accordance to all term, conditions, specifications and drawings

AWARD CRITERIA: A contract award resulting from this Invitation to Bid shall be made to the low, responsive, responsible bidder who meets the requirements as set forth in the plans and specifications and compliance thereof. Award is contingent on the availability of ARRC funds.

Description

ARRC MMS Equipment and Construction Girdwood to Potter:

Pay Item Number	Pay Item Description	Pay Units		Bid Price	Amount Bid
1	Mobilization and Demobilization	1		Lump Sum	
2	Installation and Connection of all OS Cabling and Equipment	1		Lump Sum	
3	Electrical Work at Girdwood	1		Lump Sum	
4	Electrical Work and House Move at Indian	1		Lump Sum	
				TOTAL BID =	

The Undersigned has read the foregoing ITB and hereby agrees to the terms and conditions stated therein by affixing his/her signature below.

NON-COLLUSION AFFIDAVIT: The Undersigned declares, under penalty of perjury under the laws of the United States, that neither he/she nor the firm, association, or corporation of which he/she is a member, has, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this Bid.

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BIDDERS NAME AND ADDRESS

COMPANY NAME

SIGNATURE BY AND FOR THE BIDDER

COMPANY ADDRESS

PRINTED NAME OF ABOVE BIDDER

DATE OF BID

CONTACT PHONE NUMBER
(Page 2 of 2)

CONTACT FAX NUMBER