STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES

STANDARD SPECIFICATIONS
FOR
AIRPORT CONSTRUCTION

Kongiganak Airport Improvements
Project No. CFAPT00433 / AIP 3-02-0380-004-2022

(Advisory Circular 150/5370-10H, Standard Specification for Construction of Airports, as modified, and approved by the Federal Aviation Administration for Airport Improvement Program contracts in Alaska)

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US Customary

NOTE: Special Provisions for each project are marked as changes to the text of the Standard Specifications. Deleted text is identified by strikethrough. Additions are underlined.

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PART I

GENERAL CONTRACT PROVISIONS

SECTION 10
DEFINITION OF TERMS

10-01 GENERAL. The following terms and definitions apply in these Specifications. If a term is not defined, the ordinary, technical, or trade meanings for that term shall apply, within the context in which it is used.

Titles and headings of sections, subsections, and subparts are intended for convenience of reference and will not govern their interpretation. Working titles which have a masculine gender, such as “workman” and “flagman” and the pronouns and adjectives “he”, “his” and “him” are utilized in the contract documents for the sake of brevity, and are intended to refer to persons of either sex. Any reference to a specific requirement of a numbered paragraph of the contract specifications or a cited standard shall be interpreted to include all general requirements of the entire section, specification item, or cited standard that may be pertinent to such specific reference.

These specifications incorporate by reference a number of publications including regulations, design and construction standards, or recommendations published by outside sources. Cited publications refer to the most recent issue, including interim publications, in effect on the date of the Invitation To Bid, unless specified by year or date.

These Specifications are written to the Bidder or Contractor. Unless otherwise noted, all actions required by the specifications are to be performed by the Bidder, the Contractor, or the Contractor's agent.

Some portions of these Specifications are written using imperative mood, abbreviated format, incomplete sentences and/or active voice to communicate the Contractor's responsibilities in a direct and concise manner. Omission of words or phrases such as “a,” “an,” “the,” “the Contractor shall,” “unless otherwise specified,” or “unless otherwise directed” is intentional. Interpret the Contract as if they were included.

For all Specification language except the General Contract Provisions, whenever anything is, or is to be, done, if, as, or, when, or where “acceptable, accepted, approval, approved, authorized, determined, designated, directed, disapproved, ordered, permitted, rejected, required, satisfactory, specified, submit, sufficient, suitable, suspended, unacceptable, unsatisfactory, or unsuitable,” the expression is to be interpreted as if it were followed by the words “by the Engineer” or “to the Engineer.”

10-02 ACRONYMS. Wherever the following abbreviations are used in these Specifications or on the Plans, they are to be construed the same as the respective expression represented. :

AAC	*Alaska Administrative Code*
AASHTO	American Association of State Highway and Transportation Officials
AC	*FAA Advisory Circular*
ACI	American Concrete Institute
AIA	American Institute of Architects
AIP	Airport Improvement Program
AKOSH	Alaska Occupational Safety and Health
ANSI	American National Standards Institute
AOA	Air Operations Area
AS	*Alaska Statute*
ASDS	*Alaska Sign Design Specifications*
ASTM	American Society for Testing & Materials
ATM	Alaska Test Method
ATMM	*Alaska Test Methods Manual*
CFR	*Code of Federal Regulations*
CSPP	Construction Safety and Phasing Plan
CTAF	Common Traffic Advisory Frequency
DOLWD	Alaska Department of Labor and Workforce Development
DOT&PF	Alaska Department of Transportation and Public Facilities
EPA	Environmental Protection Agency

FAA	Federal Aviation Administration
FM	Factory Mutual
FOP	Field Operating Procedure (See *Alaska Test Methods Manual*)
FSS	Flight Service Station
ICEA	Insulated Cable Engineers Association (formerly IPCEA)
MCL	Materials Certification List
MRP	Mining and Reclamation Plan
NEC	*National Electrical Code*
NEMA	National Electrical Manufacturers Association
NOTAMs	*Notices to Airmen*
RASSO	Regional Airport Safety and Security Officer
SPCC	*Spill Prevention, Control, and Countermeasure* (Plan)
SPCD	Safety Plan Compliance Document
SSAC	*DOT&PF Standard Specifications for Airport Construction*
SSPC	Society for Protective Coatings
SWPPP	*Storm Water Pollution Prevention Plan*
TCP	*Traffic Control Plan*
UL	Underwriters Laboratory
WAQTC	Western Alliance for Quality in Transportation Construction (See *Alaska Test Methods Manual*)

10-03 DEFINITIONS.

ACCEPTANCE SAMPLING AND TESTING. Sampling and testing performed by the State of Alaska, or its designated agent, to evaluate acceptability of the final product.

ACCESS ROAD. The right-of-way, the roadway, and all improvements constructed thereon connecting the airport to another public thoroughfare.

ADDENDA. Clarifications, corrections, or changes to the Plans, Specifications, or other Contract documents issued graphically or in writing by the Department after the advertisement but prior to bid opening.

ADVERTISEMENT. The public announcement, as required by law, inviting bids for specified work or materials.

ADVISORY CIRCULAR (AC). FAA standards and guidance for their Airport Improvement Program.

AGREED PRICE. An amount negotiated between the Department and the Contractor after Contract award for additional work performed or additional materials supplied under the Contract.

AIR OPERATIONS AREA (AOA). Any area of the airport used or intended to be used for the landing, takeoff, surface maneuvering, or parking of aircraft. An air operation area shall include such paved or unpaved ~~areas, that~~ areas that are used or intended to be used for the unobstructed movement of aircraft, in addition to its associated runway, taxiway, or apron.

AIRPORT. An area of land or water that is used or intended for use for the landing and takeoff of aircraft, and any appurtenant areas that are used or intended for use for airport buildings or other airport facilities or right of way, together with airport buildings and facilities.

AIRPORT IMPROVEMENT PROGRAM (AIP). A grant-in-aid program, administered by the FAA.

ALASKA STANDARD PLAN. Detail drawing adopted by the Department for repetitive use, showing details to be used where appropriate. Alaska Standard Plans are adopted as Alaska's accepted standards, in accordance with AS 19.10.160(a), and for use in conformity with 12 AAC 36.185(a)(2).

ALASKA TEST METHODS MANUAL (ATMM). The materials testing manual used by the Department. It contains Alaska Test Methods, WAQTC Test Methods, WAQTC FOPs for AASHTO Test Methods, and Alaska Standard Practices for evaluating test results and calibrating testing equipment.

ALASKA TRAFFIC MANUAL. The standard for traffic control devices on Alaska roads, per AS 28.01.010(d). The Alaska Traffic Manual is comprised of the Manual on Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration as modified by the Alaska Traffic Manual Supplement, and any adopted revisions or interim addenda issued subsequently and corrections to known errors in either document.

APPENDICES. Supplemental Contract Documents.

AVIATION MATERIALS CERTIFICATION LIST. See Materials Certification List.

AWARD. Acceptance of the successful bid by the Department. The award is effective upon execution of the Contract by the Contracting Officer.

BASE COURSE. One or more layers of specified material placed on a subbase or subgrade to support a surface course.

BID (OR PROPOSAL). The bidder's offer, on the prescribed forms, to perform the specified work at the prices quoted.

BID BOND. A type of bid guaranty.

BIDDER. An individual, firm, corporation, joint venture, or any acceptable combination of individuals and entities submitting a bid for the advertised work.

BID FORMS. Department-furnished forms that a bidder must complete and submit when making a bid in response to an advertised project. Bid forms may include a bid schedule, certification forms, acknowledgment forms, and other documents.

BID GUARANTY. The security furnished with a bid to guarantee that the bidder will enter into a contract if the Department accepts the bid.

BUILDING BOUNDARY LINE. A line located five feet horizontal distance outside the exterior edge of the foundation of any building included in the work. Work within the building boundary line and above the bottom of the footing shall be constructed, inspected, and paid for using the building technical specifications.

BUILDING TECHNICAL SPECIFICATIONS. The portions of the contract that relate to the construction of any building as part of the work, including, but not limited to, the architectural, structural, mechanical, and electrical features of such work, located within the building boundary line and above the footing elevation. Building technical specifications will not apply to items of work specifically identified as exceptions under specification section S-142.

CALENDAR DAY. Every day shown on the calendar, beginning and ending at midnight.

CHANGE ORDER. A written order by the Department to the Contractor making changes to the Contract, within its general scope, and establishing the basis of payment and time adjustment, if any, for the work affected.

COMMON TRAFFIC ADVISORY FREQUENCY (CTAF). A designated frequency for the purpose of carrying out airport advisory practices while operating to or from an airport that does not have a control tower or an airport where the control tower is not operational. CTAF is identified in appropriate aeronautical publications such as the current *Alaska Flight Information Supplement,* a civil/military flight information publication issued by FAA every 56 days.

COMPLETION DATE. The date on which all Contract work is specified to be completed.

CONSTRUCTION. Physical activity by the Contractor or any Subcontractor using labor, materials or equipment within the Project, or within material sources planned for use on the Project.

CONSTRUCTION SAFETY AND PHASING PLAN (CSPP). The overall plan for safety and phasing of a construction project developed by the Department and approved by the FAA. It is included in the ~~invitation for bids~~ appendix and becomes part of the project specifications.

CONTINGENT SUM. A method for paying for a Contract bid item reserved by the Department for specified contingencies. The Contractor shall perform Contingent Sum work only upon the Directive of the Engineer. The basis of payment for Contingent Sum work shall be specified in the Contract or the Directive.

CONTRACT. The written agreement between the Department and the Contractor setting forth the obligations of the parties for the performance and completion of the work.

The Contract includes the Invitation To Bid, Bid Form, Standard Specifications, Special Provisions, Plans, Bid Schedule, Contract Forms, Contract Bonds, Addenda, and any Change Orders, Interim Work Authorizations, Directives, or Supplemental Agreements that are required to complete the work in an acceptable manner, all of which constitute one instrument.

CONTRACTING OFFICER (PROCUREMENT OFFICER). The person authorized by the Commissioner of the Department to enter into and administer the Contract on behalf of the Department. The Contracting Officer has authority to make findings, determinations, and decisions with respect to the Contract and, when necessary, to modify or terminate the Contract. The Contracting Officer is identified on the Invitation To Bid.

CONTRACT ITEM (PAY ITEM). A specifically described item of Contract work listed on the Bid Schedule or in a Change Order.

CONTRACTOR. The individual, firm, corporation, joint venture, or any acceptable combination of individuals and entities contracting with the Department for performance of the Contract.

CONTRACT TIME. The time allowed under the Contract, including authorized time extensions, for the completion of all work by the Contractor.

CONTROLLING ITEM. Any feature of the work considered at the time by the Engineer: (1) essential to the orderly completion of the work and (2) a feature which, if delayed, will delay the time of completion of the Contract (such as an item of work on the critical path of a network schedule).

COST. Amounts actually incurred by the Contractor in the performance of the Contract that are (a) actually reflected in contemporaneously maintained accounting or other financial records and (b) supported by original source documentation. Costs are to be stated in U.S. dollars.

CULVERT. A pipe or arch half pipe, that provides an opening under the embankment.

DAY. Calendar day unless preceded by the word “working”.

DEFECTIVE. Work that is unsatisfactory, faulty, deficient, or does not conform to regulatory requirements or the Contract documents.

DEPARTMENT. The State of Alaska Department of Transportation and Public Facilities.

DIGITAL SIGNATURE. An electronic signature that conforms to the Uniform Electronic Transactions Act, AS 09.80.010 et seq.

DIRECTIVE. A written communication to the Contractor from the Engineer enforcing or interpreting a Contract requirement or ordering commencement or suspension of an item of work already established in the Contract.

DRAINAGE SYSTEM. The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

ELECTRONIC BID. A bid that a bidder (i) prepares on the Department's bid forms accessed through the Department's approved online bidding service and (ii) submits to the Department through use of that bidding service's online submittal process.

ELECTRONIC MAIL (EMAIL). A system for sending messages from one person to another via telecommunications links between computers or terminals using dedicated software.

ENGINEER. The authorized representative of the Department's Contracting Officer. The Engineer is responsible for administration of the Contract.

EQUIPMENT. All machinery, tools, apparatus, and supplies necessary to preserve, maintain, construct, and complete the work.

EQUITABLE ADJUSTMENT. An increase or decrease in Contract price or time calculated according to the terms of this Contract.

EXTRA WORK. An item of work not provided for in the Contract as awarded but found essential by the Engineer for the satisfactory completion of the Contract within its intended scope.

FEDERAL AVIATION ADMINISTRATION (FAA). Branch of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or their duly authorized representative.

FEDERAL SPECIFICATIONS. The most current version of the Federal Specifications and Standards, Commercial Item Descriptions, and supplements, amendments, and indices thereto which are prepared and issued by the General Services Administration (GSA) of the Federal Government in effect on the date bids are opened.

FOREIGN OBJECT DEBRIS (FOD). Any object, live or not, located in an inappropriate location in the airport environment that has the capacity to injure airport or air carrier personnel and damage aircraft.

HIGHWAY, STREET, OR ROAD. A general term denoting a public way used by vehicles and pedestrians, including the entire area within the right-of-way.

HIGHWAY TRAFFIC CONTROL PLAN. See traffic control plan.

HOLIDAYS. State of Alaska legal holidays are:

a. New Year's Day - January 1

b. Martin Luther King, Jr. Day - Third Monday in January

c. Presidents' Day - Third Monday in February

d. Seward's Day - Last Monday in March

e. Memorial Day - Last Monday in May

f. Independence Day - July 4

g. Labor Day - First Monday in September

h. Alaska Day - October 18

i. Veteran's Day - November 11

j. Thanksgiving Day - Fourth Thursday in November

k. Christmas Day - December 25

l. Every Sunday

m. Every day designated by public proclamation by the President of the United States or the governor as a legal holiday.

If a holiday listed above falls on a Saturday then that Saturday and the preceding Friday are both legal holidays for officers and employees of the state. If the holiday falls on a Sunday, except (12) above, then that Sunday and the following Monday are both legal holidays.

INSPECTOR. An authorized representative of the Engineer assigned to make all necessary inspections, observations, and/or tests, observation of tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

INTERIM WORK AUTHORIZATION. A written order by the Engineer initiating changes to the Contract, within its general scope, until a subsequent Change Order is executed.

INVITATION TO BID. The advertisement for bids for all work or materials on which bids are required.

LABORATORY. The official testing laboratories of the Department or such other laboratories as may be designated by the Engineer.

LIGHTING. A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

MAJOR CONTRACT ITEM. A Contract item for which the Contractor's Bid Amount is 5 percent or more of the total Contract award amount. Determination of a Major Contract Item is made at the time of Award.

MANUAL BID. A bid that a bidder (i) prepares on the Department's bid forms accessed either through the Department's approved online bidding service or obtained from the Department's Regional Contracts Office and (ii) submits to the Department in physical paper form by hand delivery, U.S. Mail, or courier service.

MATERIALLY UNBALANCED BID. A mathematically unbalanced bid that either (a) gives rise to a reasonable doubt that it will ultimately result in the lowest overall cost to the Department, even though it may be the lowest bid or (b) is so unbalanced as to be tantamount to allowing a significant advance payment.

MATERIALS. Substances specified for use in the construction of the project.

MATERIALS CERTIFICATION LIST (MCL). Also referred to as "Aviation Materials Certification List". A list of materials for which the Contractor shall submit certifications to the Engineer. The MCL will also designate electrical products requiring listing by an approved independent electrical testing laboratory. The MCL is included in the Contract documents as an appendix.

MATHEMATICALLY UNBALANCED BID. A bid (a) where each pay item fails to carry its share of the cost of the work plus the bidder's overhead and profit, or (b) based on nominal prices for some pay items and enhanced prices for other pay items.

MINOR CONTRACT ITEM. A Contract item with a total value of less than 5 percent of the Contract award amount.

NON-FROST SUSCEPTIBLE. Stone, gravel or sand, that contains 6 percent or less material passing the No. 200 screen as determined by sieve analysis performed with ATM 304 on the minus 3-inch material, and has a plastic index of 6 or less as determined by ATM 205.

NOTICE OF INTENT TO AWARD. The written notice by the Department announcing the apparent successful bidder and establishing the Department's intent to award the Contract when all required conditions are met.

NOTICE TO PROCEED. Written notice to the Contractor to begin the Contract work.

ORIGINAL GROUND (OG). The ground surface prior to the start of work.

PAVEMENT STRUCTURE. The combination of subbase, base course, and surface course placed on a subgrade to support and distribute the traffic load. Some layers may not be present, see Plans.

PAYMENT BOND. The security furnished by the Contractor and the Contractor's Surety to guarantee payment of all persons who supply labor and material in prosecution of the work provided for in the contract.

PERFORMANCE BOND. The security furnished by the Contractor and the Contractor's Surety to guarantee performance and completion of the work provided for in the contract.

PLANS. The Department's contract drawings, profiles, typical cross sections, and supplemental drawings or reproductions showing the location, character, dimensions, and details of the work. There may be separate drawings for work inside and outside of the building boundary line.

PRECONSTRUCTION CONFERENCE. A meeting between the Contractor and the Engineer to discuss the project before the Contractor begins the work.

PROCESS CONTROL. See quality control.

PROCUREMENT OFFICER. See contracting officer.

PROFILE. The vertical elevation of the surface of the layer at the location indicated. It is typically indicated at the longitudinal centerline of the top layer of pavement on the runway, taxiway, apron, or roadway. On a material or fabrication it may be used to indicate a shape, or a thickness of material or thickness of a coating.

PROJECT. (a) The specific section of the airport or other property and related facilities on which construction is to be performed, or (b) the work that is to be performed under the Contract whether completed or partially completed.

QUALIFIED PRODUCTS LIST. A list of products that the Department has found conforms to the SSAC, except for Buy American and Alaska Agricultural/Wood Products. The Department makes no guarantee that any product on the Qualified Products List meets the requirements of Subsection 60-09 Buy American Steel and Manufactured Products, or Alaska Agricultural/Wood Products.

QUALITY CONTROL (QC) also called **PROCESS CONTROL**. The system used by a contractor to monitor, assess and adjust their production or placement processes to ensure that the final product will meet the specified level of quality. Quality control includes sampling, testing, inspection and corrective action (where required) to maintain continuous control of a production or placement process.

REGULATORY REQUIREMENTS. Laws, rules, regulations, ordinances, codes, or orders, including requirements of permits, issued by a governmental entity with lawful authority over a matter.

RESOURCES. Labor, equipment, materials, supplies, tools, transportation, and supervision necessary to perform the work.

RESPONSIBLE BIDDER. A bidder that the Department determines has the skill, ability, financial resources, legal capacity to contract, equipment, required licenses, integrity, satisfactory record of performance and that is otherwise fully capable of performing the Contract.

RESPONSIVE BID. A bid that the Department determines conforms in all material respects with the solicitation for bids.

RETAINAGE. A percentage of a payment established in advance under a contract or subcontract to be withheld from a progress payment due on the contract or subcontract. Payment or a percentage of payment withheld for unsatisfactory performance is not retainage.

RIGHT-OF-WAY. Land or property or an interest in property available for a project. The uses allowed in portions of right-of-way may be restricted.

RUNWAY. The area of the airport prepared for the landing and takeoff of aircraft.

RUNWAY SAFETY AREA (RSA). A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event an aircraft undershoots, overshoots, or departs from the runway.

SAFETY PLAN COMPLIANCE DOCUMENT (SPCD). A document prepared by the Contractor that details how the Contractor will comply with the CSPP, and approved by the Department.

SCHEDULE OF VALUES. A document submitted by the Contractor to the Engineer for approval. The approved document establishes the values for separate work items that comprise the total contract price for a building included in the work.

SECURITY PLAN. A Contract document that specifies methods of controlling the operations of the Contractor, subcontractors, and suppliers so as to provide for (1) security of workers, equipment, and public, (2) security of aircraft in the Air Operations Areas of the airport, and (3) security of the Airport property.

SPECIAL PROVISION. Addition or revision that amends or supersedes the Standard Specifications and is applicable to an individual project.

SPECIALTY ITEM. A Contract item identified in the Contract that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid on the contract.

SPECIFICATIONS. General term applied to all Contract terms, conditions, directions, provisions, and requirements which include, but are not limited to, written technical descriptions of materials, equipment, construction systems, standards and workmanship, and administrative and procedural details related to the work.

STANDARD SPECIFICATIONS. A book or electronic file of specifications approved by the Department for general application and repetitive use. Standard specifications may include General Contract Provisions, and separate specifications for work inside the building boundary line.

STATE. The State of Alaska, acting through its authorized representative.

STRUCTURE. Bridge, building, catch basin or inlet, cribbing, culvert, electrical duct, flexible and rigid pavements, handholes, junction boxes, lighting fixture and base, manhole, navigational aid, retaining wall, storm and sanitary sewer lines, transformer, underdrain, vault, visual aid, water line, and other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

SUBBASE. Layer of specified material between the subgrade and base course.

SUBCONTRACTOR. Individual or legal entity to whom or to which the Contractor sublets part of the Contract.

SUBGRADE. The soil or embankment upon which the pavement structure is constructed.

SUBSIDIARY. Work or material not measured or paid for directly. Compensation for such work is included in the payment for other items of work.

SUBSTANTIAL COMPLETION. The point at which the project (1) can be safely and effectively used by the public without further delays, disruption, or other impediments; and (2) pavement structure, shoulder, drainage, sidewalk, permanent signing and markings, guardrail and other traffic barrier, fencing, safety appurtenance,

structures, utilities, lighting, bridge deck and parapet work, and guidance systems for aircraft is complete; and (3) the Engineer has issued a letter of substantial completion.

For projects built in phases the work is substantially complete when it is ready for the subsequent project.

Buildings included in the work may separately reach substantial completion. Substantial completion is the point at which the building (1) can be safely and effectively used by the public or occupied for the purpose that it was intended, without further delays, disruption, or other impediments; (2) all agencies that issue approvals before occupancy have approved the building for occupancy; and (3) the Engineer has issued a letter of substantial completion.

The terms "substantially complete" and "substantially completed" mean the work has progressed to the point of substantial completion.

SUPERINTENDENT. The Contractor's authorized representative in responsible charge of the work.

SUPPLEMENTAL AGREEMENT. Negotiated written agreement between the Department and the Contractor authorizing performance of work beyond the general scope of, but in conjunction with, the original Contract. Supplemental agreements are new procurements under the State Procurement Code, AS 36.30.

SURETY. Corporation, partnership, or individual, other than the Contractor, executing a bond furnished by the Contractor.

SURFACE COURSE. Top homogenous layer of the pavement structure. It is designed to withstand the wear of traffic and the disintegrating effects of climate. Sometimes called the wearing course.

TAXIWAY. The portion of the air operations area of an airport that has been designated for movement of aircraft to and from runways or aircraft parking areas.

TAXIWAY SAFETY AREA (TSA). A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an airplane unintentionally departing the taxiway.

TRAFFIC CONTROL PLAN (TCP). Also referred to as "Highway Traffic Control Plan". A drawing or drawings indicating the method for safely guiding and protecting motorists, pedestrians, bicyclists, and workers in a highway traffic control zone. The TCP depicts the highway traffic control devices and their placement and times of use.

UTILITY. Line, facility, or system for producing, transmitting, or distributing communications, power, electricity, light, heat, gas, oil, crude products, water, steam, waste, storm water not connected with highway drainage, or other similar commodity, including a publicly owned fire or police signal system, street lighting system, or railroad which directly or indirectly serves the public. Also means lighting as defined in this subsection. Also means a utility company, inclusive of any subsidiary.

VERIFICATION SAMPLING AND TESTING. See ACCEPTANCE SAMPLING AND TESTING.

WORK. Depending on the context, (a) The act of furnishing all resources for the project and performing all duties and obligations required by the Contract or (b) the physical construction, facility or end–product that is contemplated under the Contract, whether completed or partially completed.

WORKING DAYS. Calendar days, except Saturdays and state holidays.

WORKING DRAWINGS. Stress sheets, shop drawings, erection plans, falsework plans, framework plans, cofferdam plans, bending diagrams for reinforcing steel, wiring diagrams and schematics, traffic control plans, or any other supplementary plans or similar data which the Contractor is required to submit to the Engineer for approval.

SECTION 20
PROPOSAL REQUIREMENTS AND CONDITIONS

20-01 QUALIFICATION OF BIDDERS. A bidder shall:

a. When requested, submit a completed Contractor's Questionnaire (Form 25D-8) stating previous experience in performing comparable work, business and technical organization, financial resources, and equipment available to be used in performing the work;

b. On wholly state-funded projects, submit evidence of a valid Department of Commerce, Community, and Economic Development certificate of Contractor Registration (Contractor Registration) under AS 08.18, and submit evidence of a valid Alaska Business License prior to award under AS 36.30.110(b); and

c. On federal-aid projects, submit evidence of Alaska Business License and Contractor Registration prior to award.

All firms desiring to participate in DOT&PF construction projects must register annually by submitting a completed Bidder Registration (Form 25D-6).

20-02 CONTENTS OF BID PACKAGE. Upon request, the Department will furnish prospective bidders with a bid package, at the price stated in the Invitation To Bid.

The bid package includes the following:

a. Location and description of the project;

b. Estimates of quantities of work and materials to be furnished;

c. Schedule of contract items for which bid prices are invited;

d. Time in which the work must be completed

e. Amount of the bid guaranty;

f. Date, time, and place for the bid opening;

g. Plans and specifications; and

h. Bid forms.

Unless otherwise stated in the bid package, the Plans, Specifications, permits, forms and any other documents designated in the bid package are considered a part of the bid whether attached or not.

20-03 INTERPRETATION OF QUANTITIES IN BID SCHEDULE. Bid prices shall be based on the estimated quantities shown in the bid schedule. Quantities of work to be done and materials to be furnished are approximate and are prepared only for the comparison of bids. These quantities may increase, decrease, or be eliminated. Payment for unit price items will be made for the actual accepted quantities of work performed and materials furnished under the Contract, as determined using the method of measurement specified in the Contract.

20-04 EXAMINATION OF PLANS, SPECIFICATIONS, SPECIAL PROVISIONS, AND WORK SITE. Bidders shall examine the work site and all Contract documents before preparing a bid. Submitting a bid is a binding representation that the bidder has examined the work site, is aware of the conditions to be encountered, and has examined and understands all of the Contract documents.

Department records of subsurface and hydrological investigations, including but not limited to, boring logs, test results, soil investigation reports, material reports, and other supplemental information are made

available for information purposes only. These records are not part of the Contract. These records indicate subsurface conditions only at specific locations at the time sampled, and only to the depths penetrated. They do not necessarily reflect frozen state, or variations in soil, rock or hydrology that may exist between or outside such locations or at other times. Actual conditions, including ground water levels and saturation, may differ from what is shown in the records.

Material sources referenced in Department records may not contain materials of sufficient quantity or quality to meet project requirements. Sources may be subject to operational restrictions. The availability of these records does not constitute approval, nor guarantee suitability of soils or sources, or the right to use sources referenced in these records for this project. Department records shall not substitute for independent investigation, interpretation, or judgment of the bidder. The Department is not responsible for any interpretation or conclusion drawn from its records by the bidder. Bidders shall examine Subsection 60-02 Material Sources for further information.

Geotechnical reports referenced in the Notice to Bidders, or otherwise made available, may contain data, discussions, and references to material sources. The inclusion of material source information in these reports does not mean they are a Mandatory, Designated, or Available Source as described in Subsection 60-02. For a material source to be considered Mandatory, Designated, or Available, it must be included in the Special Provisions, or so described on the Plans.

Any questions about bidding procedures, site conditions, or Contract requirements must be submitted in writing according to the Invitation To Bid (Form 25D-7). Questions must be submitted in sufficient time to get a reply before submitting a bid. No oral responses or other oral statements are binding on the Department. Any response to a material question shall be issued by addendum sent to all bidders.

20-05 PREPARATION OF BID. A bidder shall prepare its bid using either the Department approved bid preparation software or the Department provided bid forms or legible copies of the Department's forms. All entries shall be legible and in ink or type. Bidders shall:

a. Enter all prices required on the Bid Schedule, in figures;

b. Enter a unit price for each contract item for which a quantity is given;

c. Enter the products of the respective unit prices and quantities in the column provided;

d. Enter lump sum prices for lump sum contract items in the column(s) provided; and

e. Enter the total amount of all contract items for the basic bid and, when specified, any alternates.

When a bid item contains a choice to be made by the bidder, the bidder shall indicate a choice according to the Specifications for that item. No further choice is permitted.

The bid must be signed in ink or by digital signature by the person or persons authorized to sign the Contract for the bidder. If a bidder is a corporation, the bid must be signed by a corporate officer or agent with authority to bind the corporation. If a bidder is a partnership, a partner must sign. If the bidder is a joint venture, each principal member must sign. If a bidder is a sole proprietorship, the owner must sign. Each person signing the bid must initial any changes made to entries on the bid forms.

A bidder submitting an electronic bid agrees that its digital signature constitutes a binding signature.

The bidder shall make no claim against the Department in the event it is unable to submit its bid through approved online bidding service and/or approved online bidding service is unable to submit the bid(s) to the Department. The Department reserves the right to postpone the public bid opening in the event of technical problems.

For multiple-project bid openings, the bidder may limit the total dollar amount or number of projects to be accepted by completing and attaching the following statement with its bid for at least one of the projects. The Department will then determine which of the low bids it will accept, up to the total indicated.

"We wish to disqualify all of our successful bids at this bid opening which exceed the total of $_____ or ____ contracts and hereby authorize the Department to determine which bids to disqualify, based on this limit."

20-06 NONRESPONSIVE BIDS.

a. A bid shall be rejected as nonresponsive if it:

(1) Is not properly signed by an authorized representative of the bidder and in a legally binding manner;

(2) Contains unauthorized additions, conditional or alternative bids, or other irregularities that make the bid incomplete, indefinite, or ambiguous;

(3) Includes a reservation of the right to accept or reject any award, or to enter into a contract pursuant to an award, except for an award limitation under Subsection 20-05;

(4) Fails to include an acceptable bid guaranty with the bid;

(5) Is materially unbalanced

(6) Fails to meet any other material requirement of the Invitation To Bid; or

(7) Fails to include a materially complete Certification of Buy American Compliance (Form 25D-151 or Form 25D-152), except on wholly state-funded projects.

b. A bid may be rejected as nonresponsive, in the Department's discretion, if it:

(1) Is not typed or completed in ink;

(2) Fails to include an acknowledgement of receipt of each addendum by assigned number and date of issue; or

(3) Is missing a bid price for any pay item, except when alternate pay items are authorized.

20-07 BID GUARANTY. Bids shall be accompanied by a bid guaranty in the amount specified on the Invitation To Bid. The guaranty shall be unconditionally payable to the State of Alaska and shall be in the form of an acceptable paper Bid Bond (Form 25D-14), an electronic bid bond acceptable to the Department and verified through its online bidding service, a certified check, a cashier's check, or a money order.

The surety of a Bid Bond may be any corporation or partnership authorized to do business in Alaska as an insurer under AS 21.09. A legible power of attorney shall be included with each paper Bid Bond (Form 25D-14).

An individual surety will not be accepted as a bid guaranty.

20-08 RESERVED.

20-09 DELIVERY OF BIDS. Bids shall be submitted electronically through the online bidding service, or shall be submitted in a sealed envelope. When bids are submitted in a sealed envelope, the envelope shall clearly indicate its contents and the designated address, as specified on the Invitation to Bid. Bids for other work may not be included in the envelope. In the event of a bid delay, electronic bidders that have already submitted their bid prior to the bid delay must resubmit their bid utilizing all Bid Forms EBSX Files or their bid will not be received.

The Department will not accept a bid submitted by email or fax unless specifically called for in the Invitation to Bid.

20-10 WITHDRAWAL OR REVISION OF BIDS. Manual Bids may be withdrawn or revised in writing delivered by mail, fax, or email, provided that the designated office receives the withdrawal or revision before the deadline stated in the in the Invitation To Bid. Withdraw requests must be signed and submitted by the bidder's duly appointed representative who is legally authorized to bind the bidder. Revisions shall include both the modification of the unit bid price and the total modification of each item modified but shall not reveal the amount of the total original or revised bids.

Electronic Bids may be withdrawn or resubmitted through the online bidding service. Revisions to electronic bids delivered by mail, fax, or email will not be permitted. If electronic bid withdrawal is unsuccessful, electronic bids may be withdrawn in writing delivered by mail, fax, or email provided that the designated office receives the withdrawal before the deadline stated in the Invitation To Bid. Written withdrawal requests must be signed and submitted by the bidder's duly appointed representative who is legally authorized to bind the bidder.

20-11 PROTEST OF INVITATION TO BID. An interested party, as defined in AS 36.30.699, may protest an Invitation to Bid before the bid opening according to AS 36.30.560 and AS 36.30.565. Submit a protest to the Contracting Officer.

20-12 ADDENDA REQUIREMENTS. The Department will issue addenda if it determines, in its discretion, that clarifications or changes to the Contract documents or bid opening date are needed. The Department may send addenda by any reasonable method such as fax, email, or may post the addenda on its website or online bidding service. Unless picked up in person or included with the bid documents, addenda or notice that an addendum has been issued will be addressed to the individual or company to whom bidding documents were issued and sent to the email address or fax number on the plan holders' list. Notwithstanding the Department's efforts to distribute addenda, bidders are responsible for ensuring that they have received all addenda affecting the Invitation To Bid. Bidders must acknowledge all addenda on the Bid Forms, by fax, or by email before the deadline stated in the Invitation to Bid.

20-13 RECEIPT AND OPENING OF BIDS. The Department will only consider bids, revisions, and withdrawals received before the scheduled deadline stated in the Invitation to Bid.

The Department will assemble, open, and publicly announce timely-received bids at the time and place indicated in the Invitation to Bid, or as soon thereafter as practicable. The Department is not responsible for prematurely opening or failing to open bids that are improperly addressed or identified.

20-14 RESPONSIBILITY OF BIDDERS. The Department may find a bidder is nonresponsible for any one of the following reasons, but is not limited in its responsibility analysis to the following factors:

- **a.** Evidence of bid rigging or collusion;
- **b.** Fraud or dishonesty in the performance of previous contracts;
- **c.** More than one bid for the same work from an individual, firm, or corporation under the same or different name;
- **d.** Unsatisfactory performance on previous or current contracts;
- **e.** Failure to pay, or satisfactorily settle, all bills due for labor and material on previous contracts;
- **f.** Uncompleted work that, in the judgment of the Department, might hinder or prevent the bidder's prompt completion of additional work, if awarded;
- **g.** Failure to reimburse the state for monies owed on any previous contracts;
- **h.** Default under previous contracts;
- **i.** Failure to submit evidence of registration and licensing;

j. Failure to comply with any qualification requirements of the Department;

k. Engaging in any activity that constitutes a cause for debarment or suspension under the State Procurement Code (AS 36.30) or submitting a bid during a period of debarment;

l. Failure to satisfy the responsibility standards set out in state regulations;

m. Lack of skill, ability, financial resources, or equipment required to perform the contract; or

n. Lack of legal capacity to contract.

Nothing contained in this section deprives the Department of its discretion in determining the lowest responsible bidder.

20-15 FOREIGN TRADE RESTRICTION. The Contractor by submission of an offer and/or execution of a contract, certifies that it:

a. Is not owned or controlled by one or more citizens or nationals of a foreign country included in the list of countries that discriminate against U.S. firms published by the Office of the United States Trade Representative (USTR);

b. Has not knowingly entered into any contract or subcontract for this project with a contractor that is a citizen or national of a foreign country on said list, or is owned or controlled directly or indirectly by one or more citizens or nationals of a foreign country on said list; and

c. Has not procured any product nor subcontracted for the supply of any product for use on the project that is produced in a foreign country on said list.

Unless the restrictions of this clause are waived by the Secretary of Transportation according to 49 CFR 30.17, no contract shall be awarded to a contractor who is unable to certify to the above. If the Contractor knowingly procures or subcontracts for the supply of any product or service of a foreign country on the said list for use on the project, the FAA may direct, through the Department, cancellation of the contract at no cost to and with no damages available from the Department or the Federal government.

The Contractor shall incorporate this provision for certification without modification in each contract and in all lower tier subcontracts. The Contractor shall require subcontractors to provide immediate written notice to it if the subcontractor learns that its certification was erroneous, or has become erroneous, by reason of changed circumstances. The Contractor may rely upon the certification of a prospective subcontractor unless it has knowledge that the certification is erroneous.

The Contractor shall provide immediate written notice to the Department if the Contractor learns that its certification or that of a subcontractor was erroneous when submitted or has become erroneous by reason of changed circumstances.

This certification is a material representation of fact upon which reliance was placed when making the award. If it is later determined that the Contractor or subcontractor knowingly rendered an erroneous certification, the FAA may direct, through the Department, cancellation of the contract or subcontract for default at no cost to, and with no damages available from, the Department or the Federal Government.

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

This certification concerns a matter within the jurisdiction of an agency of the United Stated of America and the making of a false, fictitious, or fraudulent certification may render the maker subject to prosecution under Title 18, United States Code, Section 1001.

20-16 ELECTRONIC MAIL. Within its submitted bid, a bidder must include a current electronic mail (email) address of bidder's representative who possesses authority to receive, process, and respond to Department emails regarding the advertised project.

The Department may send notices and information to a bidder by using the furnished email address of the bidder's authorized representative.

A bidder shall notify the Department if the bidder requests the Department to send email notices or information to an address different from the email address initially provided in its bid forms. The bidder shall notify the Department of such change by sending a request in writing to the Contract's point of contact identified on the Invitation to Bid that is signed by a representative who is authorized and empowered to legally bind the bidder.

Delivery of an email sent by the Department is complete upon receipt in the addressee's email account. An email sent after 4:30 pm shall be deemed to have occurred at the opening of business on the next working day.

If needed, the Department may demonstrate proof of email delivery by affidavit or certification that includes the following:

a. The date and time that the Department sent the email message;

b. The email address from which the Department sent the message;

c. The name and email address to which the Department sent the message;

d. A statement that the Department sent the email message and that the person signing the affidavit or certification believes the transmission to have been complete and without error; and

e. An attached copy of the subject email.

20-17 MANDATORY POST-AWARD CONFERENCE. There will be a mandatory post-award conference held in Kongiganak prior to the Contractor beginning work. The Contractor is required to attend the post-award conference. All costs incurred by the Contractor to attend this conference, including air transportation, are at the Contractor's expense. The Department will schedule the post-award conference and notify the Contractor at least 7 days prior to the conference date. The Department is not liable for delays or rescheduling of the post-award conference due to unforeseen circumstances. The proposed agenda for the conference is attached as Appendix J and identifies information the Contractor will be required to present.

SECTION 30
AWARD AND EXECUTION OF CONTRACT

30-01 CONSIDERATION OF BIDS. After the bids are opened and read, the bids will be mathematically checked and compared on the basis of the sum of the products of the bid schedule quantities and the unit bid prices. The unit bid prices govern if there is an error in extending the unit bid prices, or in totaling the extensions, or if an extension is missing. The results of the bid comparisons will be made available to the public as soon as practicable.

Until the Award, the Department may reject any or all bids, waive minor informalities or advertise for new bids without liability to any bidder if the Department, in its discretion, determines that to do so is in the best interests of the state.

A bidder may request withdrawal of a bid after opening and before the Award only according to AS 36.30.160(b) and State procurement regulations. Submit the request to the Contracting Officer.

An interested party, as defined in AS 36.30.699, may protest a proposed Award of contract as per AS 36.30.560 and AS 36.30.565. Submit the protest to the Contracting Officer.

WHOLLY STATE-FUNDED PROJECTS. On wholly state-funded projects, determination of the low bidder will include bidder preferences as required under AS 36.30.321, according to subsections a. – c. below. Alaska Bidder Preference, Alaska Veteran Preference, and Alaska Product Preference are not applicable on projects with federal funding.

a. Alaska Bidder Preference: A bidder claiming this preference shall provide with their bid an Alaska Bidder Preference Certification, certifying they qualify as an Alaska bidder eligible for Alaska Bidder Preference according to AS 36.30.

If the bidder qualifies as an Alaska Bidder, a five percent (5%) preference will be applied to the price of the bid. "Alaska bidder" means a person who:

(1) holds a current Alaska business license;

(2) submits a bid for goods, services, or construction under the name appearing on the person's current Alaska business license;

(3) has maintained a place of business within the state staffed by the bidder or an employee of the bidder for a period of six months immediately preceding the date of the bid;

(4) is incorporated or qualified to do business under the laws of the state, is a sole proprietorship and the proprietor is a resident of the state, is a limited liability company organized under AS 10.50 and all members are residents of the state, or is a partnership under former AS 32.05, AS 32.06, or AS 32.11 and all partners are residents of the state; and

(5) If a joint venture, is composed entirely of ventures that qualify under (1) through (4), above.

b. Alaska Veteran Preference: A bidder claiming this preference shall provide an Alaska Veteran Preference Certification, certifying they qualify as an Alaska bidder eligible for Alaska Veteran preference according to AS 36.30.

If a bidder qualifies as an Alaska bidder and is a qualifying entity, an Alaska Veteran Preference of five percent shall be applied to the bid price. The preference may not exceed $5,000 (AS 36.30.321). A “qualifying entity” means a:

(1) sole proprietorship owned by an Alaska veteran;

(2) partnership under AS 32.06 or AS 32.11 if a majority of the partners are Alaska veterans;

(3) limited liability company organized under AS 10.50 if a majority of the members are Alaska veterans; or

(4) corporation that is wholly owned by individuals, and a majority of the individuals are Alaska veterans.

A preference under this section is in addition to any other preference for which the bidder qualifies.

To qualify for this preference, the bidder must add value by the bidder itself actually performing, controlling, managing and supervising a significant part of the services provided or the bidder must have sold supplies of the general nature solicited to other state agencies, governments, or the general public.

An Alaska veteran is a resident of Alaska who:

(1) served in the Armed forces of the United States, including a reserve unit of the United States armed forces; or the Alaska Territorial Guard, the Alaska Army National Guard, the Alaska Air National Guard, or the Alaska Naval Militia; and

(2) was separated from service under a condition that was not dishonorable.

c. Alaska Product Preference: A bidder claiming this preference shall complete and sign the Alaska Product Preference Worksheet, according to the worksheet instructions, and submit the completed worksheet with their bid.

Except for timber, lumber and manufactured lumber products used in the construction project under AS 36.30.322(b), an Alaska products preference will be given as required under AS 36.30.326 - 36.30.332 when the bidder designates the use of Alaska products.

If the successful bidder/contractor proposes to use an Alaska product and does not do so, a penalty will be assessed against the successful bidder/contractor according to AS 36.30.330(a).

Each Alaska product declared on the Alaska Product Preference Worksheet must have an "Approval" date on the Alaska Product Preference Program List, that is on or before the bid opening date for this contract, and that does not expire before the bid opening date for this contract.

30-02 SUBCONTRACTOR LIST. The apparent low bidder shall submit a completed Subcontractor List, Form 25D-5, within five working days following receipt of written notification by the Department that it is the low bidder.

An apparent low bidder who fails to submit a completed Subcontractor List form within the time allowed will be declared nonresponsible and may be required to forfeit the bid security. The Department will then consider the next lowest bidder for award of the Contract.

If a bidder fails to list a subcontractor, or lists more than one subcontractor for the same portion of work, and the value of that work is in excess of one-half of one percent of the total bid amount, the bidder agrees to perform that portion of work without a subcontractor and represents that it is qualified to perform that work.

A bidder who lists as a subcontractor another contractor who, in turn, sublets the majority of the work required under the Contract, violates this subsection.

On federal-aid projects, subcontractors must obtain an Alaska business license and certificate of contractor registration prior to award of the Contract.

On wholly state-funded projects, all subcontractors listed by the Contractor shall have a valid Alaska business license and a valid certificate of registration as a contractor, as defined in AS 08.18, at the time the bid is opened. If a subcontractor listed by the Contractor does not have a valid business license and

certificate of registration at the time the bid is opened, the Contractor shall replace the subcontractor with a subcontractor that had a valid Alaska business license and a valid certificate of registration as a contractor under AS 08.18 at the time the bid was opened.

A bidder or Contractor may, without penalty, replace a listed subcontractor who:

a. Fails to comply with licensing and registration requirements of AS 08.18;

b. Fails to obtain a valid Alaska business license;

c. Files for bankruptcy or becomes insolvent;

d. Fails to execute a subcontract for performance of the work for which the subcontractor was listed, and the bidder acted in good faith;

e. Fails to obtain bonding acceptable to the Department;

f. Fails to obtain insurance acceptable to the Department;

g. Fails to perform the subcontract work for which the subcontractor was listed;

h. Must be replaced to meet the bidder's required state or federal affirmative action requirements;

i. Refuses to agree or abide with the bidder's labor agreement; or

j. Is determined by the Department to be not responsible.

In addition to the circumstances described above, a Contractor may in writing request permission from the Department to add a new subcontractor or replace a listed subcontractor. The Department will approve the request if it determines in writing that allowing the addition or replacement is in the best interest of the State.

A bidder or Contractor shall submit a written request to add a new subcontractor or replace a listed subcontractor to the Contracting Officer a minimum of five working days before the date the new subcontractor is scheduled to begin work on the construction site. The request must state the basis for the request and include supporting documentation acceptable to the Contracting Officer.

If a bidder or Contractor violates this subsection, the Contracting Officer may:

a. Cancel the Contract after Award without any damages accruing to the Department; or

b. After notice and a hearing, assess a penalty on the bidder or Contractor in an amount not exceeding 10 percent of the value of the subcontract at issue.

30-03 AWARD OF CONTRACT. The Department will award the Contract to the lowest responsible and responsive bidder unless it rejects all bids. The Department will notify all bidders in writing via email, fax, or U.S. Mail of its intent to award.

The Department will notify the successful bidder in writing of its intent to award the Contract and request that certain required documents, including the Contract Form, bonds, insurance and, except on wholly state-funded projects, a completed Form 25D-159 (Certification for Tax Delinquency and Felony Convictions) be submitted within the time specified. The successful bidder's refusal to sign the Contract and provide the requested documents within the time specified may result in cancellation of the notice of intent to award and forfeiture of the bid security.

If an award is made, it will be made as soon as practicable and usually within 40 days after bid opening. Award may be delayed due to bid irregularities or a bid protest, or if the award date is extended by mutual consent. Bids shall be valid for 120 days after bid opening, and may be extended by mutual consent.

For AIP contracts, no award shall be made until the FAA has concurred in the Department's recommendation to make such award and has approved the Department's proposed contract to the extent that such concurrence and approval are required by 49 CFR Part 18.

30-04 RETURN OF BID GUARANTY. The Department will return bid guaranties, other than bid bonds:

a. To all except the two lowest responsive and responsible bidders, as soon as practicable after the opening of bids; and

b. To the two lowest responsive and responsible bidders immediately after Contract award.

30-05 PERFORMANCE AND PAYMENT BONDS. The successful bidder shall furnish all required Performance and Payment Bonds on forms provided by the Department for the sums specified in the Contract. If no sum is specified, the successful bidder shall comply with AS 36.25.010. The Surety on each bond may be any corporation or partnership authorized to do business in the state as an insurer under AS 21.09 or two individual sureties approved by the Contracting Officer.

If individual sureties are used, two individual sureties must each provide the Department with security assets located in Alaska equal to the penal amount of either the performance bond or the payment bond. Any costs incurred by the Contractor and the individual Surety are subsidiary and shall be borne by the Contractor or the individual Surety. In no event will the Department be liable for these costs.

Individual sureties shall provide security by one, or a combination, of the following methods:

a. **Escrow Account.** An escrow account with a federally insured financial institution, in the name of the Department. Acceptable securities include, but are not limited to, cash, treasury notes, bearer instruments having a specific value, or money market certificates.

b. **Irrevocable Letters of Credit.** Irrevocable letters of credit with a financial institution approved by the Contracting Officer, with the Department named as beneficiary.

c. **Cashiers or Certified Check.** A cashier's check or certified check made payable to the State of Alaska issued by financial institutions approved by the Contracting Officer.

These bonds and security assets, as applicable, shall remain in effect for 12 months after the date of final payment or, if longer, until all obligations and liens under this Contract are satisfied, including, but not limited to, obligations under Subsection 70-19.

The Department may, in its discretion, notify the bonding company or Surety of any potential default or liability.

The Contractor shall substitute, within five working days, another bond or surety acceptable to the Department if an individual Surety or the Surety on any bond furnished in connection with the Contract:

a. Becomes insolvent or is declared bankrupt;

b. Loses its right to do business in any state affecting the work;

c. Ceases to meet Contract requirements;

d. Fails to furnish reports of financial condition upon request; or

e. Otherwise becomes unacceptable to the Department.

When approved by the Contracting Officer, the Contractor may replace:

a. An individual surety with a corporate surety; or

b. Posted collateral with substitute collateral.

Failure to maintain the specified bonds or to provide substitute bonds when required under this section may be grounds for withholding contract payments until substitute bonding is obtained, and may, in the Department's discretion, be grounds for declaring the Contractor in default.

30-06 INSURANCE REQUIREMENTS. The Contractor shall provide evidence of insurance with an insurance carrier or carriers satisfactory to the Department covering injury to persons and property suffered by the State of Alaska or by a third party as a result of operations under this contract by the Contractor or by any subcontractor. The Contractor's insurance shall provide protection against injuries to all employees of the Contractor and the employees of any subcontractor engaged in work under this Contract. All insurance policies shall be issued by insurers that (i) are permitted to transact the business of insurance in the State of Alaska under Title 21 of the Alaska Statutes and (ii) have a financial rating acceptable to the Department. A certificate of insurance must be furnished to the Department prior to award. The certificate of insurance must provide for notice of cancellation or non-renewal in accordance with policy provisions.

Where specific limits and coverages are shown, it is understood that they shall be the minimum acceptable. The requirements of this subsection shall not limit the Contractor's indemnity responsibility under Subsection 70-13. Additional insurance requirements specific to this contract are contained in the Special Provisions, when applicable.

The Contractor shall maintain the following policies of insurance with the specified minimum coverages and limits in force at all times during the performance of the Contract:

a. Workers' Compensation: as required by AS 23.30.045, for all employees of the Contractor engaged in work under this Contract. The Contractor shall be responsible for Workers' Compensation Insurance for any subcontractor who performs work under this Contract. The coverage shall include:

(1) Waiver of subrogation against the state;

(2) Employer's Liability Protection at $500,000 each accident/each employee and $500,000 policy limit;

(3) "Other States" endorsement if the Contractor directly utilizes labor outside of the State of Alaska;

(4) United States Longshore and Harbor Workers' Act Endorsement, whenever the work involves activity over or about navigable water; and

(5) Maritime Employer's Liability (Jones Act) Endorsement with a minimum limit of $1,000,000, whenever the work involves activity from or on a vessel on navigable water.

b. Commercial General Liability: on an occurrence policy form covering all operations, including contractual liability and products-completed operations, with combined single limits not less than:

(1) $1,000,000 Each Occurrence;

(2) $1,000,000 Personal Injury;

(3) $2,000,000 General Aggregate; and

(4) $2,000,000 Products-Completed Operations Aggregate.

c. Automobile Liability: covering all vehicles used in Contract work, with combined single limits not less than $1,000,000 each occurrence.

d. **Umbrella Coverage:** for Contract amounts over $5,000,000 not less than $5,000,000 umbrella or excess liability. Umbrella or excess policy shall include products-completed operations coverage and may be subject to $5,000,000 aggregate limits. Further, the umbrella or excess policy shall contain a clause stating that it takes effect (drops down) in the event the primary limits are impaired or exhausted.

e. **Builder's Risk Insurance:** coverage on an "All Risk" completed value basis for any building that is part of the work, including "quake and flood", and all materials, supplies, and equipment that are intended for specific installation in the Project while such materials, supplies and equipment are located at the project site, in transit from port of arrival to project site and while temporarily located away from the project site.

The State of Alaska shall be named as an additional insured on policies required by paragraphs **b** thru **d** above. All of the above insurance coverages shall be considered to be primary and non-contributory to any other insurance carried by the State of Alaska, whether through self-insurance or otherwise.

In any contract or agreement with subcontractors performing work, the Contractor shall require that all indemnities and waivers of subrogation it obtains, and any stipulation to be named as an additional insured it obtains, shall also be extended to waive rights of subrogation against the State of Alaska and to add the State of Alaska as an additional named indemnitee and as an additional insured.

The apparent low bidder shall furnish evidence of insurance to the Department before award of the Contract. The evidence shall be issued to the Department and shall be either a certificate of insurance or the policy declaration page with all required endorsements attached and must:

~~d.~~**f.** Denote the type, amount, and class of operations covered;

~~e.~~**g.** Show the effective (and retroactive) dates of the policy;

~~f.~~**h.** Show the expiration date of the policy;

~~g.~~**i.** Include all required endorsements;

~~h.~~**j.** Be executed by the carrier's representative; and

~~i.~~**k.** Provide that the Department shall receive written notice of cancellation or non-renewal in accordance with policy provisions. If a certificate of insurance, include the following statement:

"This is to certify that the policies described herein comply with all aspects of the insurance requirements of Kongiganak Airport Improvements Project No. CFAPT00433. The insurance carrier agrees that it shall notify the Engineer, in a written notice, and in accordance with the policy provisions, before cancellation of any coverage or reduction in any limits of liability."

The Department's acceptance of deficient evidence of insurance does not constitute a waiver of Contract requirements.

Failure to maintain the specified insurance or to provide substitute insurance if an insurance carrier becomes insolvent, is placed in receivership, declares bankruptcy, or cancels a policy may be grounds for withholding Contract payments until substitute insurance is obtained, and may, in the Department's discretion, be sufficient grounds for declaring the Contractor in default.

30-07 EXECUTION AND APPROVAL OF CONTRACT. The successful bidder shall execute and return the Contract Form and all other required documents to the Department within the time specified, or within 15 days after receipt by the bidder if no time is specified. A contract is awarded only after it has been signed by the Contracting Officer.

30-08 FAILURE TO EXECUTE CONTRACT. If the successful bidder fails to appropriately execute and return the Contract Form and other documents within time specified, as required above, the Department may cancel the intent to award and keep the bid guaranty. The Department will then, in its discretion, award the Contract to the next lowest responsive and responsible bidder or readvertise the work.

30-09 ORAL STATEMENTS. The written terms of the Contract are binding. No oral statement of any person shall, in any manner or degree, modify or otherwise affect, change, or amend the terms of the Contract.

30-10 INTEGRATED CONTRACT. This Contract is an integrated document and contains the complete agreement and understanding of the parties. There are no unwritten agreements or understandings between the parties. Changes ordered or agreed upon, Directives given, or Equitable Adjustments issued under this Contract, and all other matters affecting the Contract, must be in writing in order to be binding and effective.

30-11 ESCROW OF BID DOCUMENTATION. Furnish a legible copy of the Bid documentation and an affidavit, as instructed in writing by the Contracting Officer. Bid documentation consists of written documentation of quantity takeoffs, construction schedules on which the bid is based, cost estimates, rates of production and progress, assumptions, calculations, quotes from subcontractors and suppliers, and information used to prepare the Bid for this project.

Obtain and furnish the same level of bid documentation for each subcontractor, supplier or fabricator with a subcontract or agreement exceeding $200,000, regardless of tier. Seal each entity's documentation in separate envelopes, labeled with the entity's name and address, submission date, and project name and number. Include a cover letter or quote signed by a responsible party.

Meet the following requirements:

a. Submitting Bid Documentation. Place bid documentation in a sealed container clearly marked "Bid Documentation" and labeled with the bidder's name and address, submission date, and project name and number. Deliver the sealed container to the Department designated document depository for safekeeping.

b. Affidavit. Submit directly to the Contracting Officer a signed and certified affidavit attesting that

(1) the affiant has examined the bid documentation and that it includes all documents used to prepare the bid,

(2) the sealed container contains all bid documentation submitted,

(3) the escrow materials were relied on to prepare the bid, and

(4) should a dispute arise, the Contractor's rights to use bid preparation documentation other than those in escrow are waived.

c. Access and Use of Escrow Documents. The bid documentation will remain in escrow, without access by either party, except as otherwise provided herein. In the event the Contractor (1) provides notice of intent to claim, (2) a claim, (3) a contract change order, or (4) initiates contract related litigation, the Department may obtain copies of the bid documentation as provided herein.

Both parties will submit to the Depository and copy to each other a list of personnel that are authorized to access the escrow documents. Use forms provided by the Depository.

Upon request the Depository will set the time and place for access to escrow documents, will monitor the escrow documents review, and will arrange for a method of copying escrow documents. Access to escrow documents shall require at least 5 days advance written notice so that the other

party has the opportunity to witness the escrow review, examination and use. There is no requirement that both parties witness the escrow document review, but if one party is absent then the review must occur in the presence of a neutral third party observer to be designated by the Depository.

Notwithstanding paragraph five below, the Department will be allowed: to make copies of escrow documentation (whether hard copy, electronic, or otherwise); to use and review copies consultants directly involved in the subject dispute.

Distribution is not authorized except as related to resolution of a dispute. The Department will be allowed to incorporate pertinent copies as supporting documentation in significant contract change orders, contractual disputes, and the settlement of disputed claims.

The Department is not liable for any Contractor costs associated with escrow review and use.

d. Failure to Provide Bid Documentation. Refusal or failure to provide bid documentation or affidavit renders the bid non-responsive. Failure or refusal to provide subcontractor bid documentation will result in subcontract disapproval.

e. Confidentiality of Bid Documentation. Materials held in escrow are the Contractor's property. Except as otherwise provided herein, the escrow materials cannot be released without the Contractor's approval.

f. Cost and Escrow Instruction. The Department pays to store escrowed materials and instructs the depository regarding escrow.

g. Payment. Include within the overall Contract bid price costs to comply with this subsection.

h. Return of Escrow Documentation. The original escrow documents will be returned to the Contractor once litigation is concluded, outstanding claims are resolved, the Contractor has completed the Contract, and the Department receives an executed Contractor's Release (Form 25D-117) with no exceptions listed.

SECTION 40
SCOPE OF WORK

40-01 INTENT OF CONTRACT. The intent of the Contract is to provide for the construction and completion of every detail of the described work. The Contractor shall furnish all labor, material, supervision, equipment, tools, transportation, supplies, and other resources required to complete the work in the time specified and according to the Contract. The Contractor is responsible for the means, methods, techniques, sequence or procedures of construction, safety, quality control, and to perform or furnish the work in accordance with the contract documents.

The Contractor is responsible for the means, methods, techniques, sequence, and procedures of construction, safety, and quality control, and is responsible to perform and furnish the work in accordance with the Contract documents and any applicable federal, state, and local laws, rules, regulations, and ordinances.

40-02 CHANGES.

a. Within Contract Scope. The Engineer may order changes within the general scope of the Contract at any time, and without notice to sureties, including altering, ordering additions to, or ordering deletions of quantities of any item or portion of the work. These changes shall be made by a written Change Order and shall not invalidate the Contract or release the sureties.

(1) If the change does not materially differ in character or unit cost from specified Contract work, the Contractor shall perform the work at the original contract measurement methods and prices, subject to the provisions of Subsection 90-04.

(2) If the change is materially different in character or unit cost from that specified in the Contract, a new Contract Item will be established, and an equitable adjustment to Contract price and Contract time shall be calculated by one of the following methods:

(a) The Engineer and Contractor agree upon an adjustment to Contract price and Contract time, and the Engineer issues a change order for the described work;

(b) The Engineer requires the Contractor to proceed with the described work, with an adjustment to contract price and contract time, calculated by time and materials basis under Subsection 90-05, and the Engineer issues a change order for the work. The Contractor shall keep complete daily records of the cost of such work; or

(c) The Engineer may issue a unilateral Change Order requiring the Contractor to proceed with the work with an adjustment to the payment amount or Contract time based on the Engineer's estimate of reasonable value. The Contractor shall keep complete daily records of the cost of such work.

(3) If the Engineer eliminates a Contract item, the Contractor shall accept compensation under Subsection 90-09.

b. Outside Contract Scope. Changes determined to be outside the general scope of the Contract shall be made only by Supplemental Agreement issued according to AS 36.30 and the State's procurement regulations. Additional bonding or insurance may be required.

c. Cost and Pricing Data. Before a Change Order or Supplemental Agreement covering work for which there is no established Contract price will be written, the Contractor shall submit detailed cost or pricing data regarding the changed work. The cost or pricing data shall include an itemization of production rates and all costs including labor, materials, and equipment required for the work. The Contractor shall certify that the data submitted are, to the best of its knowledge and belief, accurate, complete, and current as of a mutually agreed date and that the data will continue to be accurate and complete during the performance of the changed work.

d. Time Analysis. Before a Change Order or Supplemental Agreement that adds or subtracts time from the Contract will be written, the Contractor shall provide an analysis and documentation demonstrating changes to controlling items of work that affect Contract time. The Contractor shall certify that the data submitted are, to the best of its knowledge and belief, accurate, complete, and current as of a mutually agreed date and that the data will continue to be accurate and complete during the performance of the changed work.

40-03 DIFFERING SITE CONDITIONS. If, during the progress of the work, a differing site condition is discovered, the party discovering the differing site condition shall promptly notify the other party in writing of the specific differing conditions. The written notification shall occur before the site is further disturbed and before the affected work is performed. A differing site condition is defined as:

a. Subsurface or latent physical conditions at the site, differing materially from those shown in the Contract documents, that could not have been discovered by a careful examination of the site; or

b. Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract.

When the Contractor is the discovering party, failure of the Contractor to give the Engineer prompt written notice of the alleged differing site condition as required under this section constitutes a waiver of any future claim arising from or relating to the alleged differing site condition.

Unless otherwise directed by the Engineer, the Contractor shall leave the affected area undisturbed and suspend work in that area until the Engineer investigates the conditions.

The Engineer will notify the Contractor of the determination whether or not an adjustment of the contract is warranted. If the Engineer finds that such conditions differ materially and increase or decrease the cost of, or the time required for, performance of the Contract, the Engineer will prepare a Change Order for an Equitable Adjustment to the Contract. The Contractor shall cooperate with the Engineer's preparation of the Change Order, and submit data for actual costs and time to perform differing site work according to Subsection 40-02.

The Change Order will provide an equitable adjustment to Contract price and Contract time, as agreed, to perform the work under a differing site condition. The Change Order will not include expected reimbursement, or anticipated profits suffered or claimed, for the work affected by the differing site condition.

If the Contractor and the Engineer are unable to reach an agreement concerning the alleged differing site condition, the Contractor may file a claim under Subsection 50-17.

The Contractor shall keep accurate and detailed records of the actual cost of the work done as a result of the alleged differing site condition and shall allow the Engineer access to those records. Failure to keep records, to provide the Engineer with access to those records, or to give the notice required above will bar any recovery for the alleged differing site condition.

40-04 USE OF MATERIALS FOUND ON THE WORK. Before using borrow, the Contractor shall utilize Useable Excavation to construct the embankment layer on the project. Useable Excavation is material encountered within the lines and grades of the project that is determined suitable by the Engineer under P-152-2.3, Suitable Material. For excavating the Useable Excavation and constructing the embankment with Useable Excavation, the Contractor shall be paid only the unit bid price for excavation. Hauling, placing, compacting and other activities required to construct the embankment with Useable Excavation shall be subsidiary to excavation, and the Contractor shall not be paid additional sums for those activities. The Engineer may approve the use of borrow when Useable Excavation is not available.

The Engineer may authorize the Contractor to use the Useable Excavation for Contract items other than construction of embankment, and the Contractor shall be paid both for the excavation of the Useable

Excavation and for the other Contract Item for which it is acceptably used. If this action results in a shortage of embankment material:

a. The Contractor shall replace the Useable Excavation used for Contract items other than embankment, on a yard for yard basis with borrow acceptable to the Engineer; and

b. This replacement shall be at the Contractor's expense and at no additional cost to the Department. The Contractor shall pay any royalties required for the borrow.

The Contractor shall not excavate or remove any material that is within the project limits but outside the lines and grades, without written authorization from the Engineer.

In the event the Contractor has processed material from state-furnished sources in excess of the quantities required for performance of the Contract, the Department may retain possession of the surplus processed materials, including any waste material produced as a by-product, without obligation to pay the Contractor for processing costs. When the surplus materials are in a stockpile, the Engineer may direct the Contractor to leave the materials in the stockpile, level the stockpile(s) or remove the materials and restore the premises to a satisfactory condition at no additional cost to the Department.

The Contractor may temporarily use material from a structure that is designated to be removed to erect a new structure, but shall not cut or otherwise damage such material without the Engineer's approval.

40-05 MAINTENANCE OF TRAFFIC. It is the explicit intention of the Contract that the safety of aircraft, the public, the airport's equipment and personnel, and the Contractor's equipment and personnel, shall be the most important consideration. It is understood and agreed that the Contractor shall provide for the free and unobstructed movement of aircraft in the air operations areas of the airport, except as specifically provided in this Contract or in the SPCD, with respect to its own operations and the operations of all its subcontractors. It is further understood and agreed that the Contractor shall provide for the uninterrupted operation of visual and electronic signals (including power supplies thereto) used in the guidance of aircraft, whenever the airport is open to the arrival or departure of aircraft as detailed on the plans, CSPP, and SPCD.

With respect to the Contractor's own operations and the operations of all the Contractor's subcontractors, the Contractor shall provide marking, lighting, and other acceptable means of identifying: personnel; equipment; vehicles; storage areas; and any work area or condition that may be hazardous to the operation of aircraft, fire-rescue equipment, maintenance vehicles, or support vehicles at the airport.

When the Contract requires the maintenance of vehicular traffic on an existing roadway, the Contractor shall keep such roadway open to all traffic, and shall provide such maintenance as may be required to accommodate traffic and to keep the roadway smooth and even. The Contractor shall furnish, erect, and maintain barricades, warning signs, flaggers, and other traffic control devices in reasonable conformity with the *Manual on Uniform Traffic Control Devices for Streets and Highways* (published by the United States Government Printing Office) and the *Alaska Traffic Manual Supplement*, unless otherwise specified by the Department. The Contractor shall also construct and maintain in a safe condition any temporary connections necessary for ingress to and egress from abutting property or intersecting roadways, and as required in Subsection 50-13.

The Contractor shall make their own estimate of all labor, materials, equipment, and incidentals necessary for providing the maintenance of aircraft and vehicular traffic as specified in this subsection.

The cost of maintaining the aircraft and vehicular traffic specified in this subsection shall not be measured or paid for directly, but shall be subsidiary to the various contract items, except when pay items are included in the bid schedule that directly pay for traffic control measures. The traffic control measures included for payment will be specifically described under those items.

40-06 REMOVAL OF EXISTING STRUCTURES. The Contractor shall leave in place, work around and protect from damage existing structures encountered within the project lines and grades; unless such existing structures are to be removed, demolished, relocated, or salvaged.

Should the Contractor encounter an existing structure (above or below ground) in the work for which the disposition is not indicated on the Plans, the Contractor shall notify the Engineer prior to disturbing such structure. The Engineer will determine the disposition of existing structures so encountered according to the provisions of the contract.

The cost of working around and protecting existing structures, or removing existing structures including landfill waste fees, shall not be measured or paid for directly, but shall be subsidiary to the various contract items.

Structures that may be encountered within the project lines and grades shall be utilized in the work, and shall remain the property of the owner when so utilized in the work, unless otherwise indicated in the Contract.

40-07 CLEANUP. The Contractor shall remove all rubbish, solid waste, temporary structures, excess materials, and equipment from the project site, from state owned materials sources, and from all work areas before project completion, or seasonal suspension of construction activities.

SECTION 50
CONTROL OF WORK

50-01 AUTHORITY OF THE ENGINEER. The Engineer has immediate charge of the engineering details of the project and is responsible for Contract administration. The Engineer has authority to reject defective material and suspend work not performed in accordance with the Contract. The Engineer has authority to accept completed work, issue Directives, Interim Work Authorizations, and Change Orders, and recommend Contract payments.

The Engineer will decide all questions about the quality and acceptability of the materials furnished and whether the work performed by the Contractor was in accordance with the Contract, the Contractor's rate of progress, Contract interpretation and all other questions relating to Contract compliance.

The Engineer has authority to suspend work for reasons listed under Subsection 80-06. If the suspension is to protect the traveling public from imminent harm, the Engineer may orally order the suspension of work. Following an oral order of suspension, the Engineer will promptly give written notice of suspension to the Contractor. In other circumstances, the Engineer will give the Contractor written notice of suspension before suspension of work. A notice of suspension will state the defects or reasons for a suspension, the corrective actions required to stop suspension, and the time allowed to complete corrective actions. If the Contractor fails to take the corrective action within the specified time, the Engineer may:

a. Suspend the work until it is corrected; and

b. Employ others to correct the condition and deduct the cost from the Contract amount.

The Engineer may, at reasonable times, inspect any part of the plant or place of business of the Contractor or any subcontractor that is related to Contract performance, including private or commercial plants, shops, offices, or other places of business.

The Engineer may audit all books and records related to performance of the Contract, whether kept by the Contractor or a subcontractor, including cost or pricing data submitted under Subsection 40-02.

50-02 PLANS AND WORKING DRAWINGS. The Department shall provide the Contractor at least two full size sets of the conformed Plans and Contract including Special Provisions. If cross-sections are available, one set will be provided if requested in writing by the Contractor. The Contractor shall keep a complete set of these documents available on the project site at all times.

The Contractor shall supplement structure plans with working drawings that include all details that may be required to adequately control the work and that are not included in the Plans furnished by the Department. The Contractor shall not perform work or order materials until the working drawings for such work, or for changes, are approved by the Engineer. The Engineer's approval of working drawings or changes shall not be deemed a determination that the working drawings or changes comply with federal, state or local laws, rules, regulations and ordinances. It is Contractor's duty to insure the working drawings comply with the Contract and any applicable federal, state or local laws, rules, regulations, and ordinances.

The Contractor shall submit to the Engineer for approval any required preliminary detail or working drawings. The project name and number shall be stated in the title block for all drawings, as shall the state bridge number, when applicable. The Contractor shall submit drawings in either an electronic or paper format that is acceptable to the Engineer. When paper copies are submitted, provide three sets.

The Contractor shall submit drawings to the Engineer in time to allow for review and correction before beginning the work detailed in the drawing. The Engineer shall return one set of these drawings, either approved or marked with corrections to be made, and shall retain the other sets. The Engineer's approval of working drawings does not change the Contract requirements or release the Contractor of the responsibility for successful completion of the work.

The Contractor is responsible for the accuracy of dimensions and details and for conformity of the working drawings with the Plans and Specifications. The Contractor shall indicate clearly on the working drawings any intended deviations from the Plans and Specifications and itemize and explain each deviation in the Contractor's transmittal letter. The Engineer may order the Contractor to comply with the Plans and Specifications at the Contractor's sole expense if the approved working drawings deviate from the Plans and Specifications and the Contractor failed to itemize and explain the deviations in the Contractor's transmittal letter.

Once the Contractor receives approval of the working drawings, the Contractor shall furnish to the Engineer:

a. Enough additional copies to provide eight approved sets of prints;

b. One set of reproducible transparencies (polyester film); and

c. If requested, an electronic file in AutoCAD drawing interchange format (.DXF).

The Contractor shall include the cost of furnishing all working drawings in the Contract price.

50-03 CONFORMITY WITH PLANS AND SPECIFICATIONS. Work performed and materials furnished shall conform to the Plans, Specifications and approved Working Drawings, and be within specified tolerances. When tolerances are not specified, the Engineer will determine the limits allowed in each case.

All work or material not conforming to the Plans, Specifications, and approved Working Drawings is considered unacceptable unless the Engineer finds that reasonably acceptable work has been produced. In this event, the Engineer may allow non-conforming work or material to remain in place, but at a reduced price. The Engineer will document the basis of acceptance and payment by Change Order, unless the contract specifies a method to adjust the price of that item.

The failure of the Department to strictly enforce the Contract in one or more instances does not waive its right to do so in other or future instances.

50-04 COORDINATION OF PLANS, SPECIFICATIONS, AND SPECIAL PROVISIONS. These Standard Specifications, Plans, Special Provisions, and all supplementary documents are essential parts of the Contract. They are intended to complement each other and describe and provide for a complete project. A requirement occurring in one is as binding as if occurring in all.

~~In case of conflict, calculated dimensions will govern over scaled dimensions. In the event that any of the following listed contract documents conflict with another listed contract document, the order of precedence is (with **a.** having precedence over **b.**, and **b.** having precedence over **c.**, etc.):~~

~~**a.** Special Provisions~~

~~**b.** Plans~~

~~**c.** Standard Specifications~~

~~**d.** Materials testing standards~~

~~**e.** FAA Advisory Circulars~~

This contract may include two different sets of specifications and plans. Except for specific items of work specified under specification section S-142, one set of specifications and plans will apply to work outside the building boundary line and the second set of specifications and plans will apply to work within the building boundary line. The building boundary line is defined in Subsection 10-03.

For work within the building boundary line and above the bottom of the footing, unless otherwise specified under item S-142, the Contractor shall perform the work according to the building technical specifications, and payment for the work will be included in the building schedule of values. For work outside the building

boundary line or below the bottom of the footing, the Contractor shall perform the work according to the contract unit prices for the work involved.

For work outside of the building boundary line, in case of a conflict calculated dimensions govern over scaled dimensions, and large scale details govern over small scale details. In the event that any of the following listed contract documents conflict with another listed contract document, the order of precedence is (with **a.** having precedence over **b.**, and **b.** having precedence over **c.**, etc.):

a. Contents of Addenda
b. Special Provisions
c. Plans
d. Standard Specifications
e. Materials testing standards
f. FAA Advisory Circulars

For work within the building boundary line, in case of a conflict calculated dimensions govern over scaled dimensions, and large scale details govern over small scale details. In the event that any of the following listed contract documents conflict with another listed contract document, the order of precedence is (with **a.** having precedence over **b.**, and **b.** having precedence over **c.**, etc.):

a. Contents of the Addenda
b. Special Provisions or Supplementary Conditions
c. General Contract Provisions
d. Schedules or lists of items required for the completion of the project, such as equipment, finishes, doors, or materials, in specifications or plans
e. Building Technical Specifications
f. Plans (Drawings) (with (1) having precedence over (2), (2) having precedence over (3) etc.)
  (1) Architectural drawings
  (2) Structural drawings
  (3) Mechanical drawings
  (4) Electrical drawings
  (5) Other drawings

The Contractor shall not take advantage of any apparent error or omission in the Contract documents. The Contractor may not base a claim for additional compensation or Contract time on a patent error, omission, or conflict in the Contract documents. The Contractor shall notify the Engineer immediately of any apparent errors or omissions in the Contract documents. The Engineer will make any corrections or interpretations necessary to fulfill the intent of the Contract.

50-05 COOPERATION BY CONTRACTOR. The Contractor shall give the work the constant attention necessary for its progress, and shall cooperate fully with the Engineer, Department staff, and other contractors in every way possible.

Either the Contractor's Superintendent or an acting Superintendent with authority to represent and act for the Contractor shall be available within the proximity of the project whenever work is occurring. The Contractor shall employ, as its agent, a competent superintendent thoroughly experienced in the type of work being performed and capable of reading and thoroughly understanding the Plans and Specifications. The Contractor shall provide 24-hour contact information for the Superintendent. The Contractor shall ensure that the superintendent is available at all times to receive and execute Directives and other instructions from the Engineer, to supervise workers and to coordinate the work of subcontractors. The Contractor shall give the superintendent full authority to supply the resources required. The Contractor shall furnish superintendence regardless of the amount of work sublet.

50-06 UTILITIES.

a. Bid Considerations. Bidders shall include in their bid the cost of:

(1) Providing uninterrupted operation of all visual and electronic signals, including power supplies and Lighting used in the guidance of aircraft, except as specified in the CSPP and SPCD;

(2) All utility work that is specified in the Contract as work to be performed by the Contractor;

(3) Working around or through all permanent and temporary utilities shown on the Plans, in both their present and adjusted positions;

(4) Accommodating the removal, adjustment, or relocation of utilities shown on the Plans by entities other than the Contractor;

(5) Construction and removal of temporary utilities, to provide temporary utility service during the construction or repair of a permanent utility; and

(6) Other utility work not specifically identified as compensable in Subparagraph d Compensation.

The Department will show the approximate locations of utilities it knows to be within the work zone on the Plans. Bidders shall expect that the location, elevation and nature of utilities may vary from what is shown on the Plans and shall factor those contingencies into the bid price. Additional utilities may exist that are not shown on the Plans. Compensation related to utilities not shown on the plans will only be available according to Subparagraph d Compensation.

When an entity other than the Contractor is to remove, adjust, or relocate any utility, or perform other utility related work within the project boundaries, the applicable completion dates or specific calendar days to complete the removal, adjustment, relocation, or other utility related work may be stated in the Special Provisions. If no date is stated in the Special Provisions, the Contractor shall work cooperatively with the utility owner during the Project.

b. Cooperation with Utility Owners. The Contractor assumes the obligation of coordinating their activities with utility owners, and shall cooperate with utility owners to facilitate removal, adjustment, or relocation operations, avoid duplication of work, and prevent unnecessary interruption of services. When a utility owner is identified in the Contract as being responsible for removing, adjusting, or relocating a utility, the Contractor shall give the utility owner 15 days advance written notice regarding the dates when the utility owner is required to begin and end operations.

The Contractor shall cooperate with utility owners to determine a utility progress schedule for all parties' utility work. The Contractor shall submit the schedule to the Engineer before beginning that portion of utility work. The Contractor shall update the utility progress schedule monthly and shall note time delays and their cause.

Utility owners are not required to work in more than one location at a time, and shall be allowed to complete a specific section of work prior to commencing another section. Utility owners will not normally perform adjustment or relocation of underground utilities when the ground is frozen. Utility owners may prohibit the Contractor, through the Engineer, from working near utilities when the ground is frozen.

The Department has sole discretion to grant permits for utility work within the state right-of-way. The Contractor shall allow parties with utility permits to work and make excavations in the project**.**

If utility owners do not complete their work in a timely manner, the Engineer may direct the Contractor to temporarily relocate the utilities, to construct new utilities, or to make necessary repairs to complete the utility work.

c. Utility Work. The Contractor shall:

(1) Make all necessary arrangements with utility owners to locate all utilities that may be within an area of work before excavation in that area, according to AS 42.30.400;

Request locates from all utilities having facilities in the area a minimum of seven (7) days prior to excavation. Utility company telephone numbers are as follows:

Locate Call Center 278-3121 (Anchorage) or 800-478-3121 (Statewide). The locate call center will contact the following utilities directly:

Not Applicable

Contact the following utilities directly:

Puvurnaq Power Company
907-557-5614

Request **Puvurnaq Power Company** inspection of the installed facilities 14 calendar days in advance of the date when the facility will be completed. **Puvurnaq Power Company** will complete the inspection within 14 calendar days of this date.

Prior to project substantial completion, provide temporary electric service to structures shown on the plans and pay periodic electric bills.

After project substantial completion, transfer periodic electric bills to the following:

(a) Snow Removal Equipment Building(s):
Alaska Department of Transportation and Public Facilities
Building Maintenance
Attention Mr. Al Gilbert, Superintendent (MS 2529)
P.O. Box 196900
Anchorage, AK 99519-6900
Phone (907)269-5983

(b) Electrical Enclosure for Runway Lighting System(s):
Alaska Department of Transportation and Public Facilities
Southwest M&O District
Attention Mr. Jeff Doerning, Superintendent (MS 2525)
P.O. Box 196900
Anchorage, AK 99519-6900
Phone (907)269-0754

(Submit applications to **Puvurnaq Power Company** for permanent power and copy ADOT/PF addresses under a) and b) above.

(2) Provide right-of-way staking and construction staking with lines and grades before excavation in that area;

(3) Prevent damage to utilities or utility property within or adjacent to the project;

(4) Carefully uncover utilities where they intersect the work;

(5) Immediately stop excavating in the vicinity of a utility and notify the Engineer and the utility owner if an underground utility is discovered that was not field marked or was inaccurately field marked;

(6) Promptly notify the utility owner, the Engineer, and the Airport Manager in the event of accidental interruption of utility service, and cooperate with the utility owner and the Engineer until service is restored;

(7) Take all precautions necessary to protect the safety of workers and the public when performing work involving utilities;

(8) Follow an approved TCP;

(9) Keep the length of open trench excavation to a minimum, backfill trenches as work is completed;

(10) Cover open trenches with metal plates capable of bearing traffic where traffic will cross trenches;

(11) Maintain continuous utility service and install temporary utility systems where needed;

(12) Ensure all excavation conforms to AS 42.30.400 – 42.30.490;

(13) Ensure all excavation and utility work conforms to excavation requirements in 29 CFR 1926, Subpart P, and confined space requirements in 29 CFR 1926.21(b)(6);

(14) Ensure all work undertaken near energized high voltage overhead electrical lines or conductors conforms to AS 18.60.670, AS 18.60.675, AS 18.60.680 or other applicable law;

(15) Ensure all work undertaken near energized high voltage underground electric lines or conductors conforms to all applicable laws and safety requirements of the utility owner;

(16) When required by the utility owner, provide for a cable watch of overhead power, underground power, telephone, and gas;

~~**(16)**~~**(17)** Provide a safety watch when working within 10 feet of an overhead power line;

~~**(17)**~~**(18)** Obtain plan approval from the local fire authority, and provide for the continued service of fire hydrants, before working around fire hydrants;

~~**(18)**~~**(19)** Do all pressure testing or camera testing required to verify utility acceptance in a timely manner; and

~~**(19)**~~**(20)** Coordinate the Storm Water Pollution Prevention Plan (SWPPP) (Item P-641) with their work and the utility companies' work.

d. Compensation.

(1) Except as otherwise specifically provided in this Subparagraph d, no equitable adjustment will be paid by the Department:

(a) Due to any variations in location, elevation, and nature of utilities shown on the Plans, or the operation of removing, adjusting, or relocating them;

(b) For any delays, inconvenience, or damage sustained as a result of interference from utility owners, interference from utilities, or interference from the operation of removing, adjusting, or relocating utilities; or

(c) For any adjustments or relocations of utilities requested for the Contractor's convenience.

(2) Except as otherwise specifically provided in this Subparagraph d, the Engineer will issue a Change Order with equitable adjustment if:

(a) Utilities not shown on the Plans require removal, adjustment, or relocation;

(b) Conflicts occur between utilities not shown on the Plans and other necessary work; or

(c) Conflicts due to the required elevation of a utility occur between new and existing utilities that are both shown on the Plans.

(3) When the Contractor damages utilities, the utility owner may choose to repair the damage or require the Contractor to repair the damage. When the Contractor damages utilities:

(a) No equitable adjustment will be paid by the Department, and the Contractor shall be solely responsible for repair costs and expenses, when:

1. The Contractor failed to obtain field locates before performing the work that resulted in the damage;

2. The utility was field located by the utility owner or operator, and the field locate is accurate within 24 horizontal inches if the utility is buried 10 feet deep or less, or the field locate is accurate within 30 horizontal inches if the utility is buried deeper than 10 feet;

3. The plan profile or the field locate does not indicate or inaccurately indicates the elevation of a buried utility;

4. The utility is visible in the field; or

5. The Contractor could otherwise reasonably have been aware of the utility.

(b) The Engineer will issue a Change Order with an equitable adjustment for the cost of repairing damage if:

1. The field locate by the owner or operator of a buried utility erred by more than 24 horizontal inches if the utility is buried 10 feet deep or less, or 30 horizontal inches if the utility is buried deeper than 10 feet;

2. The utility was not shown on the Plans or other Contract documents, and the Contractor could not reasonably have been expected to be aware of the utility's existence; or

3. The Contractor made a written request for a field locate according to AS 42.30.400, the utility owner did not locate the utility according to AS 42.30.410, and the Contractor could not reasonably have been expected to be aware of the utility's existence or location.

(4) If a delay is caused by a utility owner, is beyond the control of the Contractor, and is not the result of the Contractor's fault or negligence, the Engineer may issue a Change Order with an equitable adjustment to contract time, but no equitable adjustment will be made for the cost of delay, inconvenience or damage. Additional contract time may be granted if the cause of delay is because a utility owner is to perform utility work:

(a) By dates stated in the Special Provisions, and the utility work is not completed by the dates stated; or

(b) In cooperation with the Contractor and the utility owner does not complete the work in a timely manner, based on a written progress schedule agreed upon by the Contractor, the utility owner, and the Engineer.

(5) If the Engineer orders the Contractor to make necessary construction or repairs due to incomplete utility work by utility owners, the Contractor will be paid as specifically provided for in the Contract, or the Engineer will issue a Change Order with equitable adjustment.

e. **Cooperation with Airport Management and FAA.** The Contractor shall coordinate their activities and cooperate with the Airport Management and the FAA, and shall provide 45 days advance written notice to them before working on utilities in the Air Operations Area. All coordination with Airport Management and the FAA shall be through the Engineer. Refer to the CSPP for coordination requirements. The Contractor shall include and cooperate with Airport Management, the FAA, and the Engineer, in determining a utility progress schedule for work on the Airport Property.

The Contractor shall submit a written plan to repair damaged utilities to the Engineer, and shall follow the plan when repairing damaged utilities. The plan shall identify repair personnel or subcontractors. The Contractor shall not work on or adjacent to utilities unless repair personnel are available to repair damaged utilities. Personnel repairing utilities shall be licensed for the work required, and shall have the tools and material required to repair damaged utilities within the time limits required.

When damage affects, or may in the Engineer's opinion affect, the function of navigational or visual aids, the Contractor shall repair damage within two hours. When damage affects, or may in the Engineer's opinion affect, the function of utilities, the Contractor shall repair the damage within 24 hours.

50-07 COOPERATION BETWEEN CONTRACTORS. The Department may, at any time, contract for and perform other or additional work on or near the Project. The Contractor shall allow other contractors reasonable access across or through the Project.

The Contractor shall cooperate with other contractors working on or near the Project, and shall conduct work without interrupting or inhibiting the work of other contractors. All contractors working on or near the Project shall accept all liability, financial or otherwise, in connection with their Contract. No claim shall be made by the Contractor or paid by the Department for any inconvenience, delay, damage or loss of any kind to the Contractor due to the presence or work of other contractors working on or near the Project.

The Contractor shall coordinate and sequence the work with other contractors working within the same project limits. The Contractor shall properly join the work with work performed by other contractors and shall perform the work in the proper sequence to that of the others. The Contractor shall arrange, place, and dispose of materials without interfering with the operations of other contractors on the same project. The Contractor shall defend, indemnify and save harmless the Department from any damages or claims caused by inconvenience, delay, or loss that the Contractor causes to other contractors.

50-08 SURVEY CONTROL. The Department will provide sufficient horizontal and vertical control data to establish the planned lines, grades, slopes, shapes, and structures. The Contractor shall provide all additional survey work to maintain control during the project.

50-09 DUTIES OF THE INSPECTOR. The Department's inspectors are authorized to examine all work done and materials furnished, but cannot approve work or materials. Only the Engineer can approve work or materials. The inspectors can reject work or materials until any issues can be referred to and decided by the Engineer. The inspectors may not alter or waive any Contract requirements, issue instructions contrary to the Contract or act as foremen for the Contractor.

50-10 INSPECTION OF WORK. All materials and each part and detail of the work shall be subject to inspection by the Department for compliance with the Contract. The Contractor shall allow safe access to all parts of the work and provide information and assistance to the Engineer to ensure a complete and detailed inspection.

Any work done or materials used without inspection by an authorized Department representative may be ordered removed and replaced at the Contractor's expense, unless the Department failed to inspect after being given reasonable written notice that the work was to be performed.

The Contractor shall remove and uncover portions of finished work when directed. After inspection, the Contractor shall restore the work to Contract requirements. The cost to uncover and restore work shall be

at the Contractor's expense, except the Department will pay the cost to uncover and restore work if (1) an authorized Department representative had previously inspected the work or the Contractor had provided reasonable prior written notice that the work was to be performed and (2) the Department finds the uncovered work to be acceptable. If the Department finds the uncovered work to be unacceptable, the cost to correct the work, or remove and replace the work, shall be at the Contractor's expense.

Representatives of Contract funding agencies have the right to inspect the work. This right does not make that entity a party to the Contract and does not interfere with the rights of parties to the Contract.

The Department's observations, inspections, tests and approvals shall not relieve the Contractor from properly fulfilling its Contract obligations and performing the work according to the Contract. Work that has been inspected but contains latent or hidden defects shall not be deemed acceptable even though it has been inspected and found to be according to the Contract.

The State of Alaska Department of Labor may require electrical inspection of Public Structures. The Contractor shall request inspection by contacting the Electrical Inspector in Anchorage, Alaska, Phone (907) 269-4925. The Contractor shall request inspection a minimum of two weeks prior to the expected date of inspection being needed. If more than one item requires inspection, the Contractor shall submit a list to the Engineer and Electrical Inspector, with dates for all stages that requires inspection. The Department has no control over or responsibility for the timing of inspections by the Electrical Inspector.

50-11 REMOVAL OF UNACCEPTABLE AND UNAUTHORIZED WORK. All work that does not conform to the requirements of the Contract shall be deemed unacceptable by the Engineer, unless otherwise determined acceptable under Subsection 50–03. The Contractor shall correct, or remove and replace, work or material that the Engineer deems unacceptable, as ordered by the Engineer and at no additional cost to the Department.

The Contractor shall establish necessary lines and grades before performing work. Work done before necessary lines and grades are established, work done contrary to the Department's instructions, work done beyond the limits shown in the Contract, or any extra work done without authority, will be considered as unauthorized and shall not be paid for by the Department, and may be ordered removed or replaced at no additional cost to the Department.

If the Contractor fails to promptly correct, remove, or replace unacceptable or unauthorized work as ordered by the Engineer, the Engineer may employ others to remedy or remove and replace the work and will deduct the cost from the Contract payment.

50-12 LOAD RESTRICTIONS. The Contractor shall comply with all vehicle legal size and weight regulations of 17 AAC 25 and the *Administrative Permit Manual,* and shall obtain permits from the DOT&PF Division of Measurement Standards & Commercial Vehicle Enforcement before moving oversize or overweight equipment on a state highway.

The Engineer may permit oversize and overweight vehicle movements within the project limits provided the Contractor submits a written request and an acceptable Traffic Control Plan. No overloads will be permitted on a pavement, base or structure that will remain in place in the completed project. The Contractor shall be responsible for all damage done by their equipment due to overloads, and for damage done by a load placed on a material that is curing and has not reached adequate strength to support the load.

50-13 MAINTENANCE DURING CONSTRUCTION. The Contractor shall maintain the airport and related airport facilities located within the project from the date construction begins until the Contractor receives a letter of project completion. The Contractor shall maintain these areas continually and effectively on a daily basis, with adequate resources to keep them in satisfactory condition at all times. The Contractor shall maintain those areas outside the project that are affected by the work, such as haul routes, detour routes, structures, material sites, and equipment storage sites during periods of their use.

Do not place foreign objects and debris (FOD) or any debris capable of causing damage to aircraft landing gears or propellers or of being ingested in jet engines on surfaces in active aircraft movement areas. Ensure

that all loose material and debris has been removed from the sides of equipment and haul vehicles prior to travel on airport or road surfaces. Keep all active runway, taxiway, and apron areas free of materials spilled by your operations. Clean spilled materials off of closed runways, taxiways, or aprons prior to opening these areas to aircraft. If FOD is spilled on an active runway, taxiway, or apron, remove it immediately. The Engineer reserves the right to suspend all hauling operations until FOD is removed from active aircraft movement areas. Hauling time lost due to the suspended haul will not be considered reason to extend contract time or reason for a claim. The Engineer will allow hauling to continue when the spilled material is cleaned up to his satisfaction. FOD preventive measures and FOD cleanup of runways, taxiways, haul routes, and equipment is subsidiary to the contract and no additional payment will be made.

The Engineer may relieve the Contractor of this maintenance responsibility for specified portions of the project:

a. During a seasonal suspension of work. Approximately one month prior to seasonal suspension of work, the Contractor shall hold a preliminary meeting with the Engineer and Airport Management to outline the work the Contractor expects to complete before shut down and the condition the project is to be left in. The Contractor shall then schedule a field review for acceptance by the Department for winter maintenance. At the field review a punch list shall be prepared for implementation prior to acceptance. In order for the Contractor to be relieved of winter maintenance responsibility, the surface of all embankments shall be properly crowned for drainage, all edge lighting shall be in good working order, and all NAVAIDS installed by the Contractor shall first have been accepted by the FAA. After acceptance for winter maintenance and until the Contractor resumes construction operations, maintenance of the facility agreed upon will be the responsibility of the Department; or

b. Following partial completion (Subsection 50-14); or

c. Following project completion (Subsection 50-15).

The Department is responsible for routine snow removal and ice control only on those portions of the project that the Department accepts for maintenance.

The Contractor shall maintain previously constructed work until a subsequent course, layer, or structure covers that work. The Contractor shall repair damage done to the work as described in Subsection 70-15.

All costs of maintenance work shall be subsidiary to the prices bid on the various contract items, and the Contractor will not be paid an additional amount for such work.

If in the Engineer's opinion, the Contractor at any time fails to provide adequate maintenance, the Engineer will notify the Contractor of such noncompliance. The notification will specify the areas or structures for which there is inadequate maintenance, the corrective maintenance required, and the time allowed to complete corrective maintenance. If the Contractor fails to take the corrective action within the specified time, the Engineer may:

d. Suspend the work until corrective maintenance is completed;

e. Assess a traffic price adjustment against the Contract Amount when an adjustment rate is specified in the Contract; and

f. Employ others for corrective maintenance and deduct the cost from the Contract amount.

50-14 PARTIAL COMPLETION. The Contractor may submit a written request for partial acceptance of a substantially complete geographically separate portion of the project. The Engineer will accept the portion in writing before project completion and relieve the Contractor of further maintenance responsibility for the completed work, if the Engineer inspects the portion and finds that it is substantially complete to Contract requirements, and acceptance is in the best interest of the State.

Partial completion of the portion neither voids nor alters any Contract terms.

50-15 PROJECT COMPLETION. The Contractor shall notify the Engineer, in writing, upon substantial completion of all work provided for under the Contract. The Engineer will then schedule and conduct the final inspection. If the inspection discloses that any work is incomplete or unsatisfactory, the Engineer will give the Contractor a list of work items that must be completed or corrected to reach substantial completion and to reach final completion. The Contractor shall promptly complete or correct any work determined unsatisfactory by the final inspection and request a re-inspection.

The Engineer will identify the date of substantial completion in a letter of substantial completion. The letter of substantial completion will relieve the Contractor of further maintenance responsibility of the completed work. The letter of substantial completion will not stop Contract time or relieve the Contractor of the obligation to fully complete the work as required by the Contract specifications.

When all physical work and cleanup provided for under the Contract is found to be complete, the Engineer will issue a letter of project completion. Project completion stops the Contract time, but does not relieve the Contractor of any other Contract obligations.

50-16 FINAL ACCEPTANCE AND RECORD RETENTION. The Department will issue the letter of Final Acceptance after all of the following:

a. Project completion;

b. Receipt of all certificates, as-builts, warranties, and other required documents;

c. Receipt of the Contractor's Release, with no exceptions;

d. Certification of payment of payroll and revenue taxes by DOLWD and State Dept. of Revenue; and

e. Final payment under the Contract.

Final Acceptance will release the Contractor from further Contract obligations, except those:

a. Specified under Subsection 70-19;

b. Required by law or regulation; or

c. Continuing obligations established by provisions of this Contract, such as warranty, guaranty, indemnity, insurance, or bond.

The Contractor and the subcontractors shall maintain all books and records relating to performance of the Contract for three years after the date of final payment of the Contract and each subcontract.

50-17 CLAIMS. The Contractor shall notify the Engineer as soon as the Contractor becomes aware of any act or occurrence that may form the basis of a claim for additional compensation or an extension of Contract time or of any dispute regarding a question of fact or interpretation of the Contract. The Engineer has no obligation to investigate any fact or occurrence that might form the basis of a claim or to provide any additional compensation or extension of Contract time unless the Contractor notifies the Engineer in a timely manner of all facts the Contractor believes form the basis for the claim.

If the Contractor believes that he is entitled to an extension of Contract time, the Contractor must state the contract section on which the extension request is based, provide the Engineer with sufficient information to demonstrate that the Contractor has suffered excusable delay, and show the specific amount of time to which the Contractor is claiming entitlement. The Department will not grant an extension of Contract Time if the Contractor does not timely submit revised schedules in accordance with Subsection 80-03.

If the basis of claim or dispute is not resolved by agreement within seven days of the date the Engineer is notified by the Contractor, the Contractor shall within the next fourteen days submit a Contractor Intent to Claim (Form 25D-18) to the Engineer. Failure to submit a Contractor Intent to Claim as required under this section constitutes a waiver of any future claim arising from or relating to the alleged act or occurrence.

If the Contractor believes additional compensation or time is warranted, the Contractor shall immediately begin keeping complete, accurate, and specific daily records concerning every detail of the potential claim including actual costs incurred, and shall give the Engineer access to any such records and furnish the Engineer copies, if requested. Equipment costs must be based on the Contractor's internal rates for ownership, depreciation, and operating expenses and not on published rental rates. In computing damages, or costs claimed for a change order, or for any other claim against the Department for additional time, compensation or both, the contractor must establish actual damages based on internal costs for equipment, labor or efficiencies. Total cost, modified total cost or jury verdict forms of presentation of damage claims are not permitted. Labor inefficiencies must be shown to actually have occurred and can be proven solely based on job records. Theoretical studies are not a permissible means of showing labor inefficiencies. Home office overhead will not be allowed as a component of any claim against the Department.

The Contractor shall submit a written claim to the Contracting Officer within 90 days after the date the Contractor became aware of the basis of the claim or should have known of the basis of the claim, whichever is earlier. Any Claim not filed within this 90-day period will be deemed irrevocably waived by the Contractor, regardless of whether the requested relief is sought for the ultimate benefit of the Contractor or its subcontractor(s). The Contracting Officer will issue a written acknowledgement upon receipt of the claim.

The Contractor waives any right to claim if the Engineer was not notified properly or afforded the opportunity to inspect conditions or monitor actual costs or if the Claim is not filed on the date required.

a. The written Claim must include all of the following:

(1) The act, event, or condition giving rise to the claim;

(2) The Contract provisions that apply to the claim and that provide for the requested relief;

(3) The item or items of Contract work affected and how they were affected;

(4) The specific relief requested, including Contract time if applicable, and the basis upon which it was calculated;

(5) Revised progress schedules under Subsection 80–03; and

(6) A certification signed by the Contractor that to the best of the contractor's knowledge and belief, the data submitted is accurate, complete, and current and is the actual cost to the contractor or additional time for performing the additional work or supplying the additional materials.

b. The claim, in order to be considered, must show:

(1) That the Contractor suffered damages or delay;

(2) The damages or delay were caused by the act, event, or condition listed in the claim; and

(3) That the Contract entitled the Contractor for relief due to the act, event, or condition specified in the Claim.

The Department may request the Contractor to provide additional information relating to the claim at any time before issuing a decision. The Contractor shall provide the Department with the requested additional information within 30 days of receiving a request. Failure to furnish the additional information may be regarded as a waiver of the claim.

The Contracting Officer will issue a decision within 90 days of receipt of all information relating to the claim. The time for the Contracting Officer to issue a decision may be extended according to AS 36.30.620.

The Contracting Officer's decision is final and conclusive unless the Contractor delivers a notice of appeal to the Commissioner within 14 days of receipt of the decision. The Contractor shall also serve a copy of the notice of appeal on the Contracting Officer.

Appeals from a Contracting Officer's decision shall be decided according to the State Procurement Code's appeal procedures, including AS 36.30.625, AS 36.30.627, AS 36.30.630, and AS 36.30.631.

Criminal and civil penalties authorized under AS 36.30.687 (including, but not limited to, forfeiture of all claimed amounts) may be imposed on the Contractor if the Contractor makes or uses a misrepresentation in support of a claim, or defrauds or attempts to defraud the Department at any stage of prosecuting a claim under this Contract.

50-18 ONE YEAR WARRANTY. If the Department finds that an item of work in a building is defective within one year of the date of the Engineer's letter of substantial completion of the building, or any longer period of time as may be prescribed by regulatory requirements, or the contract documents, the Department will provide written notice to the Contractor of the defect. The Contractor shall promptly, without cost to the Department and according to the Department's written instructions, correct the defective work.

If the Contractor does not promptly comply with the terms of the instructions, or in an emergency where delay would cause serious risk of damage to property or persons, the Department may remove, repair, or replace the defective work. The Contractor shall reimburse the Department's direct, indirect, and consequential costs of such removal repair, or replacement.

SECTION 60
CONTROL OF MATERIALS

60-01 SOURCE OF SUPPLY AND QUALITY REQUIREMENTS. The Contractor shall furnish all materials required to complete the work except those specified to be furnished by the Department. The Contractor shall supply materials that are new and that meet Contract requirements. All manufactured materials shall be delivered and stored in their original containers and shall show the manufacturer's name, brand, and identifying number.

The Contractor shall furnish airport lighting equipment that conforms to the requirements of cited materials specifications. In addition, where an FAA specification for airport lighting equipment is cited in the Plans or Specifications, the Contractor shall furnish such equipment that is certified and listed under AC 150/5345-53, *Airport Lighting Equipment Certification Program*.

The Contractor shall notify the Engineer of proposed sources of materials at least 30 days before shipment, and shall submit to the Engineer and to the Department's State Materials Engineer a complete list of materials to be purchased from suppliers sufficiently in advance of fabrication or shipment to permit the Department to inspect the materials.

The Department's inspectors may inspect any materials, including those originating outside Alaska, at the supply source or other locations. Materials may be conditionally approved at the supply source or other location, but are subject to field inspection and may be ordered removed under Subsection 50-11 if they do not conform to Contract requirements. Inspectors are authorized to reject materials that do not conform to specifications until any issues can be referred to and decided by the Engineer. Inspectors will report their actions to the Engineer.

The Contractor shall submit a manufacturer's certificate of compliance for each item listed on the Material Certification List. The Engineer may authorize the use of materials based on a manufacturer's certificate of compliance, see Subsection 60-05. Materials incorporated into the project on the basis of a manufacturer's certificate of compliance may be tested at any time, whether in place or not, and, if they do not conform to Contract specifications, they may be rejected and ordered removed under Subsection 50-11.

The Engineer may authorize the use of materials listed in the Department's *Qualified Products List*. Materials incorporated into the project on the basis of the *Qualified Products List* may be tested at any time, whether in place or not, and, if they do not conform to Contract specifications, they may be rejected and ordered removed under Subsection 50-11.

The Contractor may request substitution of specified materials with equivalent materials. Requests for substitution shall be submitted to the Engineer, and shall include a manufacturer's statement that certifies, for each lot delivered:

a. Conformance to the specified performance, testing, quality or dimensional requirements; and

b. Suitability for the use intended in the Contract work.

When the Contractor makes an equivalent materials request related to any building material or building equipment included in the work, the Contractor shall certify in the request 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 for the same use as the specified material. The Contractor's request shall state:

a. Whether the evaluation, approval or use of the proposed substitute will delay substantial completion of the work;
b. Whether acceptance of the substitute will require changes in any of the contract documents, including the project schedule;
c. Whether incorporation or use of the substitute in connection with the work is subject to payment of any license fee or royalty;

d. All instances where the proposed substitute will be incorporated into the work;
e. The identity of the available maintenance, repair, and replacement service; and
f. An itemized estimate of all costs that will result directly and indirectly from acceptance of such substitution, including costs of installation and maintenance, repair, and replacement costs during the life cycle of the building.

The Engineer will determine the acceptability of a proposed substitute for use in the project. If a substitute is approved, a Change Order will be executed. The Department is never required to accept substitution. The Contractor shall not incorporate substitute materials into the project without written approval from the Engineer. The Engineer may test substitute materials at any time, whether in place or not, and, if the substitute materials do not meet Contract specifications, they may be rejected and ordered removed under Subsection 50-11.

60-02 MATERIAL SOURCES.

a. General. The Contractor shall:

(1) Utilize Useable Excavation according to Subsection 40-04 before using material sources listed in Subsection 60-02.d. When there is insufficient useable excavation furnish additional required materials from sources of the Contractor's choice, except that the Contractor shall use a mandatory source when identified in the Contract;

(2) Produce a sufficient quantity of materials meeting the specifications to complete the project;

(3) As a subsidiary cost: clear and grub, strip, drill and blast, excavate, crush, sort, blend, screen, wash, stockpile, haul, and rehandle material as needed to produce and deliver the specified product;

(4) Determine the type of equipment and methods to be used;

(5) Expect variations in material quality within the deposits, and procure material only from acceptable portions of the deposit, regardless of source ownership; and

(6) Prevent erosion, sedimentation, and pollution within a materials source.

The Contractor agrees that:

(7) The costs to explore and develop material sources, including all production effort, are subsidiary to the cost of providing the specified material;

(8) The Engineer may order the Contractor to procure material only from certain portions of the source and may reject material from other portions of the source that does not conform to the specifications; and

(9) All material required may not be procurable from any one source and the Contractor may need to change between sources. That contingency is to be factored into the unit bid price for the Contract Item.

b. Inspection and Acceptance. The Contractor shall perform sampling and testing during materials processing and placement according to its Quality Control Plan (Subsection 60-03.a.) and shall obtain acceptable material samples from locations designated within the source.

The Department will sample and test materials to determine the quality of the source, at its expense, as part of its Acceptance Testing (Subsection 60-03.b.). The Department will reject materials when the samples do not meet specifications. The Department may reject a proposed materials site when samples do not meet specifications.

c. Awareness Training. The operator of the Contractor's sand and gravel surface mine or other similar materials source shall provide Site-Specific Hazard Awareness Training in compliance with 30 CFR 46.11 for all the Engineer's personnel before beginning operations. All other workers shall be given training in compliance with 30 CFR 46 before exposure to mine hazards. The training must be offered at each surface mine that will be used to supply processed aggregates. A qualified person must provide the training. The training shall be according to the operator's written training plan approved by the Mine Safety and Health Administration, covering the following items:

(1) Site-specific health and safety risks;

(2) Recognition and avoidance of hazards;

(3) Restricted areas;

(4) Warning and evacuation signals;

(5) Evacuation and emergency procedures;

(6) Other special safety procedures; and

(7) A site tour.

The Contractor shall require the Engineer's personnel to sign the *Visitor's Log Book* upon completion of the training to indicate that training was provided. Training is a subsidiary cost.

d. Type of Sources.

When there is insufficient useable Excavation, as defined in Subsection 40-04, the Contractor shall supply additional required material from one or more of the following sources:

(1) Contractor-Furnished Sources. For a material source that is a commercial plant as defined in Subsection 80-01.d.(1) the Contractor shall:

(a) Acquire the necessary rights and permits to obtain material from a commercial plant;

(b) Pay as subsidiary costs all related costs to obtain and use material from the source; and

(c) Be solely responsible for the quality and quantity of materials.

For all Contractor-Furnished sources that are not a commercial plant, the Contractor shall:

(d) Acquire the necessary rights and permits to take materials from the sources including state-owned sources that are not under the Department's control;

(e) Pay as subsidiary:

(1) all related costs to obtain, develop, and use the sources, including but not limited to permit costs and mineral royalties;

(2) the material costs identified in the Material Sales Agreement you obtain for State owned sources where an existing or draft Material Sales Agreement is not included in the contract; and

(3) the material costs identified in the Material Sales Agreement for material obtained from State owned sources for which an existing or draft Material Sales Agreement is included in the contract;

(f) Be solely responsible for quality and quantity of materials; and

(g) Obtain all necessary rights, permits, and plan approvals before clearing or disturbing the ground in the material source. The contractor shall certify in writing to the Engineer that all permits and clearances relating to the use of the material source have been obtained prior to any clearing or ground disturbance in the materials source.

No equitable adjustment or other compensation will be made for any additional costs, including increased length of haul, if the Contractor:

(h) Chooses to change material sources for any reason;

(i) Is unable to produce a sufficient quantity or quality of materials from Contractor-Furnished sources; or

(j) Encounters unexpected, unforeseen, or unusual conditions within Contractor-Furnished sources.

(2) Mandatory Sources. The Department may identify material sources in the Contract from which the Contractor is required to take a specified quantity of material. No other source will be permitted for that portion of material unless prior approvals obtained from the Engineer. The Contract will specifically define these sources as Mandatory Sources and define rights and stipulations for each site. The Department will provide a materials report for these sources.

The Contractor acknowledges that samples from within a source may not be representative of the entire source. The Contractor must expect variations of quality and quantity within the source and shall factor that contingency into the unit bid price for the material. No equitable adjustment will be paid for variations encountered within the source.

When using a Mandatory Source, if it is found that the quality or quantity of material producible from the Mandatory Source does not meet project requirements and a change of source is necessary for that reason alone, a Change Order with equitable adjustment will be made.

(3) Designated Sources. The Department may identify material sources in the Contract which are available to the Contractor but which the Contractor is not required to use. The Contract will specifically define these sources as Designated Sources and define rights and stipulations for each site. The Department will provide a materials report for these sources.

The Contractor acknowledges that samples from within a source may not be representative of the entire source. The Contractor must expect variations of quality and quantity within the source and shall factor that contingency into the unit bid price for the material. No equitable adjustment will be paid for variations encountered within the source.

If the Contractor elects to use a Designated Source, and it is found that the quality or quantity of material producible from the Designated Source does not meet project requirements and a change of source is necessary for that reason alone, a Change Order with equitable adjustment will be made. If the Contractor chooses to change between or among sources for any other reason than quantity or quality of material, no equitable adjustment will be paid.

(4) Available Sources. The Department may identify other material sources that are available for use for the project by the Contractor. The Contract will specifically define these sources as Available Sources. The Department makes no guarantee as to quality or quantity of material in Available Sources. The Contractor is responsible for determining the quality and quantity of material, and if additional sources are needed. The Contractor shall be responsible for identifying the rights and stipulations for each site with the owner of the site.

When the Department furnishes copies of existing boring logs, test results, or other data in its possession concerning Available Sources, the Contractor is responsible for determining the

accuracy and completeness of this data, for any assumptions the Contractor makes based on this data, and for exploring all Available Sources to the Contractors satisfaction.

The Department makes no representation, guarantees, or warranty whatsoever, expressed or implied, as to:

(a) The quality or quantity of materials producible from an Available Source, even if such information is indicated in a Materials Report or Soils Investigation Report;

(b) Whether boring logs, test results or data reliably represent current existing subsurface conditions;

(c) Whether interpretations of the boring logs, test results, or other data are correct;

(d) Whether moisture conditions and indicated water tables vary from those found at the time borings were made;

(e) Whether the ground at the location of the borings was physically disturbed or altered after the boring was made; and

(f) The condition, materials, or proportions of the materials between borings, regardless of any subsurface information the Department may make available.

The availability of subsurface information from the Department shall not relieve the Contractor from any risks, or of any duty to make on-site examinations and investigations, or of any other responsibility under the Contract or as may be required by law.

No equitable adjustment will be made if the quality and quantity of material available from an Available Source is not as represented in any information provided by the Department, nor if a change of source is necessary for any other reason whatsoever. The use of Available Sources is entirely at the Contractor's option and the Contractor bears all risk associated with their decision to use an Available Source.

(5) Excluded Material Sources. Department owned, managed, or permitted material sources not identified in the Contract are excluded from use for the project. This exclusion does not prevent the Contractor from considering material sources as provided for under Subsection 60-02.d.(1) Contractor-Furnished Sources, nor does it prevent post-award consideration of other material sources as provided under Subsection 40-08.

e. Rights, Permits and Plan Approvals for Material Sources. Before disturbing the site of a material source, the Contractor shall acquire and pay for all necessary rights, permits and plan approvals indicated in this subsection and in subsection 70-02. For each material site the Contractor shall:

(1) Acquire approval for a Mining and Reclamation Plan (MRP) or receive an exemption, according to AS 27.19. The MRP shall include:

(a) Plan and cross-sectional views of the site;

(b) Applicable boundaries or property lines;

(c) Areas and depths to be developed;

(d) Locations of access roads, stripping, sorting, and waste piles, crushing and plant sites, stockpile sites, drainage features, erosion and pollution control features; and

(e) Condition the Contractor will leave the site after the materials extraction is completed, including reseeding.

(2) Submit a SWPPP as required by Item P-641.

f. Reclamation. After completing work in a materials source, the Contractor shall finish and grade work areas to a neat, acceptable condition according to the approved MRP. Reclamation of a Contractor-furnished source will be in accord with the Contractor's MRP.

60-03 TESTING AND ACCEPTANCE. Materials are subject to inspection and testing by the Department at any time before, during, or after they are incorporated into the project. Use of untested materials is at the Contractor's risk. The Contractor shall remove and replace unacceptable material according to Subsection 50-11.

a. QUALITY CONTROL. The Contractor is responsible for the quality of construction and materials used in the work. Quality control is process control, and includes all activities that ensure that a product meets Contract specifications. Contractor quality control is subsidiary to the applicable items unless a contract item for Quality Control is established on the bid schedule.

The Contractor shall implement a Quality Control Program in conformance with Section 100, Contractor Quality Control Program.

b. ACCEPTANCE TESTING. The Department has the exclusive right and responsibility for determining the acceptability of the construction and incorporated materials.

The Department will sample materials and perform acceptance tests at its expense. Copies of tests will be furnished to the Contractor upon request. When material is sampled by other than DOT&PF personnel or their agent(s), the sampling must be witnessed by, and possession of the sample immediately transferred to, DOT&PF personnel or their agent(s).

The Contractor shall not rely on the Department's acceptance testing for its quality control. The Department's acceptance testing is not a substitute for the Contractor's quality control. The Engineer may retest materials that have failed the Department's acceptance test, but is not required to do so.

Acceptance sampling and testing frequencies may be located in the Appendix to these Specifications, and are incorporated into the Contract.

60-04 PLANT INSPECTION. The Department may periodically inspect manufacturing methods, manufactured lots and materials at the source of production. The Department may approve, conditionally approve, or reject them.

The Contractor shall:

a. Notify the Department of the production and fabrication schedule at least 30 days before beginning work on any item requiring inspection, and notify the Department 48 hours before beginning production or fabrication;

b. Give the inspector full and safe access to all parts of the plant used to manufacture or produce materials; and

c. Cooperate fully and assist the inspector during the inspection.

Materials may be rejected if the Department requests a plant inspection and the materials are produced or fabricated without a plant inspection. The materials may be tested at any time before final acceptance, whether in place or not and whether approved at a plant inspection or not. If the materials do not meet Contract specifications, they may be rejected and ordered removed under Subsection 50-11. If rejected materials are incorporated into the project, the Department may require those materials to be removed and replaced at the Contractor's expense under Subsection 50-11.

60-05 CERTIFICATES OF COMPLIANCE. The submittal requirements of this subsection are in addition to the submittal requirements of Subsection 60-09 Buy American Steel and Manufactured Products.

The Engineer may authorize the use of certain materials or assemblies based on either a manufacturer's certificate of compliance or based on a Contractor's summary sheet with applicable documentation attached.

a. If by manufacturer's certification, the certificate must include the project name and number, the signature of the manufacturer, and must include information that clearly demonstrates the material or assembly fully complies with the Contract requirements.

b. If by Contractor's summary sheet, the summary sheet must include the project name and number, the signature of the contractor, and must include attached documentation that clearly demonstrates the material or assembly fully complies with the Contract requirements.

Electronic submittals that are submitted by email from the Contractor's email account are considered signed.

The Contractor shall submit additional certificates of compliance or test data if required by the Contract or by the Engineer. The Engineer may refuse permission to incorporate materials or products into the project based on a certificate of compliance that does not meet the Contract requirements.

60-06 STORAGE OF MATERIALS. Materials shall be stored to preserve their quality and fitness for the work, and so they can be readily inspected. Materials inspected before storage may be inspected again, before or after being incorporated into the project. The Contractor shall:

a. Use only approved portions of the project site for storage of materials and equipment or plant operations;

b. Provide any additional space needed for such purposes without extra compensation;

c. Restore Department-owned or controlled storage and plant sites to their original condition without extra compensation;

d. Obtain the landowner's or lessee's written permission before storing material on private property, and furnish copies of the permission to the Engineer, if requested; and

e. Restore privately owned or leased storage sites, without extra compensation from the Department, to their original condition or as agreed to between the Contractor and the private owner.

60-07 DEPARTMENT-FURNISHED MATERIAL. Material furnished by the Department will be made available to the Contractor at a state yard or delivered at the locations specified in the Special Provisions.

The Contractor shall include the cost of handling and placing all materials after they are delivered in the Contract price for the item in connection with which they are used. The Contractor is responsible for all material delivered to the Contractor. Deductions will be made from any monies due the Contractor to make good shortages and deficiencies from any cause whatsoever, for any damage that may occur after delivery, and for demurrage charges.

60-08 SUBMITTAL PROCEDURE. The Contractor shall complete a Submittal Register, and shall submit it to the Engineer on forms provided by the Department or similar forms of the Contractor's choice as approved by the Engineer. The intent of the Submittal Register is to provide a blueprint for the smooth flow of specified project documents. The Contractor shall fill it out sequentially by bid item and allow at least three spaces between bid items. The Submittal Register shall list all working drawings, schedules of work, and other items required to be submitted to the Department by the Contractor including but not limited to: Progress Schedule, anticipated dates of material procurement, SPCD, TCP, SWPPP, Quality Control Program, Utility Progress Schedule, Blasting Plan, Mining Plan, annual EEO reports, DBE payment documentation and subcontracts.

The Contractor shall submit materials (product) information to the Engineer for review, as required by the Contract.

Unless otherwise specified, provide all submittals in an electronic format acceptable to the Engineer.

If the Contract has a duration of 180 days or less, the Contractor shall, within fifteen days after the date of the Notice to Proceed, submit to the Department for review all submittals and the submittal register. If the Contract has a duration greater than 180 days, the Contractor shall, within fifteen days after the date of the Notice to Proceed, submit to the Department for review, an anticipated schedule for transmitting submittals.

Each submittal shall include a Submittal Summary sheet. The Contractor shall sign submittals and submit them to the Engineer. Electronic submittals that are submitted by email from the Contractor's email account are considered signed. The Department will return submittals to the Contractor as either: approved, conditionally approved with the conditions listed, or rejected with the reasons listed. The Contractor may resubmit a rejected submittal to the Engineer with more information or corrections. The Department's approval of a submittal in no way relieves the Contractor of its responsibility for the means, methods, techniques, sequence, and procedures of construction, safety, and quality control.

The Contractor shall be responsible for timely submittals. Failure by the Department to review submittals within 30 days or as otherwise provided in the applicable subsection may be the basis for a request for extension of Contract time but not for additional compensation.

Payment for a specific contract item will not be made until the Department has received the Submittal Register for all items and approved all required submittals for that specific contract item.

When material invoices, freight bills, and mill certificates are submitted, they shall provide sufficient information for the Engineer to identify: the date, supplier and origin of invoice (bill, certificate); project name and number where material will be incorporated; manufacturer, product number, quantity, cost and bid item.

60-09 BUY AMERICAN PREFERENCE.

a. GENERAL. Except on wholly state-funded projects, the Contractor shall comply with 49 USC Section 50101. The Contractor shall ensure that all steel and manufactured goods used on federally funded projects are wholly produced in the United States and are of 100% U.S. Materials, unless:

(1) The FAA has issued a waiver for the product;

(2) The product is listed as an Excepted Article, Material or Supply in Federal Acquisition Regulation subpart 25.108; or

(3) The product is included in the FAA Nationwide Buy American Waivers Issued list.

b. BID PROPOSAL. The bidder must complete and submit with their bid the Certificate of Buy American Compliance (Form 25D-151 or Form 25D-152) provided in the bid documents. The Department will reject as nonresponsive any bid that does not include a completed Certificate of Buy American Compliance.

c. WAIVER SUBMITTAL. The apparent low bidder who indicates they will request a Type 3 waiver on the Certificate of Buy American Compliance, must complete Form 25D-153 and associated documentation including Form 25D-155 and Form 25D-156. Submit Form 25D-153 and associated documentation within 5 working days after date of notification of apparent low bidder.

An apparent low bidder who fails to submit a completed Type 3 waiver form within the time allowed, must agree to perform the work without a waiver, or they may be declared nonresponsible and may be required to forfeit the bid guaranty. The Department will then consider the next lowest bidder for award of the Contract.

The bidder agrees to refrain from seeking a waiver request after award of the contract, unless extenuating circumstances emerge that the FAA determines justified.

If FAA approves a waiver request, the bidder agrees to provide products in accordance with the waiver. If FAA will not approve a waiver, the bidder agrees to furnish U.S. domestic product for products listed on the waiver request that the FAA rejects.

A successful bidder's refusal to sign the Contract due to denial of a waiver request, will be considered nonresponsible, and will be addressed in accordance with subsection 30-03 Award of Contract.

d. MATERIAL SUBMITTALS. During performance of the Contract, the Contractor must provide a Material Submittal for Buy American Compliance (Form 25D-154), from the supplier for each steel or manufactured good, prior to incorporating any steel or manufactured good into the project. The supplier certifying Form 25D-154 may be the original manufacturer, fabricator, vendor, or subcontractor; provided the supplier has sufficient control and knowledge of the manufacturing process to accept responsibility and certify full and complete conformance with 49 USC Section 50101. Provide mill certificates or other material documentation when required by the Engineer. False statements may result in criminal penalties prescribed under AS 36.30.687 and Title 18 USC Section 1001.

60-10 OPERATION AND MAINTENANCE MANUALS. The Contractor shall provide operation and maintenance manuals for equipment and systems incorporated in the work. The Contractor shall submit one set of all manuals 60 days prior to substantial completion for review by the Department. The Contractor shall make corrections noted by the Department, and submit 5 complete sets of manuals 14 days prior to substantial completion.

The Contractor shall submit the manuals in neatly bound hard cover loose-leaf three ring binders. Include project name, Contractor's/Subcontractor's name, address and telephone number on each cover. Prepare data in the form of an instruction manual with a table of contents and a tabbed fly leaf for each section.

The Contractor shall provide a separate section for each product or system installed which includes the following:

a. Description of each unit or system and the component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests. Systems shall include:

(1) Heating System

(2) Fuel Oil Storage and Supply System

(3) Runway Lighting System

b. Product data with each sheet marked to clearly identify the specific products, component parts, and data applicable to installation. Delete inapplicable information. Product data shall include:

(1) Lighting Fixtures

(2) Wiring Devices

(3) Electric Power Distribution Components

(4) Runway Lighting System Components

(5) Thaw Wire and Heat Trace System Components

c. Include drawings to supplement product data and illustrate relations of component parts of equipment and systems. Show control and flow diagrams. Provide copies of all approved shop drawings. Drawings shall include:

(1) Equipment Storage Building Plans

(2) Electrical Equipment Enclosure Plans

(3) Runway Lighting One-line Control and Power Diagrams

(4) Electric Power One-line Diagrams

(5) Electric Power Panel Directories

(6) Thaw Wire and Heat Trace Systems

d. Type text as required to supplement product data and show logical sequence of operations for each procedure, incorporating the manufacturer's instructions.

e. Operating procedures to include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include any special operating instructions. Include reprogramming instructions for all programmable equipment. Systems shall include:

(1) Runway Lighting System

(2) Heating System

(3) Fuel Oil Storage and Distribution System

f. Maintenance requirements and repair data. Include routine procedures. Provide a guide for troubleshooting, disassembly, repair, and reassembly. Provide alignment, adjusting, and checking instructions. Maintenance and repair data shall include:

(1) Heating System

(2) Fuel Oil Storage and Distribution System

g. Supplies and replacement parts. For each item of equipment and each system list names, addresses, and telephone numbers of subcontractors and suppliers. Provide local source of supplies and replacement parts with complete nomenclature and commercial number of replacement parts. Provide a copy of manufacturer's recommended spare parts list for applicable equipment. Provide data for:

(1) Lamps for Runway Lighting System

(2) Lamps for Lighting Fixtures

(3) Fuel Oil System

h. Warranties. Include copies of warranties.

i. Tests. Include logs of all tests performed.

60-11 ALASKA AGRICULTURAL/WOOD PRODUCTS. On wholly state-funded projects, agricultural/wood products harvested in Alaska shall be used pursuant to AS 36.15.050 and AS 36.30.322 whenever they are priced no more than seven percent above agricultural/wood products harvested outside the state and are of a like quality as compared with agricultural/wood products harvested outside the state.

The Contractor shall maintain records which establish the type and extent of agricultural/wood products utilized. When such products are not utilized, the Contractor shall document the efforts he made towards obtaining agricultural/wood products harvested in Alaska and include in this documentation a written statement that he contacted the manufacturers and suppliers identified on the Department of Commerce and Economic Development's list of suppliers of Alaska forest products concerning the availability of agricultural/wood products harvested in Alaska and, if available, the product prices. The Contractor shall complete this documentation at a time determined by the Contracting Officer.

The Contractor's use of agricultural/wood products that fail to meet the requirements of this Subsection shall be removed and replaced in accordance with Subsection 50-03, Conformity with Plans and Specifications.

60-12 PROHIBITION ON CERTAIN TELECOMMUNICATION AND VIDEO SURVEILLANCE SERVICES OR EQUIPMENT. On projects using federal funds, the Contractor shall comply with the requirements of 2 CFR 200.216, as amended effective August 13, 2020, Federal Register, Vol. 85, No. 157, 49506 – 49582, **Prohibition on certain telecommunication and video surveillance services or equipment.**

The Contractor shall submit documentation acceptable to the Department certifying it has not entered into a contract nor extended or renewed a contract to procure or obtain equipment, services, or systems that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system produced by:

a. Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities),

b. Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities).

c. Any entity that the Secretary of Defense, in consultation with the Director of the National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

The Contractor shall further certify that it has complied with the requirements of 2 CFR 200.216, as amended effective August 13, 2020, Federal Register, Vol. 85, No. 157, 49506 – 49582 and that it will continue to do so throughout the term of the Contract.

SECTION 70
LEGAL REGULATIONS AND RESPONSIBILITY TO PUBLIC

70-01 LAWS TO BE OBSERVED. The Contractor shall keep fully informed of, observe, and comply with all federal, state, and local laws, ordinances, and regulations, and all orders and decrees of bodies or tribunals having any jurisdiction or authority, that in any manner affect those engaged or employed on the work or which in any way affect the conduct of the work.

For any building included in the work, 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.

The Contractor and the Surety shall defend, indemnify, and hold harmless the state and its representatives against any claim or liability related to violations of any laws, ordinances, regulations, orders, decrees or permits by the Contractor, the Contractor's agents, the Contractor's employees, a subcontractor at any tier, or a supplier or service provider.

The Contractor has the affirmative duty to keep informed of and comply with all laws. The Contractor is not entitled to and shall not rely on any Department employee's interpretation, whether oral or written, of any law, ordinance, regulation, order, or decree, or any permit issued by an agency other than the Department.

The Contractor is responsible for conspicuously displaying required posters in an area readily accessible to workers.

a. For wholly state-funded projects, display all posters listed on the Department of Labor and Workforce Development website at http://labor.alaska.gov/lss/posters.htm.

b. For projects using federal funds, display posters required by law or funding agency including posters listed under Related Information on the FAA website http://www.faa.gov/airports/engineering.

70-02 PERMITS, LICENSES, AND TAXES. The terms, conditions, and stipulations in permits obtained either by the Department or by the Contractor are made a part of this Contract. Permits obtained by the Department for this project are attached to these Specifications as appendices. Contact names and phone numbers for permits obtained by the Department are shown on the individual permits. The Contractor shall obtain required building and fire safety permits, and pay required permit fees, except when the Department has already obtained the permits and attached them to the Contract.

The Department will:

a. Secure permits and licenses that the Department determines are required for the construction of the proposed project, and the use of mandatory sources, designated sources and designated waste disposal areas for the proposed project; and

b. Modify Department-acquired permits during the performance of the contract, if deemed necessary by the Engineer.

The Contractor shall:

c. Acquire any permits and licenses required to complete the project that are not acquired by the Department;

d. Provide qualified professionals to collect data or perform studies necessary to acquire permits for the use of sites not previously permitted;

e. Give all notices required for the prosecution of the work;

f. Abide by all permits and licenses whether acquired by the Department or by the Contractor;

g. Notify the Engineer promptly if any activity cannot be performed as specified in the permits, and cease conducting the activity until permit modifications or any required additional permits are obtained;

h. Obtain modifications to permits acquired by the Contractor;

i. Pay all charges, fees and taxes; and

j. Provide proof of payment of all taxes before the Department makes final payment.

k. Provide the information necessary to comply with the Alaska Department of Environmental Conservation, Alaska Pollutant Discharge Elimination System (APDES) to discharge stormwater from the construction site. Requirements for this permit are given under P-641, Erosion, Sediment, and Pollution Control.

The provisions of permits acquired by the Contractor, and of notices and information under this section does not shift or create responsibility for compliance with Federal or State law to the Department, or otherwise impose a duty for oversight or review.

In addition, before using an area on or off project site not previously permitted for use by the Contract, the Contractor shall:

l. Contact all government agencies having possible or apparent permit authority over that area;

m. Obtain all required permits, clearances, and licenses from those agencies;

n. Obtain permission from any property owners or lessees with an interest in the property; and

o. Provide all of the following to the Engineer:

(1) All permits or clearances necessary to use the site for its intended purpose(s);

(2) A written statement that all permits or clearances necessary have been obtained;

(3) Written evidence that the Contractor has contacted all of the relevant agencies and that no additional permits are required on the part of the Contractor, including at a minimum the name of the agency and staff person contacted, the date contacted, and result of coordination; and

(4) A plan that identifies how the site will be finally stabilized and protected.

The Engineer may reject a proposed site if the Contractor fails to provide any of the above information or to demonstrate that a proposed site can be finally stabilized to eliminate future adverse impacts on natural resources and the environment.

70-03 PATENTED DEVICES, MATERIALS AND PROCESSES. If the Contractor employs any design, device, material, or process covered by patent, trademark, or copyright, the Contractor shall obtain and provide the Engineer with a copy of a suitable legal agreement with the patentee or owner.

The Contractor and the Surety shall defend, indemnify, and hold harmless the state and its representatives and any affected third party or political subdivision from any claim, cause of action, and damages for infringement arising from or relating to the Contractor's use of a patented design, device, material, process, trademark, or copyright.

The Contractor has no right to use for its own purposes, any of the contract documents prepared by or for the Department. The Contractor shall not use any of the contract documents on extensions of the project,

or on work unauthorized by the Department, without written consent of the Department, in its sole discretion. If granted, ~~t. T~~he Department's consent is conditioned upon the Contractor:

a. Agreeing to indemnify, defend, and hold the state harmless for any claims arising from the reuse of the contract documents;
b. Presenting to the Department the written consent of the Project designer, for documents prepared by a design consultant; and
c. Presenting a certification from the designer, evidenced by application of new designer's seal, that the design is suitable for the proposed use.

70-04 WAGE RATES. The Contractor and all subcontractors shall pay the current prevailing rate of wages as per AS 36.05.010 and this Contract. On federally funded projects the Contractor and all subcontractors shall pay the higher of the appropriate wage rates published by the Alaska Department of Labor and the U.S. Department of Labor, for each individual job classification. The Contractor and all subcontractors shall file certified payroll with the Alaska Department of Labor and Workforce Development (DOLWD) and with the Engineer for all work performed on the project. Submit signed and certified payrolls electronically to the DOLWD and the Engineer.

Before beginning work the Contractor shall file a Notice of Work with DOLWD and pay all required fees. After finishing work the Contractor shall file a Notice of Completion with DOLWD and pay all additional fees required by increases in the Contract amount.

70-05 FEDERAL PROVISIONS. The Contractor shall:

a. Observe all federal laws, rules, regulations, and requirements applicable to the project; and

b. Allow appropriate federal officials access to inspect the work.

The federal government is not a party to the Contract. The Contractor agrees that federal inspections will not form the basis for any claim against the federal government or the State for interference with the rights of the Contract parties.

70-06 SANITARY, HEALTH, AND SAFETY PROVISIONS. The Contractor shall provide and maintain neat and sanitary accommodations for employees that meet all federal, state and local requirements.

The Contractor shall comply with federal, state, and local laws, rules, and regulations concerning construction safety and health standards, including U.S. Mine Safety and Health Administration rules when the project includes pit or quarry operations.

The Contractor shall not expose the public to, or require any workers to work under, conditions that are unsanitary, hazardous, or dangerous to health or safety.

The Contractor is responsible for ensuring all workers are adequately protected. The Contractor shall have a safety and health management program that complies with AKOSH requirements, and includes:

a. A worksite hazard analysis;

b. A hazard prevention and control plan including personal protective equipment and safe work procedures required for specific tasks;

c. New employee training and periodic worker training regarding safety and health;

d. Regular safety meetings with written documentation of attendance, safety topics discussed, worker safety complaints, and corrective actions taken; and

e. A designated safety officer, employed by the Contractor, who monitors the construction site and is responsible for implementing the safety and health management program.

The Contractor shall implement measures to comply with the following:

f. Executive Order 13513 – Federal leadership on reducing text messaging while driving, dated October 1, 2009, and DOT Order 3902.10 – Text messaging while driving, dated December 30, 2009; and

g. Alaska Statue 28.35.161 – Driving a motor vehicle with a screen device operating; unlawful installation of television, monitor, or similar device.

The Contractor and Surety shall defend, indemnify and hold harmless the State of Alaska from all claims, causes of action and judgments arising from or relating to the Contractor's failure to comply with any applicable federal, state or local safety requirement, regulation or practice, whether or not listed above.

70-07 ARCHAEOLOGICAL OR HISTORICAL DISCOVERIES. When the Contractor's operation encounters prehistoric artifacts, burials, remains of dwelling sites, paleontological remains, shell heaps, land or sea mammal bones, tusks, or other items of historical significance, the Contractor shall:

a. Immediately cease operations at the site of the find;

b. Immediately notify the Engineer of the find; and

c. Not disturb or remove the finds or perform further operations at the site of the finds until directed by the Engineer.

The Engineer will issue an appropriate Change Order if the Engineer orders suspension of the Contractor's operations or orders the Contractor to perform extra work in order to protect an archaeological or historical find.

70-08 PUBLIC CONVENIENCE AND SAFETY, AND RAILWAY PROVISIONS. The Contractor shall control its operations and those of its subcontractors and all suppliers, to assure the least inconvenience to the traveling public. Under all circumstances, safety shall be the most important consideration.

The Contractor shall maintain the free and unobstructed movement of aircraft, airport personnel and vehicular traffic in the AOA, except as specifically provided in this Contract. The Contractor's operations and those of its subcontractors and all suppliers, shall be done according to Subsection 40-05 and shall limit operations for the convenience and safety of the traveling public as specified in Subsection 80-04.

The Contractor shall conduct all operations on or near a railroad according to the Contract, any contract between the Department and the railroad, and any permits issued by the railroad. The Department shall obtain permits for hauling materials across railroad tracks at locations specified in the Contract. If the Contractor desires additional crossings, the Contractor shall obtain any required permits at the Contractor's expense.

70-09 BARRICADES, WARNING SIGNS AND HAZARD MARKINGS. The Contractor shall furnish, erect, and maintain all barricades, warning signs and markings for hazards necessary to protect the public and the work. It shall be the Contractor's responsibility to maintain markers at all times to separate areas closed to aircraft from adjacent areas that are open to aircraft.

For public vehicular and pedestrian traffic, the Contractor shall furnish, erect, and maintain barricades, warning signs, lights and other traffic control devices in conformity with the *Manual on Uniform Traffic Control Devices for Streets and Highways* (published by the United States Government Printing Office) and the *Alaska Traffic Manual Supplement*, and according to the approved TCP.

When the work requires closing an airport operations area of the airport or portion of such area, the Contractor shall furnish, erect and maintain temporary markings and associated lighting conforming to the requirements of AC 150/5340-1, *Standards for Airport Markings*, and according to the CSPP and SPCD.

For work within the airport property, the Contractor shall furnish, erect, and maintain markings and associated lighting of open trenches, excavations, temporary stockpiles, and parked construction

equipment that may be hazardous to the operation of emergency, fire-rescue, maintenance or support vehicles on the airport in conformance to AC 150/5370-2, *Operational Safety on Airports During Construction*.

The Contractor shall identify each motorized vehicle or piece of construction equipment in conformance to AC150/5370-2 and 150/5210-5.

The Contractor shall furnish and erect all barricades, warning signs, and markings for hazards prior to commencing work that requires such erection and shall maintain the barricades, warning signs, and markings for hazards until their removal is directed by the Engineer.

Open-flame type lights shall not be permitted within the air operations areas of the airport.

70-10 USE OF EXPLOSIVES. The Contractor shall obey all laws, regulations and permits applicable to using, handling, loading, transporting, or storing explosives. When using explosives, the Contractor shall take utmost care not to endanger life, property, new construction, or existing portions of the project and facilities that are to remain in place after the project is complete.

The Contractor shall provide notice to property owners, the traveling public, and utility companies in the vicinity before using explosives. The Contractor shall provide a minimum of three working days' notice to the Federal Aviation Administration and the airport manager. The Contractor shall notify police and fire authorities in the vicinity before transporting or using explosives. The Contractor shall provide notice sufficiently in advance to enable all potentially affected parties to take whatever steps they may deem necessary to protect themselves and their property from injury or damage. The Contractor shall not use explosives on or near airport property until a Notices to Airmen (NOTAMs) has been issued. Each new use of explosives may require a separate NOTAMs to be issued. The Contractor shall not use electric blasting caps within 1,000 feet of the airport property.

The Contractor is liable for all property damage, injury, or death resulting from the use of explosives on the project. The Contractor and Surety shall indemnify, hold harmless, and defend the State of Alaska from all claims related to the use of explosives on the project, including claims from government agencies alleging that explosives were handled, loaded, transported, used, or stored improperly.

70-11 PROTECTION AND RESTORATION OF PROPERTY AND LANDSCAPE.

a. Restoring Areas. Areas used by the Contractor, including haul routes, shall be restored to their original condition after the Contractor's operations are completed. The original condition of an area shall be determined as follows: Prior to commencement of operations, the Engineer and the Contractor shall inspect each area and haul route that will be used by the Contractor and take photographs to document their condition. After construction operations are completed or prior to seasonal suspension of work, the condition of each area and haul route will be compared to the earlier photographs. Prior to demobilization or seasonal suspension of work, the Contractor shall repair damages attributed to its operations. The Contractor agrees that all costs associated with repairs shall be subsidiary to other items of work and will not be paid for directly.

b. Material Disposal Sites. Offsite disposal areas may be at locations of the Contractor's choice, provided the Contractor obtains from the owner of such land written permission for such disposal and a waiver of all claims against the State for any damage to such land which may result therefrom, together with all permits required by law for such disposal. A copy of such permission, waiver of claims, and permits shall be filed with the Engineer before commencing work on private property. The Contractor's selected disposal sites shall also be inspected and approved by the Engineer prior to use of the sites.

c. Property marks. The Contractor shall:

(1) Be responsible for and protect from disturbance all land monuments and property marks until the Engineer has approved the witnessing or otherwise referenced their locations; and

(2) Not move such monuments or marks without the Engineer's approval.

d. Damage to property. The Contractor shall:

(1) Be responsible for all damage to public or private property resulting from any act, omission, neglect, or misconduct in the manner or method of executing the work;

(2) Be responsible for all damage to public or private property resulting from defective work or materials at any time, before, during, or after project completion; and

(3) Restore all such damaged property to a condition similar or equal to that existing before the damage occurred, at no additional cost to the Department.

e. Protection of natural resources. The Contractor shall:

(1) Conduct work in a manner that minimizes disturbance to and protects natural resources in compliance with all federal, state, and local laws and regulations;

(2) When working near designated wetlands, as defined by the Corps of Engineers, place no fill, nor operate equipment outside the permitted area; and

(3) When working in or near designated anadromous fish streams, as defined by AS 41.14.840 and AS 41.14.870, place no fill or dredge material, nor operate equipment, within or on the banks of the stream (including fording) except as permitted by the State Fish Habitat Permit issued for the project.

f. Hazardous materials. Hazardous materials include but are not limited to petroleum products, oils, solvents, paints, lead based paints, asbestos, and chemicals that are toxic, corrosive, explosive, or flammable. Except as otherwise specified in this Contract, the Contractor shall:

(1) Not excavate, nor use for fill, any material at any site suspected of or found to contain hazardous materials or petroleum fuels;

(2) Not raze and remove, or dispose of structures that contain asbestos or lead-based paints;

(3) Not stockpile, nor dispose of, any material at any site suspected of or found to contain hazardous materials or petroleum;

(4) Report immediately to the Engineer any known or suspected hazardous material discovered, exposed, or released into the air, ground, or water during construction of the project;

(5) Report any containment, cleanup, or restoration activities anticipated or performed as a result of such release or discovery;

(6) Handle and dispose of hazardous material with properly trained and licensed personnel who follow an approved Hazardous Material Control Plan as per Item P-641.

g. Protected areas. The Contractor shall not use land from any park, recreation area, wildlife or waterfowl refuge, or any historical site located inside or outside of the project limits for excess fill disposal, staging activities, equipment or material storage, or for any other purposes unless permitted by the Contract or unless all permits and clearances necessary for such work have been obtained by the Contractor as detailed in Subsection 70-02.

h. Solid waste. The Contractor shall remove all debris, trash, and other solid waste from the project site as soon as possible and according to the Alaska Department of Environmental Conservation Solid Waste Program.

70-12 FOREST PROTECTION. The Contractor shall:

a. Comply with all laws and regulations of the United States and the State of Alaska, local governments, or other authorities governing the protection of forests and the carrying out of work within forests;

b. Keep forest areas in an orderly condition;

c. Dispose of all refuse and obtain permits for the construction and maintenance of all construction camps, stores, warehouses, residences, latrines, cesspools, septic tanks, and other structures according to the requirements of the supervising authorities;

d. Take all reasonable precautions to prevent and suppress forest fires;

e. Require workers and subcontractors, both independently and at the request of officials, to do all reasonably within their power to prevent and suppress and to assist in preventing and suppressing forest fires; and

f. Make every possible effort to notify the appropriate forestry agency at the earliest moment of the location and extent of any forest fire.

70-13 RESPONSIBILITY FOR DAMAGE CLAIMS. The Contractor shall indemnify, hold harmless, and defend the State of Alaska and its agents and employees from any and all claims or actions for injuries or damages whatsoever sustained by any person or property that arise from or relate to, directly or indirectly, the Contractor's performance of the Contract; however, this provision has no effect if, but only if, the sole proximate cause of the injury or damage is the Department's negligence.

This Contract does not create a third party benefit to the public or any member of the public, nor does it authorize any person or entity not a party to this Contract to maintain a suit based on this Contract or any term or provision of the Contract, whether for personal injuries, property damage, or any other claim or cause of action.

70-14 OPENING SECTIONS OF THE PROJECT TO TRAFFIC. Unless prohibited by the CSPP, the Engineer may, at his discretion, order the Contractor to open sections of the work to traffic prior to completion of the entire project. Openings under this section shall not constitute (a) acceptance of the opened sections or any other part of the work or (b) a waiver of any other provision of the Contract.

The Engineer may establish a time period for completing any features of the opened section of work that are behind schedule.

The Contractor shall:

a. Maintain the opened portions of the work without additional compensation;

b. Perform all necessary repairs or renewals on the opened sections of the work without additional compensation;

c. Conduct the remainder of the work with minimum interference to traffic; and

d. Maintain barricades and other safety devices required by AC 150/5370-2, *Operational Safety on Airports During Construction*, to provide separation of opened and closed sections of the project.

70-15 CONTRACTOR'S RESPONSIBILITY FOR WORK. The Contractor shall be responsible for implementing all preventative measures necessary to protect, prevent damage, and repair damage to the work from all causes at no additional cost to the Department. This duty continues from the date construction begins until the date specified in a letter of Substantial Completion or Partial Acceptance of a specific section of the project. Where there is a Partial Acceptance, the duty ends only as to the accepted portion of the work. This duty continues during periods of suspended work, except in specific sections the Department has agreed to maintain under Subsection 50-13.a. Seasonal Suspension of Work.

The Contractor shall not load or permit the loading with materials, equipment or workers of a floor, roof, or wall of a building included in the work in a manner that will endanger the structure, workers, or adjacent property. The Contractor shall brace the building during construction to allow it to withstand reasonably foreseeable winds, snow and ice, and earthquakes.

The Contractor shall rebuild, repair, restore, and make good all losses or damages to any portion of the work including that caused by vandalism, theft, accommodation of public traffic, and weather. The Department will only be responsible for loss or damage due to unforeseeable causes beyond the control of and without the Contractor's fault or negligence, such as Acts of God, the public enemy, and governmental authorities.

In case of suspension of work from any cause, the Contractor shall take such precautions as may be necessary to prevent damage to the work or facilities affected by the work. This will include providing for drainage and erecting any necessary temporary structures, signs, or other facilities and maintaining all living material such as plantings, seedings, and soddings.

70-16 RESERVED.

70-17 FURNISHING RIGHT-OF-WAY. The Department will secure all necessary right-of-way or property in advance of construction. Any exceptions will be indicated in the Contract.

70-18 PERSONAL LIABILITY OF PUBLIC OFFICIALS. There shall be no liability upon the Engineer and their authorized representatives, either personally or as officials of the state, in carrying out any of the provisions of this Contract, or in exercising any power or authority granted to them by or within the scope of the Contract, it being understood that in all such matters the Engineer and their authorized representatives act solely as agents and representatives of the State. The Contractor shall bring no suit related to or arising under this Contract naming as defendants any State officer, employee or representative in either their personal or official capacities, and shall include a prohibition to that effect in all subcontracts entered into for this Project.

70-19 NO WAIVER OF LEGAL RIGHTS. The Department shall not be precluded nor estopped by any measurement, estimate, or certificate made either before or after the completion and acceptance of the work and payment, from showing the true amount and character of the work performed and materials furnished by the Contractor, nor from showing that any measurement, estimate, or certificate is untrue or is incorrectly made, nor that the work or materials do not in fact conform to the Contract.

The Department shall not be precluded nor estopped, notwithstanding any measurement, estimate, or certificate and payment, from recovering from the Contractor or the Contractor's Sureties, or both, such damages as it may sustain by reason of the Contractor's failure to comply with the terms of the Contract.

Neither the acceptance by the Department, or by any representative of the Department, nor any payment for or acceptance of the whole or any part of the work, nor any extension of time, nor any possession taken by the Department, shall operate as a waiver by the Department of any portion of the Contract or of any right of the Department to damages. A waiver by the Department of any breach of the Contract shall not be held to be a waiver of any other subsequent breach.

70-20 GRATUITY AND CONFLICT OF INTEREST. The Contractor shall not extend any loan, gratuity, or gift of money of any form whatsoever to any employee of the Department, nor will the Contractor rent or purchase any equipment or materials from any employee of the Department or to the best of the Contractor's knowledge from any agent of any employee of the Department. The Contractor shall execute and furnish the Department an affidavit certifying that the Contractor has complied with this section before final acceptance.

70-21 FEDERAL AFFIRMATIVE ACTION (RESERVED).

SECTION 80
EXECUTION AND PROGRESS

80-01 SUBCONTRACTING OF CONTRACT. The Contractor shall submit a Contractor Self Certification, Form 25D-042, and, except on wholly state-funded projects, a completed Certification for Tax Delinquency and Felony Convictions, Form 25D-159, for each Subcontractor and each Lower Tier Subcontractor, before the Contractor or any subcontractor subcontracts, sells, transfers, assigns, or otherwise disposes of the Contract or any portion of the Contract. The Department has authority to review subcontracts and to deny permission to subcontract work. The Department may penalize the Contractor for false statements or omissions made in connection with Form 25D-042.

The Contractor shall perform, with the Contractor's own organization, work amounting to at least 30 percent of the difference between the original Contract price and the price of designated Specialty Items. For the purpose of this subsection, work is defined as the dollar value of the services, equipment, materials, and manufactured products furnished under the Contract. The Engineer will determine the value of the subcontracts based on Contract unit prices or upon reasonable value, if entire items are not subcontracted.

The Department's consent to the subcontracting, sale, transfer, assignment, or disposal of all or a part of the Contract shall not relieve the Contractor and the Surety of responsibility for fulfillment of the Contract or for liability under the bonds regardless of the terms of the transfer or sublet approvals.

a. The Contractor shall ensure that for all subcontracts (agreements):

(1) The Department is furnished with one completed Contractor Self Certification, Form 25D-042, for each subcontract;

(2) The subcontractors have submitted a Bidder Registration, Form 25D-6;

(3) The required prompt payment provisions of AS 36.90.210 are included in all subcontracts:

(4) A clause is included requiring the Contractor to pay the subcontractor for satisfactory performance according to AS 36.90.210 and within eight (8) working days after receiving payment from which the subcontractor is to be paid;

(5) A clause is included requiring the Contractor to pay the subcontractor interest, according to AS 45.45.010(a), for the period beginning the day after the required payment date and ending on the day payment of the amount due is made:

(6) A clause is included requiring the Contractor to pay the subcontractor all retainage due under the subcontract, within eight (8) working days after final payment is received from the Department, or after the notice period under AS 36.25.020(b) expires, whichever is later;

(7) A clause is included requiring the Contractor to pay interest on retainage, according to AS 36.90.250 and AS 45.45.101(a):

(8) Other required items listed in Form 25D-042, including but not limited to Form 25D-55A, are included in the subcontracts;

(9) The subcontractors pay current prevailing rate of wages as per Subsection 70-04 and file signed and certified payrolls with the Engineer and DOLWD for all work performed on the project; and

(10) Upon receipt of a request for more information regarding subcontracts, the requested information is provided to the Department within 5 calendar days.

b. The Contractor shall ensure that for all lower tier subcontracts (agreements between subcontractors and lower tier subcontractors):

(1) The Department is furnished with one completed Contractor Self Certification, Form 25D-042, for each lower tier subcontract;

(2) The required prompt payment provisions of AS 36.90.210 are included in all lower tier subcontracts;

(3) A clause is included requiring the subcontractor to pay the lower tier subcontractor for satisfactory performance according to AS 36.90.210, and within eight (8) working days after receiving payment from which the subcontractor is to be paid;

(4) A clause is included requiring the subcontractor to pay the lower tier subcontractor interest, according to AS 45.45.010(a), for the period beginning the day after the required payment date and ending on the day payment of the amount due is made;

(5) A clause is included requiring the subcontractor to pay the lower tier subcontractor all retainage due under the subcontract, within eight (8) working days after final payment is received, or after the notice period under AS 36.25.020(b) expires, whichever is later;

(6) A clause is included requiring the subcontractor to pay the lower tier subcontractor interest on retainage, according to AS 36.90.250 and AS 45.45.101(a);

(7) Other required items listed in Form 25D-042, including but not limited to Form 25D-55A, are included in the lower tier subcontracts;

(8) The lower tier subcontractors pay current prevailing rate of wages as per Subsection 70-04 and file signed and certified payrolls with the Engineer and DOLWD for all work performed on the project; and

(9) Upon receipt of a request for more information regarding lower tier subcontracts, the requested information is provided to the Department within 5 calendar days.

c. The following will be considered as subcontracting, unless performed by the Contractor:

(1) Roadside Production. Roadside production of crushed stone, gravel, and other materials with portable or semi-portable crushing, screening, or washing plants set up or reopened in the vicinity of the project to supply materials for the project, including borrow pits used exclusively or nearly exclusively for the project.

(2) Temporary Plants. Production of aggregate mix, concrete mix, asphalt mix, other materials, or fabricated items from temporary batching plants, temporary mixing plants, or temporary factories that are set up or reopened in the vicinity of the project to supply materials exclusively or nearly exclusively for the project.

(3) Hauling. Hauling from the project to roadside production, temporary plants, or commercial plants, from roadside production or temporary plants to the project, from roadside production or temporary plants to commercial plants, and all other hauling not specifically excluded in this subsection.

(4) Other Contractors. All other contractors working on the project site under contract with the Contractor are considered subcontractors unless specifically excluded in this subsection.

d. The following will not be considered as subcontracting, but the Contractor shall comply with the prompt payment provisions of AS 36.90:

(1) Commercial Plants. The purchase of sand, gravel, crushed stone, crushed slag, batched concrete aggregates, ready-mixed concrete, asphalt paving mix, and any other material or fabrication produced at and furnished from established and recognized commercial plants that sell to both public and private purchasers.

(2) Hauling. Delivery of materials from a commercial plant to a different commercial plant, and delivery from a commercial plant to the project site by vehicles owned and operated by the commercial plants or by commercial freight companies that have a contract with the commercial plant. Commercial freight companies are trucking or hauling companies that deliver multiple types of materials to multiple clients, both public and private, on an established route and on a recurrent basis.

(3) Contractors' General Business. Work within permanent home offices, branch plants, fabrication plants, tool yards, and other establishments that are part of a contractor's or subcontractor's general business operations.

e. Owner-Operators. Hauling of materials for the project by bona fide truck owner-operators who are listed as such on the signed and certified payroll of the Contractor or approved subcontractor is not considered subcontracting for purposes of AS 36.30.115.

The Contractor shall ensure that the required prompt payment provisions of AS 36.90.210 are included in contracts with owner-operators.

The Contractor shall collect and maintain at the project site current and valid copies of the following to prove that each trucker listed is a bona fide owner-operator:

(1) Alaska Driver's License with appropriate CDL class and endorsements;

(2) Business license for trucking with supporting documents that list the driver as the business owner or corporate officer;

(3) Documents showing the driver's ownership interest in the truck, including copies of:

(a) Truck registration; and

(b) Lease (if truck is not registered in driver's name or in the name of the driver's company).

The Contractor shall maintain legible copies of these records for a period of at least three years after final acceptance of the project.

Owner-operators must qualify as independent contractors under the current Alaska Department of Labor's criteria. Owner-operators may be required to show:

(4) The owner-operator's right to control the manner in which the work is to be performed;

(5) The owner-operator's opportunity for profit or loss depending upon their managerial skill;

(6) The owner-operator's investment in equipment or materials required for their task, or the employment of helpers;

(7) Whether the service rendered requires a special skill;

(8) The degree of permanence of the working relationship; and

(9) Whether the service rendered is an integral part of the owner-operator's business.

The status of owner-operators is subject to evaluation throughout the project period. If the criteria for an independent contractor are not met, the Contractor shall submit amended payrolls listing the driver as an employee subject to all labor provisions of the Contract.

The Contractor shall issue each owner-operator a placard in a form approved by the Engineer that identifies both the truck driver and the vehicle. The placard shall be prominently displayed on the vehicle so that it is visible to scale operators and inspectors.

Notwithstanding the Department's definitions of contracting and subcontracting, the Contractor shall be responsible for determining and complying with all federal and state laws and regulations regarding contracting, subcontracting, and payment of wages. The Contractor shall promptly pay any fines or penalties assessed for violations of those laws and regulations, and shall promptly comply with the directives of any government agency having jurisdiction over those matters.

80-02 NOTICE TO PROCEED. The Department will issue a Notice to Proceed authorizing construction to begin and indicating the date when Contract time will begin. The Contractor shall not begin construction before the effective date of the Notice to Proceed. The Notice to Proceed may include limits or restrictions on allowable activities. The Department will, in its sole discretion, refuse to pay for construction begun before the effective date of the Notice to Proceed. The Contractor shall notify the Engineer at least 48 hours before construction begins at the project site.

80-03 PROSECUTION AND PROGRESS. The Contractor shall meet with the Engineer at the regional construction office for a preconstruction conference before beginning construction. The Engineer will schedule the Preconstruction Conference no less than five days after the following have been received:

a. A Critical Path Method (CPM) Schedule is required as described in Section G-300. ~~A progress schedule, in a format acceptable to the Engineer, showing the order in which the Contractor proposes to carry out the work and the contemplated dates on which the Contractor and the subcontractors will start and finish each of the salient features of the work, including any scheduled periods of shutdown. The schedule shall indicate the anticipated hours of operation and any anticipated periods of multiple-shift work.~~

b. A list showing anticipated dates for procurement of materials and equipment, ordering of articles of special manufacture, furnishing of plans, drawings and other data required under Subsections 50-02 and 60-08, and for other events such as inspection of structural steel fabrication

c. A list showing all subcontractors and material suppliers

d. A Storm Water Pollution Prevention Plan, a Hazardous Material Control Plan, and a Spill Prevention Control and Countermeasure Plan, with the line of authority and designated field representatives, as required under Item P-641 (see submittal deadlines under P-641-1.3)

e. A letter designating the Contractor's Project Superintendent, defining that person's responsibility and authority, and providing a specimen signature

f. A letter designating an Equal Employment Opportunity Officer and a Disadvantaged Business Enterprise Officer, and designating those person's responsibilities and authority

g. A Quality Control Program, as required under Subsection 60-03 and Section 100

h. An approved Safety Plan Compliance Document (SPCD), as required under Subsection 80-04

i. A Traffic Control Plan, as required under Subsection 70-09 and Item G-710

j. A Utility Repair Plan, as required under Subsection 50-06.e.

k. A Schedule of Values submitted on a state contract form for any building included in the work. The Contractor may not begin construction of the building until the Engineer has approved the Schedule of Values. The Contractor shall break down all the work for the building into measurable work items, in sufficient detail to serve as a basis for progress payments. Any stockpiled materials for which interim payment is proposed shall be included. The Schedule of Values must indicate a quantity and unit cost, including overhead and profit for each work item, the total cost for each work item, and the total cost of all work items. The Contractor shall certify the cost of each item and the overhead and profit for each item. The total cost for all work items must equal the total contract price for the building.

Provide suitable proof of filing and subsequent approval of a completed FAA Form 7460-1 Notice of Proposed Construction or Alteration, at least 45 days before the start date of work occurring on the project. Coordinate with the RASSO and Engineer when filing Form 7460-1. The Contractor is encouraged to file the form electronically. The FAA 7460-1 form and the electronic submittal instructions may be found at: https://oeaaa.faa.gov/oeaaa/external/portal.jsp

The Contractor shall provide adequate materials, labor and equipment to ensure the completion of the project according to the Plans and Specifications. The work shall be performed as vigorously and as continuously as weather conditions or other interferences may permit. The Contractor shall take into consideration and make due allowances at the Contractor's expense for foreseeable delays and interruptions to the work such as unfavorable weather, frozen ground, equipment breakdowns, shipping delays, quantity overruns, utility work, permit restrictions, and other foreseeable delays and interruptions. The Contractor shall identify these allowances on the progress schedule.

The Contractor shall adjust forces, equipment and work schedules as necessary to ensure completion of the work within the Contract time, and shall notify the Engineer at least 24 hours before resuming suspended operations. Upon a substantial change to the work schedule or when directed by the Engineer, the Contractor shall submit a revised progress schedule in the form required, including a written explanation for each revision made in the schedule or methods of operation.

The Engineer's review or approval of the documents, plans, and schedules provided by the Contractor under this section shall not change the Contract requirements, release the Contractor of the responsibility for successful completion of the work or relieve the Contractor of the duty to comply with applicable laws. The Engineer's review or approval of schedules shall not indicate agreement with any assertions of delay or claims by the Contractor.

It is the Contractor's responsibility to prepare and submit documents that satisfy all applicable contract requirements. By reviewing and approving the Contractor's documents, the Department does not warrant that following the Contractor's documents will result in successful performance of the work. The Department's failure to discover defects in the Contractor's documents, the assumptions upon which they are based or conditions that prevent the Contractor from performing the work as indicated in the documents will not entitle the Contractor to additional compensation or time. If the Contractor becomes aware of any act or occurrence that may form the basis of a claim for additional compensation or an extension of time, it must specifically advise the Engineer of these conditions according to Subsection 50-17.

For any building included in the work, the Contractor shall maintain one record copy of all plans, drawings, specifications, addenda, directives, change orders, supplemental agreements and written interpretations and clarifications issued by the Engineer, annotated to accurately record variations in the work from requirements shown or indicated in the contract documents. These record documents together with all approved samples and a copy of all approved working drawings will be available to the Engineer for reference and copying. Upon completion of the work, the Contractor shall deliver the annotated record documents, samples, and working drawings to the Contracting Officer.

80-04 LIMITATION OF OPERATIONS. The Contractor shall not open up work to the detriment of work already started. The Contractor shall minimize interference with traffic within the project. The Contractor shall not stop or otherwise impede traffic outside the project limits without the Engineer's prior written permission. The Engineer may require the Contractor to finish a section of work in progress before starting additional sections if the Engineer determines it is necessary for the convenience of the public or the Department.

The Contractor shall control its operations and the operations of its subcontractors and all suppliers, so as to provide for the least inconvenience to traffic and the free and unobstructed movement of aircraft in the Air Operations Areas of the airport, except as specifically provided in this Contract. Under all circumstances, safety shall be the most important consideration.

a. **Environmental Limitations.** The Contractor shall comply with all environmental commitments, permit stipulations, and construction limitations, in the Contract permits and specifications. These may include time periods in which certain construction activities are not allowed. The Contractor shall avoid

disturbing wetlands unless permitted to do so. The Contractor shall avoid disturbing threatened and endangered species, historic sites, and hazardous materials sites.

b. Construction Safety.

(1) Construction Safety and Phasing Plan (CSPP). This document is included within the contract documents when attached as an appendix to this document. The CSPP specifies minimum requirements for operational safety during construction activities.

(2) Safety Plan Compliance Document (SPCD). When the contract documents include a CSPP, the Contactor shall submit to the Engineer a SPCD in accordance with the provisions set forth within the current version of AC 150/5370-2, *Operational Safety on Airports During Construction*. The SPCD shall include a general statement that the Contractor has read and will abide by the CSPP and shall include the Contractor's name, the title of the project CSPP, the approval date of the CSPP, and a reference to any supplemental information (example statement: "I, Name of Contractor, have read the Title of the Project CSPP, approved on Date, and will abide by it as written and with the following additions as noted."). The supplemental information in the SPCD should be written to match the format of the CSPP indicating each subject by corresponding CSPP subject number and title. If no supplemental information is necessary for any specific subject, the statement, "No supplemental information," should be written after the corresponding subject title. The SPCD should not merely duplicate information in the CSPP. No deviations or modifications may be made to the approved CSPP or SPCD unless approved in writing by the Engineer.

The Contractor shall implement all necessary CSPP and SPCD measures prior to commencement of any work activity. The Contractor shall conduct daily checks of its workers, equipment, and construction methods to assure compliance with the CSPP and SPCD measures. The Contractor shall document the checks in writing and sign them. Documented checks shall be available for inspection by the Engineer.

The Contractor is responsible for the conduct of all subcontractors and suppliers it employs on the project. The Contractor shall assure that all subcontractors and suppliers are made aware of the requirements of the CSPP and SPCD, and that the subcontractors and suppliers implement and maintain all necessary safety measures.

The CSPP and SPCD will indicate areas within airport property boundaries that may be used for material stockpile, and will indicate the maximum height of stockpile allowed. The Contractor shall obtain prior approval from the Engineer before using other areas within airport property. The Engineer may limit stockpile heights or equipment heights in any area, either inside or outside of airport property, based on requirements in the ACs or other factors necessary to ensure the free and unobstructed operation of aircraft.

c. Security Plan. When required by the Contract, the Contractor shall control its operations and the operations of its subcontractors and all suppliers so as to provide for the security of the Airport. The Contactor's operations shall be conducted according to the Security Plan and the provisions set forth within the current version of DOT/FAA/AR-00/52, *Recommended Security Guidelines for Airport Planning and Construction*. No deviations or modifications may be made to the approved Security Plan unless approved in writing by the Engineer.

d. Notification. When the work requires the Contractor to conduct its operations within an Air Operations Area of the airport, the work shall be coordinated in accordance with the requirements of the CSPP. The Contractor shall begin coordination through the Engineer with the Airport Manager, FAA, other project stakeholders, at least 45 days before working in the Air Operations Area. When written correspondence is approved by the Engineer the Contractor shall copy to the Engineer all correspondence with the Airport Manager, the FAA, and other project stakeholders.

The Contractor shall provide information and coordinate with the Airport Manager, through the Engineer, for all required NOTAMs. Begin coordination at least 14 days prior to the date that the

NOTAM needs to be issued by. Provide final information on a form provided by the Department, and submit the form through the Engineer to the Airport Manager at least 72 hours prior to: closure or change in the Air Operations Area; or startup, resumption, cessation of, or change in construction activity that affects aircraft operations.

The Contractor shall not begin work for any Phase that requires issuance of a NOTAM until all of the following have been met:

(1) Coordination required by the CSPP and the SPCD has been accomplished;

(2) The NOTAM has been ~~authorized~~ issued by the Airport Manager~~; and its issuance by the FAA has been confirmed;~~

(3) The necessary temporary marking and associated lighting are accepted;

(4) The necessary NAVAIDS have been modified as specified in the CSPP, SPCD, and Subsection 70-09; and

(5) The Engineer has authorized the Contractor to begin work.

When the work is complete, the Contractor shall notify the Airport Manager, through the Project Engineer, that the work that required a NOTAM has been completed and that the NOTAM can be cancelled.

Coordinate all questions to the FAA through the Engineer.

(6) Contact the FAA Systems Operations Control Center at least 45 days prior to:

(a) Closing a runway

(b) Re-opening a closed runway

(c) Interrupting service or removing visual or navigational aids

(d) Displacing a runway threshold

(7) Except as provided in GCP 50-06e, all contacts with the Airport Manager and the FAA will be through the Engineer.

e. Work Procedures and Communications within the Airport Operations Area.

Vehicles, equipment and materials shall never be parked or left standing on runways, runways safety areas, and taxiways open to aircraft. In Air Operations Areas, all vehicles shall be equipped with a functional flashing amber hazard light and carry a mounted orange and white checkerboard flag as outlined in AC 150/5210-5D Sections 4.d.(2) & (3) and all obstructions except stakes or hazard markers shall be removed during non-working hours. The Contractor shall remove construction equipment from and otherwise clear the runway and the designated Runway Safety Areas for operation of regularly scheduled airline flights. The Contractor shall remain continuously informed regarding flight schedule times.

The Contractor shall not allow their labor force or equipment to interfere with the operation of aircraft on any runway or taxiway. **Aircraft always have the right of way.** The Contractor shall not park vehicles or equipment or leave materials standing within 300 feet of an active runway or within 150 feet of an active taxiway or taxi lane. When work is to be performed within the limits specified, the Contractor shall ensure that the runway or taxiway is closed to aircraft or maintain radio contact with the tower. Time shall be minimized in restricted areas. The Contractor shall provide responsible personnel, such as a foreman, for radio communication.

When the contract work requires the Contractor to work within an Air Operations Area of the airport on an intermittent basis (intermittent opening and closing of all or a portion of the Air Operations Area), the Contractor shall maintain constant communications as hereinafter specified, immediately obey all instructions to vacate the Air Operations Area, and immediately obey all instructions to resume work in such Air Operations Area. Failure to maintain the specified communications or to obey instructions shall be cause for suspension of the Contractor's operations in the Air Operations Area, with no damages available from the Department, until the satisfactory conditions are provided. The Contractor shall establish and maintain communication or monitor communications with the appropriate radio facility as prescribed in the following:

(1) Airports With Control Towers: At those airports with control towers, the Contractor shall comply with the instructions of the airport controller. The Contractor shall continuously monitor 2-way radio communication on the appropriate ground control frequency. The Contractor shall furnish a liaison radio operator and 2-way radio communication with each work party located within the Air Operations Area

(2) Airports Without Control Towers: At those airports without control towers, the Contractor shall comply with the instructions of a FSS Employee, a pilot, or a pilot's representative. The Contractor shall continuously monitor by 2-way radio, the Common Traffic Advisory Frequency (CTAF) published in the current ~~*Alaska Flight Information Supplement*~~*Chart Supplement Alaska*. ~~The Contractor shall furnish a liaison radio operator and~~ The Contractor shall furnish a liaison radio operator monitoring the CTAF, who shall at all times be in 2-way radio communication with each work party located within the Air Operations Area.

80-05 CHARACTER OF WORKERS, METHODS, AND EQUIPMENT. The Contractor shall employ sufficient labor and equipment to complete the work required under the Contract and to complete it on time.

The Contractor shall ensure that all workers on the project have the skills and experience necessary to properly perform their assigned work. Workers engaged in special work or skilled work shall have sufficient experience in that work and in the operation of the equipment required to properly perform that work.

The Contractor shall comply with any written order by the Engineer to remove workers, who, in the opinion of the Engineer, violate operational regulations, violate CSPP requirements, violate SPCD requirements, perform the work in an unskilled manner, create risk of imminent harm for the traveling public, who are intemperate or disorderly, or who fail to perform the work in accordance with the Contract and any and all applicable federal, state, and local laws, rules, regulations, and ordinances. The Contractor shall allow removed workers to return to the project only with the Engineer's written permission. The Engineer may suspend the work if the Contractor fails to furnish suitable and sufficient personnel necessary to perform the work, or fails to remove any worker at the Engineer's order.

The Contractor shall not use prisoner labor on the project.

The Contractor shall use equipment of the appropriate size and mechanical condition to produce the specified quality and quantity of work by the means specified in the Contract, if any, and shall ensure that the equipment does not damage roadways or property.

The Contractor shall ensure all equipment, materials, and articles incorporated into the work are new and of the specified quality, unless the Contract specifically permits otherwise.

The Contractor shall provide the Engineer with a list of all powered equipment that will be used on the project, showing the make, model, year, capacity, horsepower, and related information. The Contractor shall update this list when equipment is added or removed from the work site, but need not update more frequently than weekly.

When the methods and equipment to be used by the Contractor are not prescribed by the contract, the Contractor is free to use any method, means or equipment that is satisfactory to produce the specified work in conformity with the Contract, except as provided above. At the request of the Engineer, the Contractor shall

demonstrate that the method, means and equipment chosen will produce the work specified in the Contract in the time allowed under the Contract. The Contractor shall bear all costs and impacts associated with any means, methods and equipment chosen by the Contractor. No suggestion, statement or observation from the Engineer or other Department representatives shall alter this responsibility.

If the Contract specifies a particular method, means or type of equipment for performance of the work, the Contractor must use that method, means or equipment unless the Contractor first requests, in writing, permission to alter the Contract requirement and receives prior written approval from the Engineer. The written request shall include a full description of the methods and equipment proposed and of the reasons for desiring to make the change. If approval is given, it will be on the condition that the Contractor will be fully responsible for producing work in conformity with contract requirements. If, after trial use of the substituted methods or equipment, the Engineer determines that the work produced does not meet contract requirements, the Contractor shall discontinue the use of the substitute method or equipment and shall complete the remaining work with the specified methods and equipment. The Contractor shall remove any deficient work and replace it with work of specified quality, or take such other corrective action as the Engineer may direct. No change will be made in basis of payment for the contract items involved, nor in contract time, as a result of authorizing a change in methods or equipment under this subsection, except as specifically provided under Subsection 40-08.

80-06 CONTRACT TIME, EXTENSION OF CONTRACT TIME AND SUSPENSION OF WORK. Contract time will be specified in Calendar Days, by Completion Date, or both.

a. Calendar Days. 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. If no starting day is specified in the Contract, the count of Contract time begins on the day following receipt of the Notice to Proceed by the Contractor.

Calendar days shall continue to be counted against Contract time until and including the date of project completion. Calendar days shall not be counted during the period from November 1 through April 30, except for days that the Contractor is working on the project site.

b. Completion Date. When the contract time is specified on a completion date basis, all work under the Contract shall be completed by the specified completion date.

c. Reasons for Suspension of Work and Extension of Contract Time. The Department may order a suspension of work for any reason listed in this subparagraph c., items (1) through (16).

The Department shall not pay additional compensation, but may extend Contract time only, if there are delays in the completion of controlling items of work from unforeseeable causes that are beyond the Contractor's control and are not the result of the Contractor's fault or negligence, including:

(1) Acts of God;

(2) Acts of the public enemy;

(3) Fires;

(4) Floods;

(5) Epidemics;

(6) Quarantine restrictions;

(7) Strikes;

(8) Freight embargoes;

(9) Unusually severe weather;

(10) According to Subsection 50-06.d.(4), delays by utility owners beyond completion dates specified in the Special Provisions for relocating or adjusting utilities and related facilities; or

(11) Delays of subcontractors, suppliers and fabricators from unforeseeable causes beyond the control of the subcontractors, suppliers or fabricators and that are not the fault of the subcontractors, suppliers or fabricators, including those causes listed in this Subparagraph c, Items 1 through 10.

No additional Contract time or additional compensation will be allowed due to delays caused by or suspensions ordered due to:

(12) Failure to correct conditions that create risk of imminent harm for the traveling public, violations of the Contract or any applicable federal, state, and local laws, rules, regulations, and ordinances;

(13) Adverse weather that is not unusually severe;

(14) Failure to carry out Contract provisions;

(15) Failure to carry out orders given by the Engineer; or

(16) Failure to timely obtain materials, equipment, or services.

The Contractor shall notify the Engineer as soon as the Contractor becomes aware of any act or occurrence that may form the basis of a request for a time extension under this section. The Contractor shall submit a request for a time extension to the Engineer within 10 days of the act or occurrence, and if an agreement is not reached, the Contractor may submit a Claim under Subsection 50-17.

The time allowed in the Contract, as awarded, is based on performing the original estimated quantities of work set out in the bid schedule. An assertion that insufficient time was originally specified shall not constitute a valid reason for extension of contract time.

If satisfactory fulfillment of the Contract requires extra work, the Department may extend Contract time according to Subsection 40-02.

d. Suspension of Work. The Engineer will suspend work on the project, in whole or in part, for such periods and for such reasons as the Engineer determines to be reasonable, necessary, in the public interest, or for the convenience of the Department.

(1) The Engineer will issue a written order to suspend, delay, or interrupt all or any part of the work. The Contractor shall not be compensated for the suspension, delay, or interruption if it is imposed for a reasonable time under the circumstances.

(2) Unless another Contract section specifically provides otherwise, the Contractor will be compensated by equitable adjustment for a suspension, delay, or interruption of the work only if:

(a) The period of suspension, delay, or interruption is for an unreasonable time under the circumstances and another Contract section allows compensation in the event of a suspension, delay, or interruption of the work under the circumstances that actually caused the suspension, delay, or interruption; or

(b) The delay, suspension, or interruption results from the Department's failure to fulfill a contractual obligation to the Contractor within the time period specified in the Contract or, if no time period is specified, within a reasonable time.

(3) No equitable adjustment will be made under this subsection for any suspension, delay, or interruption of the work if the Contractor's performance would have been suspended, delayed, or interrupted by any other cause for which:

(a) The Department is not responsible under the Contract, including the Contractor's fault or negligence; or

(b) An equitable adjustment is either provided for or excluded under any other section of this Contract.

(4) Claims for equitable adjustments under this section shall be filed under Subsection 50-17 except that:

(a) The Contractor must give written notice of intent to claim no later than 20 days after the event giving rise to the delay, suspension, or interruption;

(b) The claim may not include any costs incurred more than 20 days before the Contractor files the Contractor's written notice of intent to claim;

(c) The contractor must submit a written request for adjustment within 7 calendar days of receipt of the notice to resume work;

(d) No profit will be allowed on an increase in cost necessarily caused by the suspension, delay, or interruption.

80-07 FAILURE TO COMPLETE ON TIME. For each calendar day that the work is not substantially complete after the expiration of the Contract time or the completion date has passed, the Engineer shall deduct the full daily charge corresponding to the original Contract amount shown in Table 80-1 from progress payments.

For each calendar day that the work is substantially complete but the project is not complete, after the expiration of the Contract time or the completion date has passed, the Engineer shall deduct 20 percent of the daily charge corresponding to the original Contract amount shown in Table 80-1 from progress payments.

If no money is due the Contractor, the Department may recover these sums from the Contractor, from the Surety, or from both. These are liquidated damages and not penalties. These charges shall reimburse the Department for its additional administrative expenses incurred due to the Contractor's failure to complete the work within the time specified.

TABLE 80-1
DAILY CHARGE FOR LIQUIDATED DAMAGES
FOR EACH CALENDAR DAY OF DELAY

Original Contract Amount		Daily Charge
From More Than	To and Including	
$ 0	$ 500,000	$1,000
500,000	1,000,000	1,500
1,000,000	5,000,000	1,800
5,000,000	10,000,000	2,500
10,000,000	25,000,000	3,800
25,000,000	---------	4,800

Permitting the Contractor to continue work after the durations, dates, and times specified in the Contract have elapsed, or after the Contract time has elapsed or the completion date has passed does not waive the Department's rights to collect liquidated damages under this section.

80-08 DEFAULT OF CONTRACT. The Contracting Officer will give a written Notice of Default to the Contractor and the Surety if the Contractor:

a. Fails to begin work under the Contract within the time specified;

b. Fails to perform the work with sufficient workers, equipment, or materials to ensure the prompt completion of the work;

c. Performs the work unsuitably or neglects or refuses to remove materials or to replace rejected work;

d. Discontinues the prosecution of the work;

e. Fails to resume work that has been discontinued within a reasonable time after notice to do so;

f. Becomes insolvent except that if the Contractor declares bankruptcy, termination shall be according to the Federal Bankruptcy Code. In the event that the Contractor declares bankruptcy, the Contractor agrees that the Contract will be assumed by the Surety in a timely manner so as to complete the Contract by the date specified in the Contract;

g. Allows any final judgment to stand against the Contractor unsatisfied for a period of 60 days;

h. Makes an assignment for the benefit of creditors, without the consent of the Engineer;

i. Fails to comply with applicable minimum wage or civil rights requirements;

j. Is a party to fraud, deceit, misrepresentation, or malfeasance in connection with the Contract; or

k. Fails to perform the work in an acceptable manner for any other cause whatsoever.

The written Notice of Default will include a notice to cure and will establish a date by which the cure must be completed. The Contracting Officer may allow more time to cure than originally stated in the Notice to Default if the Contracting Officer deems it to be in the best interests of the Department. Failure to cure the delay, neglect, or default within the time specified in the Contracting Officer's Notice of Default authorizes the Department to terminate the contract. The Department will provide the Contractor and the Contractor's Surety with a written Notice of Termination.

After the Notice of Termination is issued, the Department may take over the work without further notice; may complete it by itself, by contract or otherwise; and may take possession of and use materials, appliances, equipment, or plant on the work site necessary for completing the work.

The Department may transfer the obligation to perform the work from the Contractor to the Surety. In that event, the Surety shall submit its plan for completion of the work, including any contracts or agreements with third parties for completion, to the Department for approval before beginning work. The Surety must follow the Contract requirements for approval of subcontracts, except that the limitation on percent of work subcontracted will not apply. On receipt of the transfer notice, the Surety shall take possession of all materials, tools, equipment, and appliances at the work site, employ an appropriate work force, and complete the Contract work as specified. The Contract specifications and requirements shall remain in effect, except that the Department will make subsequent Contract payments directly to the Surety. The Contractor forfeits any right to claim for the work and is not entitled to receive any further balance of the amount to be paid under the Contract.

The Contractor and the Contractor's Surety are jointly and severally liable for any damage to the Department resulting from the Contractor's delay, neglect, or default, whether or not the Department terminates the Contractor's right to prosecute the work. The Department's damages include any increased costs incurred by the Department in completing the work or paying for the work to be completed. The Department's rights and remedies are in addition to any other rights and remedies provided by law or under the Contract.

If, after notice of termination of the Contractor's right to proceed under this clause, it is determined that the Contractor was not in default, or that the default was excusable, the rights and obligations of the parties will be determined under Subsection 80-09, Termination for Convenience.

80-09 TERMINATION FOR CONVENIENCE.

a. Notice. The Contracting Officer may terminate the Contract in whole or in part due to:

(1) Executive Orders of the President of the United States or the Governor of the State of Alaska with respect to the prosecution of war or the interest of national defense, or any disaster declaration.

(2) Restraining orders or injunctions by a court of competent jurisdiction affecting prosecution of the work based on acts or omissions of persons or agencies other than the Contractor.

(3) Any reason determined by the Contracting Officer to be in the best interest of the Department.

The Contracting Officer will issue a written Notice of Termination to the Contractor. The Notice of Termination shall state the extent to which performance of work under the Contract is terminated, the effective date of the termination, and for which of the above-listed reasons the Contract is terminated.

b. Required Actions. Unless otherwise directed by the Contracting Officer, upon receipt of a Notice of Termination the Contractor shall immediately:

(1) Stop work as directed in the Notice.

(2) Place no further orders or subcontracts for materials, services, or facilities except as approved to complete work not terminated.

(3) Terminate all orders and subcontracts for the terminated work.

(4) Accomplish either (a) or (b) below as directed by the Contracting Officer:

(a) Assign to the Department all right, title and interest in any terminated orders or subcontracts. The Contracting Officer will settle all claims on the terminated orders or subcontracts.

(b) Settle any outstanding liabilities and claims arising from termination of orders and subcontracts. Settlements must be limited to costs allowed under this section.

(5) Submit to the Contracting Officer a list, certified as to quantity and quality, of all materials acquired or produced for incorporation into the project and that are properly allocable to the terminated portion of the project, exclusive of items disposed of under Subsection 80-09.b.(6), below.

(6) Dispose of materials in the Contractor's possession or control that were acquired or produced but not incorporated into the project as of the termination date as directed by the Contracting Officer under either (a) or (b) below:

(a) Transfer title and deliver the materials to the Department. The Department will pay for the materials at the actual cost delivered to the project or storage site, including transportation charges, to which cost 15% will be added.

(b) Sell the materials. Credit will not have to be extended to prospective purchasers.

The Contractor may acquire the materials if the Contracting Officer approves the sale price and the Contractor meets any other conditions prescribed by the Contracting Officer.

At the sole discretion of the Contracting Officer, the proceeds of any sale, transfer, or disposition of materials may be:

(c) Applied to reduce any payments to be made by the Department under the Contract;

(d) Credited to the cost of the work; or

(e) Paid in any other manner as directed.

(7) Deliver to the Department completed or partially completed plans, drawings, information, and other property required to be furnished under the Contract.

(8) Take all necessary actions and comply with all directives to protect contract-related property in which the Department has or may acquire an interest.

(9) Complete work not terminated.

The Contractor shall proceed immediately with performance of the above obligations notwithstanding any delay in determining or adjusting the amount of any item or reimbursable cost under this clause.

c. Claim. The Contractor shall submit any termination claim to the Contracting Officer within 90 days after the effective date of termination, unless the date for submitting a claim is extended in writing by the Contracting Officer.

(1) Without duplication of any amount paid for under Subsection 80-09.b., the claim may be for the total of:

(a) Costs incurred in performing the terminated work from the date of Contract award to the effective date of the termination subject to the provisions of 80-09.c.(2) regarding reimbursement of equipment costs and 80-09.c.(3) regarding unallowable items.

(b) Payments approved by the Contracting Officer under 80-09.b.(4)(b) to settle the termination claims of suppliers and subcontractors to the extent not covered under 80-09.c.(1)(a).

(c) Reasonably incurred costs for:

(i) Accounting, legal, clerical, and other costs reasonably necessary for preparation of the termination claim and settlement negotiations, excluding costs incurred after the date an appeal is filed with the Appeals Officer under 80-09.h.

(ii) Settling subcontractor and supplier claims, excluding the amounts of those settlements paid under 80-09.c.(1)(b).

(d) Reasonable profit on the costs included in Subsection 80-09.c.(1)(a) based on the Contractor's bid rate for profit or as determined under any other reasonable accounting method. However, if it appears that the Contractor would have sustained a loss on the entire Contract had it been completed, the Contracting Officer will allow no profit and will reduce the settlement to reflect the indicated rate of loss under Subsection 80-09.d. The Department will not pay profit on costs included in Subsections 80-09.c.(1)(b) and 80-09.c.(1)(c).

(2) Equipment claims will be reimbursed as follows:

(a) Contractor-owned equipment usage, based on the Contractor's ownership and operating costs for each piece of equipment as determined from the Contractor's accounting records. Do not base equipment claims on published rental rates.

(b) Idle time for Contractor-owned equipment, based on the Contractor's internal ownership and depreciation costs. Idle equipment time is limited to the actual period of time equipment is idle as a direct result of the termination, not to exceed 30 days. Operating expenses will not be included for payment of idle equipment time.

(c) Rented equipment, based on reasonable, actual rental costs. Equipment leased under "capital leases" as defined in Financial Accounting Standard No. 13 will be considered Contractor-owned equipment. Equipment leased from an affiliate, division, subsidiary or other organization under common control with the Contractor will be considered Contractor-owned equipment.

(3) The following costs are not payable under a termination settlement agreement or Contracting Officer's determination of the termination claim, or on appeal:

(a) Anticipated profits on work that is not performed prior to issuance of the Notice of Termination, or any consequential or compensatory damages.

(b) Unabsorbed home office overhead (also termed "General & Administrative Expense") related to ongoing business operations.

(c) Bidding and project investigative costs.

(d) Direct costs of repairing equipment to render it operable for use on the terminated work.

d. Adjustment for Loss. If the Contractor would have sustained a loss on the entire Contract had it been completed, the Department will not pay the Contractor more than the total of:

(1) The amount due for termination claim costs under Subsection 80-09.c.(1)(c); plus

(2) The remainder of the total allowable claim amount due reduced by multiplying the remainder by the ratio of (a) the total contract price to (b) the remainder plus the estimated cost to complete the entire Contract; minus

(3) All disposals and other credits, all advance and progress payments and all other amounts previously paid under the Contract.

e. Deductions. In arriving at the amount due under this subsection, the Department will deduct:

(1) All previous payments made before termination;

(2) Any claim which the Department may have against the Contractor;

(3) The proceeds of the sale or transfer of any materials, supplies, or other items acquired for the terminated work and not otherwise recovered by or credited to the Department;

(4) All partial payments made under this section; and

(5) Any adjustment for loss determined under Subsection 80-09.d.

f. Agreed Settlement. The Contractor shall make every effort to arrive at a claim settlement with the Contracting Officer that is fair to both parties, that reflects the reasonable and allocable incurred costs allowable under Subsection 80-09.c, that includes a profit under Subsection 80-09.c.(1)(d) or, where appropriate, a loss adjustment under Subsection 80-09.d., and that takes into account the Contractor's reasonable business judgment in performing the work.

The total settlement, whether determined under this Subsection 80-09.f. or under Subsection 80-09.g., exclusive of the costs listed in Subsection 80-09.c.(1)(c), may not exceed the total contract price as reduced by previous payments made and the contract price of work not terminated.

If an agreement is reached in whole or in part, the Department will amend the contract and will pay the agreed amount.

g. Determined Settlement. If the Contractor fails to submit a termination claim within the time allowed, or if an agreement is not reached on the amount due, the Contracting Officer may determine in a Contracting Officer's Decision, the amount due under Subsection 80-09 on the basis of information available to the Department.

h. Right of Appeal. The Contractor may appeal a Contracting Officer's Decision within the time and in the manner specified in Subsection 50-17.

i. Partial Payments. In the sole discretion of the Contracting Officer, the Department may make partial payments against costs incurred by the Contractor in connection with the terminated portion of the

Contract. The sum of these partial payments will not exceed the Contracting Officer's estimate of the total amount that will be due as a result of the termination. The estimate will be based on available information. The Contracting Officer may adjust the estimate as additional information becomes available. If the Contracting Officer orders an audit of the Contractor's financial or project records, the Contracting Officer may decline to make partial payments until the audit is completed.

j. No Waiver of Rights. The termination of work by the Department does not affect or extinguish any of the rights of the Department against the Contractor or the Contractor's Surety then existing or which may thereafter accrue. Any retention or payment of monies by the Department due under the terms of the Contract will not release the Contractor or the Contractor's Surety from the contractual obligations or warranties made under Subsection 70-19 or elsewhere in the Contract.

k. Retaining Records. The Contractor shall unless otherwise provided for in the Contract or by applicable statute, keep all books, records, documents, and other evidence bearing on the Contractor's cost and expenses under the Contract and relating to the work terminated for a period of 3 years after final settlement under this Contract. Records must be made available to the Department at the Contractor's office and at all reasonable times.

l. Definitions. In this Subsection 80-09, the term "cost" and the term "expense" mean a monetary amount in U.S. Dollars actually incurred by the Contractor, actually reflected in the Contractor's contemporaneously maintained accounting or other financial records and supported by original source documentation.

m. Cost Principles. The Department may use the federal cost principles at 48 CFR §§ 31.201-1 to 31.205-52 (or succeeding cost principles for fixed price contracts) as guidelines in determining allowable costs under this subsection to the extent they are applicable to airport construction contracts and consistent with the specifications of this Contract. The provisions of this contract control where they are more restrictive than, or inconsistent with, these federal cost principles.

SECTION 90
MEASUREMENT AND PAYMENT

90-01 GENERAL. Wherever the Contract provides that certain work is subsidiary or it is without extra compensation, the payment for that work is included in the payment for other items of work, and no further or additional payment shall be made for that work.

When more than one type of material or work is specified for a pay item, the pay item and the proposal line number are used to differentiate the material or work.

Lump sum items will not be measured for payment. The Contractor shall accept the bid amount for a lump sum item as complete payment for all work necessary to complete that item. Quantities shown for lump sum items are approximate. No adjustment in the lump sum price will be made if the quantity furnished is more or less than the estimated quantity unless the Contract specifically states otherwise.

For work within the building boundary line and above the bottom of the footing, unless specifically identified as an exception under specification section S-142, the work shall be measured and paid according to the schedule of values submitted under subsection 80-03. For work outside the building boundary or below the bottom of the footing, the work shall be measured and paid according to the contract unit prices for the work involved.

90-02 MEASUREMENT OF QUANTITIES. All work completed under the Contract will be measured using the U.S. Customary system of measure. The Engineer may agree for purposes of making progress payments to use a method of measurement other than the methods described below. However, all final payments for quantities will be calculated using one or more of the methods of measurement described below and in the applicable pay item section. Unless otherwise specified, work will be measured as follows:

a. Acre (43,560 ft^2). Horizontally, unless specified on the ground surface. No deductions will be made for individual fixtures with an area of 500 ft^2 or less.

b. Contingent Sum. Measured as specified in the Contract or Directive authorizing the work. The method of payment may include: (1) a lump sum basis, (2) a price multiplied by the units of work performed, (3) a pay adjustment based on the quality of work, or (4) a deduction from the contract amount.

c. Cubic Yard (yd^3). At the location specified using method (1), below. Methods (2) through (5) may be used with written approval of the Engineer.

(1) Average End Area. End area is the calculated area between original ground cross section and either the design cross section or at the Engineer's discretion the final cross section. Volume of material is calculated using the average of end areas multiplied by the distance along centerline between end areas. In extreme cases where most of the earthwork lies along a single horizontal curve the Engineer may compute volume using the average of end areas multiplied by the distance along centroid of cross section between end areas.

(2) Three-Dimensional. Where it is impractical to measure material by cross sectioning due to erratic location of isolated deposits, acceptable methods involving three-dimensional measurements may be used.

(3) Neat Line. Structures will be measured according to neat lines shown on the Plans or as altered to fit field conditions.

(4) Nominal. Volume calculated as nominal width times nominal thickness times the average length of each piece.

(5) Weight. With the Engineer's written approval, material that is specified to be measured by volume may be weighed and converted to volume for payment purposes. The Engineer will

determine the appropriate conversion factors. When liquid asphalt is a pay item, ASTM D4311 will be used to convert from weight to volume at 60 °F.

d. **Cubic Yard Vehicle Measure (CYVM).** Material measured by volume in the hauling vehicle will be measured at the point of delivery. Vehicles may be of any acceptable size or type provided that the volume of the actual contents may be readily and accurately determined. Vehicles shall be loaded to the measured vehicle volume. If vehicles are not loaded to the measured vehicle volume, the Engineer at their discretion, may apply a percentage of full factor to the measured volume. Loads shall be leveled when directed. No payment will be made for loads that exceed the legal capacity of the vehicle.

e. **Linear Foot (LF).** From end to end, in place, parallel to the centerline of the item or ground surface on which the items are placed.

f. **Thousand Feet Board Measure (MBM).** Nominal volume based on nominal widths and thickness times actual extreme length of each piece. One thousand feet board measure = 1,000 ft^2 X 1 inch thick.

g. **Thousand Gallon (MGal).** By using method (1), below. Methods (2) or (3) may be used with written approval of the Engineer:

   (1) Measured or calibrated volume tank;

   (2) Metered volume, using a certified calibrated meter; or

   (3) Weighed under this subsection and converted to volume, using a specified or approved conversion factor.

h. **Mile.** From end to end, measured horizontally along centerline.

i. **Pound.** Using a certified scale or the net weight of packaged material as labeled by the manufacturer. The Engineer will accept nominal weights for standard manufactured items, unless otherwise specified. The Engineer will accept industry-established manufacturing tolerances, unless otherwise specified.

j. **Square Foot (ft^2).** Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 ft^2 or less. Transverse measurement for area computations will be the neat dimensions shown on the Plans or as directed by the Engineer.

k. **Square Yard (yd^2).** Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 yd^2 or less. Transverse measurement for area computations will be the neat dimensions shown on the Plans or as directed by the Engineer.

l. **Station (100 feet).** Horizontally, parallel to centerline.

m. **Ton (2,000 pounds).** By using method (1) or (2), below. Methods (3) or (4), below, may be used with written approval of the Engineer:

   (1) Commercial Weighing System. Permanently installed and certified commercial scale that meets the requirements for the project weighing system.

   (2) Project Weighing System. Approved automatic digital scale and scale house. All scales are subject to approval according to the Weights and Measures Act, AS 45.75.

   Spring balances and belt conveyor scales shall not be used to determine pay weight.

The Contractor may use proportioning (batch) scales for weighing material for payment when the batching equipment includes an approved and certified automatic weighing, cycling, and monitoring system.

Weigh scales used with a storage silo may be used to weigh the final product for payment, provided the scales are approved and certified.

Vehicle scales shall be maintained with the platform level and rigid bulkheads at each end. The platform must be long enough to permit simultaneous weighing of the hauling vehicle including coupled vehicles, in a single draft. Double draft weighing is not allowed.

(a) Scale Requirements. The Contractor shall:

1. Ensure that vehicle scale(s) are installed and maintained to the standards listed in the National Institute of Standards and Technology (NIST), Handbook 44, Specifications, Tolerances and other Technical Requirements for Commercial Weighing and Measuring Devices, as adopted by AS 45.75.050(d);

2. Contact the Division of Measurement Standards/Commercial Vehicle Enforcement (MSCVE) to coordinate scale inspections before use, at required intervals or as directed by the Engineer and for clarification or possible exceptions to this section;

3. Ensure that a weatherproof housing is provided to protect the scale indicating/recording equipment and allows the scale operator convenient access to the weigh indicator, scale computer, ticket printer, and sequential printer;

4. Use competent personnel to operate the scale system;

5. Furnish and maintain on-site, NIST Class-F cast iron test weights in denominations of 500-lb and/or 1,000-lb. The required minimum for vehicle scales is 4,000-lb; the required minimum for hopper scales is 2,000-lb. Test weights shall have a recognized calibration certificate on file which is dated no more than two years from date of Notice to Proceed. Test weights will be used as directed by the Engineer or MSCVE for initial accuracy calibration testing and may be used for subsequent scale testing or inspection. Projects accessible by direct road access from the communities identified on the dot.alaska.gov/mscve website, 5 days before bid opening, are exempt from the requirement to furnish and maintain on-site test weights;

6. Provide the following information on any scale used to weigh materials for payment:

i. Owner of the scales and scale locations;

ii. Manufacturer's name, model serial number, maximum capacity, and type of scales (single beam, double beam, self-reading, etc.)

iii. Date(s) the scales were installed and/or adjusted;

iv. Scale service company inspections and accuracy checks (attach copy);

v. Division of Measurement Standards inspections and accuracy checks (attach copy); and

vi. Time and dates of notification of any malfunctions.

(b) Electronic Computerized Weighing System. The Contractor shall use an electronic computerized weighing system (ECWS) with the following minimum capabilities:

1. **Computer.** A computer with a self-reading scale system that includes the scale load cell, a sealed direct reading weight indicator, scale computer, ticket printer, and sequential printer, and that can record a complete shift's transaction in an electronic format approved by the Engineer.

   The computer must store project numbers, all pay item descriptions for multiple projects and products that are weighed, and the following information for each hauling vehicle used on the project:

   i. Vehicle identification number marked on the vehicle;

   ii. Tare weight; and

   iii. Maximum allowable gross vehicle weight (MAVW).

   During weighing operations, the ECWS must compare each vehicle's gross weight to its MAVW. If the vehicle exceeds its MAVW, the system must alert the scale operator that an "overload" exists. The system must not issue a ticket for an overload.

   The computer must have a battery backup and protection for power surges or brown outs. The computer system must retain all stored data during a power outage and must operate during a power outage to allow the scale operator to shut down the hard drive without losing information.

2. **Tickets.** The ECWS must have a ticket printer that prints a legible, serially numbered weigh ticket for the Engineer with the following information on each ticket in the order listed:

   i. Project number;

   ii. Item number and description;

   iii. Date weighed;

   iv. Time weighed;

   v. Ticket number;

   vi. Vehicle Identification Number;

   vii. Maximum allowable gross vehicle weight;

   viii. Gross weight;

   ix. Tare weight;

   x. Net weight;

   xi. Subtotal item net weight for each haul unit since start of shift; and

   xii. Accumulated item net weight for all haul units since start of shift.

   Tickets must show all weights in pounds in accordance to NIST Handbook 44, and in tons reported to two decimal places.

After printing, the weigh ticket must automatically advance to a perforation so it can be torn off and handed to the driver. Each ticket shall be initialed by the scale operator before handoff to the driver.

3. **Sequential Printer.** A sequential printer that prints out all transactions (keystrokes) made by the computer concurrently with the ticket printer. For permanent commercial scales, the printer may print at the end of the company's daily shift with the Engineer's approval. The printer must print all scales transactions including tares, voided tickets, and data changes made by the scale operator. The printer must allow for advancing the paper manually so that the scale operator can write notes on the paper when special situations occur, such as voided tickets, incorrect vehicle identification number used, etc. The scale operator shall also note these special situations in the Scales Diary.

   The sequential printout shall be submitted to the Engineer at the end of each shift.

4. **Data Files.** Submit electronic data files to the Engineer at the end of each shift, with all ticket information produced during the shift recorded. These Data files must be complete and correct without conversion or manipulation.

5. **Scale Diary.** The scale operator shall keep a Scale Diary in an electronic format acceptable to the Engineer. The scale operator shall complete the Scale Diary with the following information: dates of action, type of material, source, time the scale opened and time the scale closed, times of scale balance, ticket sequence, time the haul for each material started and stopped, voided ticket numbers, vehicle identification numbers, times of tare and tare weights, and the scale operator's signature. The Scale Diary shall include the following information on any scale used to weigh materials for payment:

   i. Owner of the scales and scale locations;

   ii. Manufacturer's name, model serial number, maximum capacity, and type of scales (single beam, double beam, self-reading, etc.);

   iii. Date(s) the scales were installed and/or adjusted;

   iv. Scale service company inspections and accuracy checks (attach copy);

   v. Division of Measurement Standards inspections and accuracy checks (attach copy); and

   vi. Time and dates of notification of any malfunctions.

   The Scale Diary shall be given to the Engineer at the end of each shift. The Scale Diary is the property of the Department.

(c) Weighing Procedures. The scale operator shall tare hauling vehicles and record tare weights at least once daily; perform additional tares and record additional tare weights as directed by the Engineer; perform tares in the presence of the Engineer when requested; and ensure that each hauling truck displays a unique, legible identification mark.

The Engineer will calculate the MAVW for each vehicle and list all vehicles and their MAVW(s) in the scale house. The MAVW is either the maximum allowable legal weight determined by the Engineer when the Contractor cannot haul overloads, or the manufacturer's recommended maximum allowable gross vehicle weight as certified by the Contractor when vehicles are allowed to haul overloads. Only MAVWs that the Engineer

has provided in writing shall be used. Tickets may not be issued to a vehicle until the Engineer provides the MAVW.

No payment will be made for any material weighed without using the ECWS, unless the Contractor obtains the Engineer's prior written authorization. If the ECWS malfunctions or breaks down, weights shall be manually weighed and recorded for up to 48 hours as directed by the Engineer. The manual weighing operation shall meet all other Contract requirements.

The system must generate a report either during or at the end of the day or shift that summarizes the number of loads and total net weight for each date, project, and product. The scale operator shall submit the original report to the Engineer at the end of each shift.

No payment for any hauled material on a given date will be made until the following are delivered to the Engineer:

1. Sequential printout;

2. Daily data; and

3. Scale Diary.

The Contractor will not receive payment for any material hauled in a vehicle that does not conform to the requirements of Subsection 50-12, Load Restrictions, and this Subsection. The Contractor shall dump material from non-conforming vehicles until they conform, then reweigh the vehicles.

When a weighing device indicates less than true weight, the Contractor will not receive additional payment for material previously weighed and recorded. When a weighing device indicates more than true weight, all material received after the last previously correct weighing accuracy test will be reduced by the percentage of error that exceeds 0.5 percent.

If the Engineer incurs extra construction engineering expenses from checking non-machine data entries or other data irregularities, the total value of those expenses will be deducted from the value of the Contract item before payment.

The Contractor shall accept natural variations in the specific gravity of aggregates, without adjustment in Contract unit price.

(3) Invoices. Supplier's invoice with net weight or volume converted to weight for bulk material that is shipped by truck or rail and is not passed through a mixing plant. Periodic check weighing may be required. Net certified weights or volumes of asphalt materials are subject to correction for temperature and foaming. All materials are subject to correction for material that is lost, wasted, or otherwise not incorporated into the work, for computing quantities.

All aggregate paid by weight shall be less than 2% over optimum moisture, or as approved by the Engineer.

(4) Barge Displacement Method. When the barge displacement method is proposed the Contractor shall furnish water loading charts, certified by a Professional Engineer for all barges utilized in the hauling of the material. If barge hauled material is stockpiled, loss shall be estimated by the Engineer and shall be deducted from the total weight measured to allow for stockpile loss. Any material wasted or lost between the barge and the point where it is placed in final position shall be estimated and the loss deducted by the Engineer.

90-03 SCOPE OF PAYMENT. The Department will make payment at the Contract price or prices for each item shown on the bid schedule or as modified by change order with specified price adjustments. The Contractor shall accept the Contract prices as full and complete payment for (a) furnishing all equipment,

materials, tools, and labor necessary to complete the work in a complete and acceptable manner, and for (b) all of the Contractor's risk, loss, damage, or expense of whatever character arising from or relating to the work and performance of the work.

90-04 COMPENSATION FOR ALTERED QUANTITIES. Payment to the Contractor for unit price items shall be made only for the actual quantities of work performed and accepted or materials furnished, in conformance with the Contract. When the accepted quantities of work or materials vary from the quantities stated in the bid schedule, the Contractor shall accept payment at the original Contract unit prices for the quantities of work and materials furnished, completed and accepted as payment in full. Payment at the Contract unit price shall compensate the Contractor for all costs, expenses, and profit that the Contractor is entitled to receive for the altered quantities, except as provided below:

a. When the final quantity of a Major Contract Item varies more than 25 percent above or below the bid quantity, either party to the Contract may receive an equitable adjustment, excluding anticipated profits, in the Contract unit price of that item. If the final quantity of work is:

(1) Greater than 125 percent of the bid quantity, the equitable adjustment will be made only for those units that are in excess of 125 percent of the bid quantity.

(2) Less than 75 percent of the bid quantity, the equitable adjustment will be made for those units of work done and accepted, except that the total payment for the item shall not exceed 75 percent of the total amount bid for the item.

Except as provided above and in Subsection 40-02, no allowance shall be made for any increased expenses, expected reimbursement, or anticipated profits suffered or claimed, either directly from alterations in quantities or indirectly from unbalanced allocations among the contract items on the part of the bidder and subsequent loss of expected reimbursements, or any other causes.

90-05 COMPENSATION FOR EXTRA WORK ON TIME AND MATERIALS BASIS. When the Engineer orders extra work to be performed on a time and materials basis, compensation will be computed as follows:

a. **Labor.** Based on the sum of **(1)** through **(6)**:

(1) **Total hours worked times the straight time rate of pay.** The rates of pay are those indicated on the certified payroll for all labor and foremen in direct charge of the specific operations. Rates shall not exceed those for comparable labor currently employed on the project, and shall not include general superintendence.

(2) **Overtime hours worked times the difference between the overtime rate and the straight time rate.** No markup is allowed.

(3) **Fringe benefit rate times the total hours worked.** Fringe benefits include Health and Welfare, Pension Fund, etc., when such amounts are required by collective bargaining agreement or other employment contracts generally applicable to the classes of labor employed on the project.

(4) **Workers' Compensation Insurance at 8 percent of (1).** The actual net rate may be used if it exceeds 10 percent and if proof of rates is furnished within 30 days of the completion of the extra work.

(5) **Either subsistence and travel allowances or prorated camp costs.** If an employee is due and receives subsistence or camp privileges on their days off, divide that cost by the number of days worked that week and add to their daily subsistence entitlement. If the employee did not work an entire day on time and materials work, prorate the entitlement for the hours worked on time and materials.

(6) **Markup at 35 percent of the sum of (1), (3), (4), and (5).** This includes and shall fully compensate the Contractor for all overhead and profit, including general superintendence,

additional bond, property damage liability insurance, unemployment insurance contributions, social security and other taxes, administrative overhead costs, and profit.

b. Materials. Actual invoiced material and delivery costs plus 15 percent markup. The material must be approved and incorporated into the work. The Contractor shall furnish to the Engineer proof of payment for materials used in the work plus applicable transportation charges. For Contractor-produced materials, certify in writing the Contractor's actual direct costs, the quantities used, and attach cost spreadsheets and production documentation to verify the costs.

c. Equipment. Includes machinery and special equipment (other than small tools) necessary for the work and authorized by the Engineer. No additional compensation will be made for overhead, profit, maintenance, service, repairs, fuels, lubricants, or replacement parts.

(1) Hourly Rental Rate. Based on rental rates in the current edition and appropriate volume of the *Rental Rate Blue Book,* by EquipmentWatch, Penton Media, Inc.

The regular hourly rental rate is equal to the equipment rate plus the estimated hourly operating cost. These rates apply for equipment used during the Contractor's regular shift of 10 hours per day. No markup is allowed.

The equipment rate is equal to the age adjusted monthly rate for the basic equipment plus the age adjusted monthly rate for applicable attachments, both divided by 176, and multiplied by the regional adjustment factor. The equipment rate is per hour.

The age adjusted monthly rate is that resulting from application of the age adjustment formula, to eliminate replacement cost allowances in machine depreciation and contingency cost allowances.

Only the attachments required for the time and materials work will be included.

(2) Hourly Overtime Rate. Half of the equipment rate plus the full estimated hourly operating cost. The overtime rate will apply to hours the equipment is used in excess of 10 hours per day, either on the Contractor's normal work or on time and materials, and either on single or multiple shifts. No markup is allowed.

(3) Hourly Stand-by Rate. Half of the equipment rate, for equipment ordered on stand-by during the Contractor's normal work shift, not to exceed eight hours per day. No operating costs or markup is allowed.

(4) Unlisted Equipment. For equipment not listed in The Blue Book, the Contractor and the Engineer may agree to a rate before extra work is begun. If agreement is not reached, the Engineer has authority to establish a rate based on similar equipment in the Rental Rate Blue Book or prevailing commercial rates. No markup is allowed.

(5) Leased or Rented Equipment. Equipment that must be rented or leased specifically for work required under this section and authorized in writing by the Engineer shall be paid at invoice price plus 15 percent markup.

Equipment rented or leased for other work under the Contract and used for work under this section shall be paid based on c.(1), (2), and (3). (above) with no markup, except that the adjusted monthly rate is the monthly rate determined directly from the submitted rental or lease agreement.

(6) Transportation of Equipment. The actual cost of moving equipment to and from the work site. To receive reimbursement for transportation of equipment, the Contractor shall obtain the equipment from the nearest approved source and use the equipment exclusively for time and materials work. Payment for move-out will not exceed the amount of the move-in. No markup is allowed, except on operator's wages.

Basis of payment:

(a) If by common carrier: paid freight bill or invoice.

(b) If hauled with the Contractor's own resources: hourly rental rate for hauling unit plus operator wages.

(c) If equipment must be moved under its own power: half of the normal hourly rental rate plus operator's wages.

d. Work by a Subcontractor or Owner-Operator. For time and materials work performed by an approved subcontractor or owner-operator under items **a.** through **c.** above, the Contractor will receive a 5 percent markup for administrative costs. No percentage will be paid on work covered under bid items in the original Contract. No percentage over the amount covered above will be paid for work done by a lower tier subcontractor.

e. Work by a Specialty Subcontractor. The Contractor shall obtain the Engineer's advance agreement that the specialty item needed is beyond the Contractor's ability or expertise or that of the Contractor's other subcontractors. For work on a specialty item performed by an approved specialty subcontractor, the Contractor will receive the approved invoice cost of work or service plus a 15 percent markup for administrative costs.

f. Records. The Engineer will maintain a daily record of labor, equipment and materials utilized in the extra work. The Engineer will present this record to the Contractor at the end of each day's work for verification and signature.

g. Compensation. Payment for time and materials work will be made in the progress estimate following receipt of the verified daily records and all required supporting information from the Contractor. If, at any time, a unit price or lump sum basis of compensation is agreed to for work being performed under this subsection, that compensation will be set forth in writing as a Change Order.

90-06 PROGRESS PAYMENTS. The Department will make monthly progress payments to the Contractor based on estimates of the value of work performed and materials on hand under Subsection 90-07. At the Departments discretion, a progress payment may be made twice monthly if the value of the estimate exceeds $10,000.

Contractor's failure to pay subcontractors, or subcontractor's failure to pay lower tier subcontractors, according to prompt payment provisions required under Subsection 80-01 is considered unsatisfactory performance.

The Department will not withhold payment as retainage but may withhold payment for unsatisfactory performance. If satisfactory progress is being made and subcontractors are paid according to Subsection 80-01 and AS 36.90.210, the Engineer will authorize 100 percent payment for the estimated value of work accomplished, less any authorized deductions.

If the Engineer finds that satisfactory progress is not being made or payment for satisfactory work by a subcontractor or lower tier subcontractor is not paid according to Subsection 80-01, the Engineer may withhold up to 100 percent of the total amount earned from subsequent progress payments. The Engineer may withhold up to 200 percent of the estimated cost to complete final punch list items for unsatisfactory performance until those items are complete. The Engineer will notify the Contractor in writing within eight (8) working days of a request for a progress payment of the reasons why part or all of the payment is being withheld for unsatisfactory performance and what actions may be taken by the Contractor to receive full payment.

Payments of withheld amounts will be made in accordance with AS 36.90.200. No interest will be paid to the Contractor for amounts withheld for unsatisfactory performance except if the Department fails to pay

the amount withheld within twenty one (21) calendar days after the Contractor satisfactorily completes the remedial actions identified by the Engineer, as provided in AS 36.90.200(e).

The Contractor shall pay interest on retainage withheld from subcontractors, and at an interest rate according to AS 36.90.250 and AS 45.45.010(a).

90-07 PAYMENT FOR MATERIAL ON HAND.

a. Partial Payment. The Engineer will make partial payment for materials designated for incorporation into the work. The material shall:

(1) Meet Contract requirements;

(2) Be delivered and stockpiled at the project or other approved location;

(3) Be supported by invoices, freight bills, and other required information; and

(4) Not be living or perishable.

b. Payment Requests. The Contractor shall make each payment request in writing and:

(1) List stockpiled items, quantities of each, and stockpile location(s);

(2) Certify that materials meet the applicable Contract specifications;

(3) For purchased materials, attach copies of invoices, freight bills, and manufacturer's published storage recommendations;

(4) For Contractor-produced materials, attach production statements showing quantities and dates produced and copies of process quality control test results; and

(5) Include other information requested by the Engineer.

c. Storage Conditions. The Contractor shall protect material from damage or loss while in storage. The Contractor shall:

(1) Physically separate stockpiled materials from other materials at the storage location;

(2) Clearly label materials with the project name and number; and

(3) Store materials per the manufacturer's recommendations.

If storage conditions become unsatisfactory, liens are filed on any materials, or the storage location is changed without approval, the Engineer will deduct any previous payments made for such materials.

d. Method of Payment. The Engineer will include payments for acceptably stockpiled materials in the progress estimate following receipt of the Contractor's written request and all required documentation. The Engineer will:

(1) Pay for materials purchased by the Contractor at the delivered cost but not to exceed 85% of the Contract amount for those items.

(2) Pay for materials produced by the Contractor at up to 50% of the Contract amount for those items.

(3) Deduct the Department's cost to inspect materials stored off the limits of the project.

(4) Deduct partial payment quantities as they are incorporated into the project.

The Contractor shall release and discharge the Department from any liability for damages or delays related to the storage or transport of, and to the payment for, material on hand.

The Department's payment for material on hand will not constitute final acceptance by the Department.

90-08 FINAL PAYMENT. When the project has been completed as provided in Subsection 50-15, the Engineer will prepare the final estimate of the quantities of the various classes of work performed. All prior progress estimates and payments shall be subject to correction in the final estimate and payment. The final estimate will not be processed until the Alaska Department of Labor and Workforce Development has verified that final payment can be released. The Department will not process the final estimate until the Contractor completes Items **a** through **d** in the first paragraph of Subsection 50-16.

If the Contractor certifies the final estimate, or does not file a claim within 90 days of receiving the final estimate, the estimate shall be processed for final payment. Final payment shall consist of the entire sum found to be due after deducting all previous payments and all amounts to be retained or deducted under the provisions of the Contract. Failure to file a claim within 90 days of receiving the final estimate is a waiver of any and all claims relating to or arising from the final estimate.

When the Contractor executes the Certification of Final Estimate (Form 25D-116) and the Contractor's Release (Form 25D-117), final payment will be processed.

The Contractor may reserve any unresolved claims that were timely filed according to Subsection 50-17 by listing those claims as exceptions on the Contractor's Release. Any claims listed as exceptions that were not filed before the Contractor executes the final estimate will be considered null and void. Any claims filed in a timely manner but not listed on the Contractor's Release are waived and deemed released.

If the Contractor fails or declines to approve the final estimate within 90 days but does not file any claims, the Department will consider the estimate approved and process the estimate for final payment. Any subsequently raised claims will be considered null and void.

90-09 ELIMINATED ITEMS. When the Contractor is notified of the elimination of a minor Contract item, the Contractor will be reimbursed for actual work performed and all direct costs incurred before notification. In no case will any payment be made for anticipated profits or overhead.

Should it become necessary to eliminate a major Contract item, an equitable adjustment will be made and the Contract modified in writing accordingly.

90-10 CONSTRUCTION WARRANTY.

a. In addition to all other warranties or remedies, express or implied, available to the Department under this contract, the Contractor warrants that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, workmanship, or design furnished, or performed by the Contractor or any subcontractor or supplier at any tier.

b. This warranty shall continue for a period of one year from the date of final acceptance of the work. If the Department takes possession of any part of the work before final acceptance, this warranty shall continue for a period of one year from the date the Department takes possession. However, this will not relieve the Contractor from corrective items required by the final acceptance of the project work.

c. The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Department real or personal property, when that damage is the result of:

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished by the Contractor.

d. The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for one year from the date of repair or replacement.

e. The Engineer will notify the Contractor, in writing, within seven (7) days after the discovery of any failure, defect, or damage.

f. If the Contractor fails to remedy any failure, defect, or damage within 14 days after receipt of notice, or longer timeframe approved by the Engineer, the Department shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

g. With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall: (1) Obtain all warranties that would be given in normal commercial practice; (2) Require all warranties to be executed, in writing, for the benefit of the Department, as directed by the Engineer, and (3) Enforce all warranties for the benefit of the Department.

h. The provisions of this section shall not limit the Department's rights with respect to latent defects, gross mistakes, or fraud.

90-11 PROJECT CLOSEOUT. Approval of final payment to the Contractor is contingent upon completion and submittal of the items listed below. The final payment will not be approved until the Engineer approves the Contractor's final submittal. The Contractor shall:

a. Provide two (2) copies of all manufacturers warranties specified for materials, equipment, and installations;

b. Provide weekly payroll records (not previously received) from the general Contractor and all subcontractors;

c. Complete final cleanup in accordance with Subsection 40-07, Cleanup;

d. Complete all punch list items identified during the Final Inspection;

e. Provide a certified statement signed by the subcontractors, indicating actual amounts paid to the DBE subcontractors and/or suppliers associated with the project;

f. When applicable per state requirements, return copies of sales tax completion forms;

g. Manufacturer's certifications for all items listed in the MCL;

h. All required record drawings, as-built drawings or as-constructed drawings;

i. Project Operation and Maintenance (O&M) Manual;

j. Security for Construction Warranty, when required;

k. Equipment commissioning documentation submitted, if required.

SECTION 100
CONTRACTOR QUALITY CONTROL PROGRAM (CQCP)

100-01 GENERAL. The Contractor shall assure that all materials and completed construction conform to contract Plans, technical specifications and other requirements, whether manufactured by the Contractor, or procured from subcontractors or vendors. The Contractor shall establish, provide, and maintain an effective Contractor Quality Control Program (CQCP) that details the methods and procedures that will be used. Although guidelines are established and certain minimum requirements are specified herein and elsewhere in the contract technical specifications, the Contractor shall assume full responsibility for accomplishing the stated purpose.

The Contractor shall establish a CQCP that will:

a. Provide qualified personnel to develop and implement the CQCP.

b. Adequately provide for the production of acceptable quality materials.

c. Provide sufficient information to assure that the specification requirements can be met.

d. Document the CQCP process.

The Contractor shall be prepared to discuss and present, at the preconstruction conference, their understanding of the quality control requirements. The Contractor shall not begin any construction or production of materials to be incorporated into the completed work until the CQCP has been reviewed and accepted by the Engineer. No partial payment will be made for materials subject to specific quality control (QC) requirements until the CQCP has been reviewed and accepted.

The QC requirements contained in this section and elsewhere in the contract technical specifications are in addition to and separate from the acceptance testing requirements. Acceptance testing requirements are the responsibility of the Engineer.

A Quality Control (QC)/Acceptance Testing workshop with the Engineer, Contractor, subcontractors, and testing laboratories shall be held prior to start of construction. The workshop shall address QC and acceptance testing requirements of the project specifications. The Contractor shall coordinate with the Engineer on time and location of the QC/Acceptance Testing workshop.

100-02 DESCRIPTION OF PROGRAM.

a. General Description. The Contractor shall establish a CQCP to perform inspection and testing of each item of work for which it is required by the technical specifications, including those performed by subcontractors. This CQCP shall ensure conformance to applicable specifications and Plans with respect to materials, workmanship, construction, finish, and functional performance. The CQCP shall be effective for control of all construction work performed under this Contract and shall specifically include surveillance and tests required by the technical specifications, in addition to other requirements of this section and any other activities deemed necessary by the Contractor to establish an effective level of QC.

b. Contractor Quality Control Program (CQCP). The Contractor shall describe the CQCP in a written document. The written CQCP and plan for QC testing laboratory shall be submitted to the Engineer for review at least 5 calendar days before the preconstruction conference. The Contractor's CQCP and QC testing laboratory must be accepted by the Engineer prior to the start of any production, construction, or off-site fabrication.

The CQCP shall be organized to address, as a minimum, the following items:

a. QC organization;

b. Project progress schedule;

c. Submittals schedule;

d. Inspection requirements;

e. QC testing plan;

f. Documentation of QC activities and distribution of QC reports;

g. Requirements for corrective action when QC and/or acceptance criteria are not met; and

h. Material quality and construction means and methods. Address all elements applicable to the project that affect the quality of the pavement structure including subgrade, subbase, base, and surface course. Some elements that must be addressed include, but is not limited to mix design, aggregate grading, stockpile management, mixing and transporting, placing and finishing, quality control testing and inspection, smoothness, laydown plan, equipment, and temperature management plan.

The Contractor shall add any additional elements to the CQCP that are necessary to adequately control all production and/or construction processes required by this contract.

100-03 QUALITY CONTROL ORGANIZATION. The Contractor's CQCP shall be implemented by the establishment of a separate QC organization. An organizational chart shall be developed to show all QC personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all QC staff by name and function, and shall indicate the total staff required to implement all elements of the CQCP, including inspection and testing for each item of work. If necessary, different technicians can be utilized for specific inspection and testing functions for different items of work. If an outside organization or independent testing laboratory is used for implementation of all or part of the CQCP, the personnel assigned shall be subject to the qualification requirements of Subsections 100-03.a. and 100-03.b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The QC organization shall consist of the following minimum personnel:

a. Program Administrator. The Contractor Quality Control Program Administrator (CQCPA) shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The CQCPA shall have a minimum of 5 years of experience in QC pavement construction with prior QC experience on a project of comparable size and scope as the contract.

Included in the 5 years of paving/QC experience, the CQCPA shall meet at least one of the following requirements:

(1) Professional engineer with 1 year of airport paving experience acceptable to the Engineer.

(2) Engineer-in-training with 2 years of airport paving experience acceptable to the Engineer.

(3) National Institute for Certification in Engineering Technologies (NICET) Civil Engineering Technology Level IV with 3 years of airport paving experience.

(4) An individual with 4 years of airport paving experience acceptable to the Engineer, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.

The CQCPA shall have full authority to institute any and all actions necessary for the successful implementation of the CQCP to ensure compliance with the contract Plans and technical specifications. The CQCPA authority shall include the ability to immediately stop production until

materials and/or processes are in compliance with contract specifications. The CQCPA shall report directly to a responsible officer of the construction firm. The CQCPA may supervise the CQCP on more than one project provided that person can be at the job site within 2 hours after being notified of a problem.

b. QC Technicians. A sufficient number of QC technicians necessary to adequately implement the CQCP shall be provided. These personnel shall be either engineers, engineering technicians, or experienced craftsman with qualifications in the appropriate field equivalent to NICET Level II in Civil Engineering Technology or higher, and shall have a minimum of 2 years of experience in their area of expertise.

The QC technicians shall report directly to the CQCPA and shall perform the following functions:

(1) Inspection of all materials, construction, plant, and equipment for conformance to the technical specifications, and as required by paragraph100-06, and.

(2) Performance of all QC tests as required by the technical specifications and Subsection 100-07.

Certification at an equivalent level of qualification and experience, by a state or nationally recognized organization will be acceptable in lieu of NICET certification, including WAQTC qualification in any modules for which testing will be performed.

c. Staffing Levels. The Contractor shall provide sufficient qualified QC personnel to monitor each work activity at all times. Where material is being produced in a plant for incorporation into the work, separate plant and field technicians shall be provided at each plant and field placement location. The scheduling and coordinating of all inspection and testing must match the type and pace of work activity. The CQCP shall state where different technicians will be required for different work elements.

100-04 PROJECT PROGRESS SCHEDULE. Critical QC activities shall be shown on the project schedule as required by Section 80, paragraph 80-03, *Prosecution and Progress*.

100-05 SUBMITTALS SCHEDULE. The Contractor shall submit a detailed listing of all submittals (e.g., mix designs, material certifications) and shop drawings required by the technical specifications. The listing can be developed in a spreadsheet format and shall include as a minimum:

a. Pay item number;

b. Item description;

c. Description of submittal;

d. Specification Subsection requiring submittal; and

e. Scheduled date of submittal.

100-06 INSPECTION REQUIREMENTS. QC inspection functions shall be organized to provide inspections for all definable features of work, as detailed below. All inspections shall be documented by the Contractor as specified by paragraph 100-09.

Inspections shall be performed as needed to ensure continuing compliance with contract requirements until completion of the particular feature of work. Inspections shall include the following minimum requirements:

a. During plant operation for material production, QC test results and periodic inspections shall be utilized to ensure the quality of aggregates and other mix components, and to adjust and control mix proportioning to meet the approved mix design and other requirements of the technical specifications. All equipment utilized in proportioning and mixing shall be inspected to ensure its

proper operating condition. The CQCP shall detail how these and other QC functions will be accomplished and utilized.

b. During field operations, QC test results and periodic inspections shall be utilized to ensure the quality of all materials and workmanship. All equipment utilized in placing, finishing, and compacting shall be inspected to ensure its proper operating condition and to ensure that all such operations are in conformance to the technical specifications and are within the plan dimensions, lines, grades, and tolerances specified. The CQCP shall document how these and other QC functions will be accomplished and utilized.

100-07 CONTRACTOR QC TESTING FACILITY.

a. For projects that include Item P-401, meet paragraph 401-3.4 Testing Laboratory.

b. For projects that include Item P-501, meet paragraph 501-3.5 Concrete Mix Design Laboratory.

100-08 QC TESTING PLAN. As a part of the overall CQCP, the Contractor shall implement a QC testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by the technical specification for the Pay Item, as well as any additional QC tests that the Contractor deems necessary to adequately control production and/or construction processes.

The QC testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

a. Pay item number (e.g., P401.010.0010);

b. Item description (e.g., Hot Mix Asphalt, Type I, Class A);

c. Test type (e.g., gradation, grade, asphalt content);

d. Test standard (e.g., ASTM or AASHTO test number, as applicable);

e. Test frequency (e.g., as required by technical specifications or Material Sampling and Testing Frequency table when requirements are not stated);

f. Responsibility (e.g., plant technician); and

g. Control requirements (e.g., target, permissible deviations).

The QC testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples according to ASTM D3665. The Engineer shall be provided the opportunity to witness QC sampling and testing.

All QC test results shall be documented by the Contractor as required by paragraph 100-09.

100-09 DOCUMENTATION. The Contractor shall maintain current QC records of all inspections and tests performed. These records shall include factual evidence that the required QC inspections or tests have been performed, including type and number of inspections or tests involved; results of inspections or tests; nature of defects, deviations, causes for rejection, etc.; proposed remedial action; and corrective actions taken.

These records must cover both conforming and defective or deficient features, and must include a statement that all supplies and materials incorporated in the work are in full compliance with the terms of the contract. Legible copies of these records shall be furnished to the Engineer daily. The records shall cover all work placed subsequent to the previously furnished records and shall be verified and signed by the CQCPA.

Contractor QC records required for the contract shall include, but are not necessarily limited to, the following records:

a. **Daily Inspection Reports.** Each Contractor QC technician shall maintain a daily log of all inspections performed for both Contractor and subcontractor operations on a form acceptable to the Engineer. These technician's daily reports shall provide factual evidence that continuous QC inspections have been performed and shall, as a minimum, include the following:

(1) Pay item number and description;

(2) Compliance with approved submittals;

(3) Proper storage of materials and equipment;

(4) Proper operation of all equipment;

(5) Adherence to Plans and technical specifications;

(6) Summary of any necessary corrective actions; and

(7) Safety inspection.

The daily inspection reports shall identify all QC inspections and QC tests conducted, results of inspections, location and nature of defects found, causes for rejection, and remedial or corrective actions taken or proposed.

The daily inspection reports shall be signed by the responsible QC technician and the CQCPA. The Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record. When QC inspection and test results are recorded and transmitted electronically, the results shall be archived.

b. **Daily Test Reports.** The Contractor shall be responsible for establishing a system which will record all QC test results. Daily test reports shall document the following information:

(1) Pay item number and description;

(2) Test designation;

(3) Location;

(4) Date of test;

(5) Control requirements;

(6) Test results;

(7) Causes for rejection;

(8) Recommended remedial actions; and

(9) Retests.

Test results from each day's work period shall be submitted to the Engineer prior to the start of the next day's work period. When required by the technical specifications, the Contractor shall maintain statistical QC charts. When QC daily test results are recorded and transmitted electronically the results shall be archived.

100-10 CORRECTIVE ACTION REQUIREMENTS. The CQCP shall indicate the appropriate action to be taken when a process is deemed, or believed, to be out of control (out of tolerance) and detail what action

will be taken to bring the process into control. The requirements for corrective action shall include both general requirements for operation of the CQCP as a whole, and for individual items of work contained in the technical specifications.

The CQCP shall detail how the results of QC inspections and tests will be used for determining the need for corrective action and shall contain clear rules to gauge when a process is out of control and the type of correction to be taken to regain process control.

When applicable or required by the technical specifications, the Contractor shall establish and utilize statistical QC charts for individual QC tests. The requirements for corrective action shall be linked to the control charts.

100-11 INSPECTION BY THE ENGINEER. All items of material and equipment shall be subject to inspection by the Engineer at the point of production, manufacture or shipment to determine if the Contractor, producer, manufacturer or shipper maintains an adequate QC system in conformance with the requirements detailed herein and the applicable technical specifications and Plans. In addition, all items of materials, equipment and work in place shall be subject to inspection by the Engineer at the site for the same purpose.

Inspection by the Engineer does not relieve the Contractor of performing QC inspections of either on-site or off-site Contractor's or subcontractor's work.

100-12 NONCOMPLIANCE.

a. The Engineer will notify the Contractor in writing of any noncompliance with the CQCP. The Contractor shall, after receipt of such notice, take corrective action.

b. When QC activities do not comply with either the CQCP or the contract provisions, or when the Contractor fails to properly operate and maintain an effective CQCP, and no effective corrective actions have been taken after notification of non-compliance, the Engineer may:

(1) Order the Contractor to replace ineffective or unqualified QC personnel or subcontractors, and /or.

(2) Order the Contractor to stop operations until appropriate corrective action is taken.

SECTION 110
METHOD OF ESTIMATING
PERCENTAGE OF MATERIAL WITHIN SPECIFICATION LIMITS (PWL)

110-01 GENERAL. All statistical Quality Level Analysis (QLA) is computed using the Engineer's Price Adjustment program. The program calculates all intermediate values to 16 decimal places. Pay factors are rounded to the nearest 0.001. The basis of payment for production lots of selected pay items is adjusted using statistical analysis of acceptance test results.

Analysis is based on an Acceptable Quality Level (AQL) of 90 percent. The AQL is the minimum Percent Within Limits (PWL) at which the material is considered fully acceptable and receives a 1.000 pay factor.

As an incentive to produce quality material, a pay factor greater than 1.000 is possible. The maximum pay factor obtainable is 1.050.

110-02 METHOD FOR COMPUTING PWL. The computational sequence for computing PWL is as follows:

The procedure for estimating the PWL uses the number (n), the arithmetic mean ($\overline{X}$) and the sample standard deviation (s), of acceptance test results as shown below. If the sample standard deviation is less than 0.001, then it is set at 0.001.

a. The arithmetic mean is computed:

$$\bar{X} = \frac{\sum_{i=1}^{n} X_i}{n}$$

Where: X_i = test result for sublot i.

$\sum_{i=1}^{n}$ = sum of values from sublot 1 to n.

b. The sample standard deviation is computed:

$$s = \sqrt{\frac{\sum_{i=1}^{n} (X_i - \bar{X})^2}{(n-1)}}$$

The upper specification limit (USL) and lower specification limit (LSL) are equal to the Target Value (TV) plus and minus the allowable tolerances as defined in the pay item specification.

Quality Indexes are computed as shown below. The maximum Quality Index obtainable is 10.000.

c. The Upper Quality Index (Q_U) is computed:

$$Q_U = \frac{USL - \bar{X}}{s}$$

d. The Lower Quality Index (Q_L) is computed:

$$Q_L = \frac{\bar{X} - LSL}{s}$$

The computed Q_U and Q_L are used with AASHTO R 9 to determine the Percent Within Upper Limits (PWL_U) and Percent Within Lower Limits (PWL_L).

e. The PWL used in pay factor determination is:

$$PWL = (PWL_U + PWL_L) - 100$$

When material requirements are one-sided, with only an upper or lower limit, then the PWL is equal to the percent within the side that has a limit. For example, if a material only has an upper specification (maximum) limit, then PWL= PWL_U. Also, two-sided specification limits with one side that cannot be exceeded (like 100% passing) will be analyzed as if they are one-sided.

f. The pay factor (PF) is:

$$PF = 0.55 + \frac{\text{PWLo}}{200}$$

Where: PWL varies from 50.000 to 100.000.

When PWL is less than 50.000, pay factor (PF) = zero.

PART II

TECHNICAL SPECIFICATIONS

ITEM D-701 PIPE FOR STORM DRAINS AND CULVERTS

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains according to these Specifications and in reasonably close conformity with the lines and grades shown on the Plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the Plans and specified below.

701-2.2 PIPE. The pipe shall be of the type called for on the Plans and shall be according to the following appropriate requirements.

Metallic Coated Corrugated Steel Pipe (Type I, IR or II)	AASHTO M 36
Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains	ASTM A760
Galvanized Steel Corrugated Structural Plates and Fasteners for Pipe, Pipe-Arches, and Arches	ASTM A761
Polymer Precoated Corrugated Steel Pipe for Sewers and Drains	ASTM A762
Post-Coated and Lined (Bituminous or Concrete) Corrugated Steel Sewer and Drainage Pipe	ASTM A849
Corrugated Aluminum Alloy Culvert Pipe	ASTM B745
Non-Reinforced Concrete Pipe	ASTM C14
Reinforced Concrete Pipe	ASTM C76
Reinforced Concrete D-Load Pipe	ASTM C655
Reinforced Concrete Arch Pipe	ASTM C506
Reinforced Concrete Elliptical Pipe	ASTM C507
Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers	ASTM C1433
Corrugated Polyethylene (PE) Pipe and Fittings	ASTM F667
Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter	ASTM F714
Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based on Controlled Inside Diameter	ASTM F794
Polyethylene (PE) Large Diameter profile Wall Sewer and Drain Pipe	ASTM F894
Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings	ASTM F949
Steel Reinforced Polyethylene (PE) Corrugated Pipe	ASTM F2435
Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage	ASTM F2562
Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe	ASTM F2736
Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications	ASTM F2764
Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications.	ASTM F2881
Bituminous-Coated Corrugated Metal Pipe and Pipe Arches	AASHTO M 190
Bituminous-Coated Corrugated Aluminum Alloy Culvert Pipe	AASHTO M 190 and M 196
Bituminous-Coated Structural Plate Pipe, Pipe Arch, and Arches	AASHTO M 167 and M 243
Aluminum Alloy Structural Plate for Pipe, Pipe Arch, and Arches	AASHTO M 219
Polyvinyl Chloride (PVC) Pipe	ASTM D3034
Corrugated Polyethylene Drainage Tubing	AASHTO M 252

Corrugated Polyethylene Pipe, 300 mm to 1500 mm (12- to 60-in) Diameter	AASHTO M 294
Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter	AASHTO M 304

701-2.3 CONCRETE. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

701-2.4 RUBBER GASKETS. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C443. Rubber gaskets for PVC pipe and polyethylene pipe shall conform to the requirements of ASTM F477. Rubber gaskets for zinc-coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D1056, for the ``RE'' closed cell grades. Rubber gaskets for steel reinforced thermoplastic ribbed pipe shall conform to the requirements of ASTM F477.

701-2.5 JOINT MORTAR. Pipe joint mortar shall consist of one part by volume of Portland cement and two parts sand. The Portland cement shall conform to the requirements of AASHTO M 85, Type I. The sand shall conform to the requirements of AASHTO M 45.

701-2.6 JOINT FILLERS. Poured filler for joints shall conform to the requirements of AASHTO M 324.

701-2.7 PLASTIC GASKETS. Plastic gaskets shall conform to the requirements of AASHTO M 198 (Type B).

701-2.8. CONTROLLED LOW-STRENGTH MATERIAL (CLSM). Controlled low-strength material shall conform to the requirements of Item P-153. When CLSM is used all joints shall have gaskets.

701-2.9 CULVERT MARKER POSTS. Provide posts made of durable glass fiber and resin reinforced material flexible to -40°F, resistant to impact and ultraviolet light. “T” in cross section, 3.75-inch wide by 72 inches long, and color blue. Provide Carsonite CUM-375 utility marker or approved equal.

701-2.10 CLASS B BEDDING. Use one of the following materials:

a. Suitable material as defined in specification subsection P-152-2.3, except that 100% of the material will pass a 1-inch sieve.

b. P-299 Aggregate Surface Course (when included in this contract).

c. P-209 Crushed Aggregate Base Course (when included in this contract).

701-2.11 END SECTIONS. End sections for metal pipe must be of the same material as the pipe.

CONSTRUCTION METHODS

701-3.1 EXCAVATION. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 18 inches on each side. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inches or 1/2-inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than 75% of the nominal diameter of the pipe. The width of the excavation shall be at least 1 foot greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved Class B bedding material for the full trench width. The Engineer shall determine the depth of removal necessary. The Class B bedding material shall be compacted to provide adequate support for the pipe.

The excavation for pipes that are placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the Plans.

701-3.2 BEDDING. The pipe bedding shall conform to the class specified on the Plans. When no bedding class is specified or detailed on the Plans, the requirements for Class B bedding shall apply. Compact all bedding to 95% of the maximum density determined by ATM 207 or ATM 212.

a. **Rigid Pipe.** Class A bedding shall consist of a continuous concrete cradle conforming to the plan details.

   Class B bedding shall consist of a bed of granular material having a thickness of at least 6 inches below the bottom of the pipe and extending up around the pipe for a depth of not less than 30% of the pipe's vertical outside diameter. The layer of bedding material shall be shaped to fit the pipe for at least 10% of the pipe's vertical diameter and shall have recesses shaped to receive the bell of bell and spigot pipe.

   Class C bedding shall consist of bedding the pipe in its natural foundation material to a depth of not less than 10% of the pipe's vertical diameter. The bed shall be shaped to fit the pipe and shall have recesses shaped to receive the bell of bell and spigot pipe.

b. **Flexible Pipe.** For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows in Table 701-1. Minimum Bedding Depth per Pipe Corrugation Depth.

TABLE 701-1. MINIMUM BEDDING DEPTH PER PIPE CORRUGATION DEPTH

Pipe Corrugation Depth, in.	Minimum Bedding Depth, in.
1/2	1
1	2
2	3
2-1/2	3-1/2

c. **PVC and Polyethylene Pipe.** For PVC and polyethylene pipe, the bedding material shall consist of Class B bedding. The bedding shall have a thickness of at least 6 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

701-3.3 LAYING PIPE. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 JOINING PIPE. Joints shall be made with (1) Portland cement mortar, (2) Portland cement grout, (3) rubber gaskets, (4) plastic gaskets, or (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints in order to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. **Concrete Pipe.** Concrete pipe may be either bell and spigot or tongue and groove. The method of joining pipe sections shall be such that the ends are fully entered and the inner surfaces are reasonably flush and even. Joints shall be thoroughly wetted before mortar or grout is applied.

b. **Metal Pipe.** Metal pipe shall be firmly joined by form fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M 36 for aluminum pipe.

c. **PVC, Polypropylene, and Polyethylene Pipe.** Joints for PVC, polypropylene, and polyethylene pipe shall conform to the requirements of ASTM D3212 when water tight joints are required. Joints for PVC and polyethlyene pipe shall conform to the requirements of AASHTO M 304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M 252 or M 294. Fittings for polypropylene pipe shall conform to the requirements of ASTM F2881, ASTM F2736, or ASTM F2764.

701-3.5 BACKFILLING. Pipes shall be inspected before any backfill is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense.

Use backfill that is suitable material as defined in subsection P-152-2.3 except that:

a. 100% of the material placed within 1 foot of the pipe will pass a 3-inch sieve.

b. If the pipe is placed in or under the structural section, construct the backfill according to the material and construction requirements of the specifications for the applicable lift of material (P-154, P-299, P-209).

When the top of the pipe is even with or below the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches on both sides of the pipe and shall be brought up 1 foot above the top of the pipe or to natural ground level, whichever is greater. Care shall be exercised to thoroughly compact the backfill material under the haunches of the pipe without displacing the pipe. Material shall be brought up evenly on both sides of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the backfill shall be compacted in layers not exceeding 6 inches and shall be brought up evenly on both sides of the pipe to 1 foot above the top of the pipe. The width of backfill on each side of the pipe for the portion above the top of the trench shall be equal to twice the pipe's diameter or 12 feet, whichever is less.

For PVC, polypropylene, and polyethylene pipe, the backfill shall be placed in two stages; first to the top of the pipe and then at least 12 inches over the top of the pipe. The backfill material shall meet the requirements of subsection 701-3.2c.

All backfill shall be compacted to the density required under Item P-152.

It shall be the Contractor’s responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 CULVERT MARKER POSTS. Install culvert marker posts at each culvert inlet and outlet. Drive posts to 18 inches minimum embedment.

METHOD OF MEASUREMENT

701-4.1 PIPE. The length of pipe will be measured according to GCP Section 90, and by the linear feet of pipe in place, completed, and approved. It will be measured along the centerline of the pipe from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types and size will be measured separately. All fittings and end sections will be included in the length of the pipe being measured. All trench excavation and backfill associated with pipe installation is subsidiary to D-701 items used for the work. Removal of existing pipe will be not be measured for payment.

701-4.2 CONCRETE. The volume of concrete for pipe cradles to be paid for will be the number of cubic yards of concrete which is completed in place and accepted.

701-4.3 ROCK. The volume of rock to be paid for will be the number of cubic yards of rock excavated. No payment will be made for the cushion material placed for the bed of the pipe.

701-4.4 CULVERT MARKER POSTS. Culvert marker posts will not be measured for payment.

BASIS OF PAYMENT

701-5.1 PAYMENT. Payment will be made at the contract unit price per linear foot for each kind of pipe of the type and size designated; at the contract unit price per cubic yard of concrete for pipe cradles; and at the contract unit price per cubic yard for rock excavation. Culvert marker posts will not be paid for directly, but will be subsidiary to pipe items. Removal of existing pipe culverts will be subsidiary to D-701 items.

Payment will be made under:

Item D701.010.0036 CS Pipe, 36-inch – per linear foot

MATERIAL REQUIREMENTS

AASHTO M 36	Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
AASHTO M 45	Aggregate for Masonry Mortar
AASHTO M 85	Portland Cement
AASHTO M 157	Ready-Mixed Concrete
AASHTO M 190	Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 196	Corrugated Aluminum Alloy Culverts and Underdrains
AASHTO M 198	Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Watertight Gaskets
AASHTO M 219	Aluminum Alloy Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 243	Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M 252	Corrugated Polyethylene Drainage Tubing
AASHTO M 294	Corrugated Polyethylene Pipe, 300 to 1500 mm Diameter
AASHTO M 304	Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO M 324	Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM A760	Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains

ASTM A761	Steel Galvanized, Corrugated Structural Plates and Fasteners for Pipe, Pipe-Arches, and Arches
ASTM A762	Precoated (Polymeric) Galvanized Steel Sewer and Drainage Pipe
ASTM A849	Post-Coated and Lined (Bituminous or Concrete) Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Corrugated Aluminum Alloy Culvert Pipe
ASTM C14	Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C1433	Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers, 3 – 24 in
ASTM C76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C506	Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C700	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM D1056	Flexible Cellular Materials--Sponge or Expanded Rubber
ASTM D3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667	Corrugated Polyethylene Pipe and Fittings
ASTM F714	Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Polyethylene (PE) Large Diameter profile Wall Sewer and Drain Pipe
ASTM F949	Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings
ASTM F2435	Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Polypropylene (PP) Corrugated Singe Wall Pipe and Double Wall Pipe
ASTM F2764	Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

ITEM F-162 CHAIN-LINK FENCE

DESCRIPTION

162-1.1 This item shall consist of furnishing and erecting a chain-link fence according to these specifications and the details shown on the Plans.

MATERIALS

162-2.1 FABRIC. Chain-link fabric shall meet AASHTO M 181, 9-gage thickness, Type I (zinc-coated steel), Class D coating, and 2-inch mesh.

162-2.2 BARBED WIRE. Barbed wire shall meet AASHTO M 280, Design Number 12-4-5-14R, Standard Grade, Coating Type Z, and Coating Class 3.

162-2.3 POSTS, RAILS AND BRACES. Line posts, rails, and braces shall be galvanized steel pipe, or equivalent galvanized roll-formed sections, and meet AASHTO M 181, Type I, Grade 1 or Grade 2.

The dimensions of the posts, rails, and braces shall be as shown on the Plans.

162-2.4 GATES. Gate frames shall consist of galvanized steel pipe, or equivalent galvanized roll-formed sections, and shall meet AASHTO M 181, Type I, Grade 1 or Grade 2. The fabric shall be of the same type material as used in the fence.

162-2.5 WIRE TIES AND TENSION WIRES. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall meet AASHTO M 181, Type I, Class 3 coating.

162-2.6 MISCELLANEOUS FITTINGS AND HARDWARE. Miscellaneous steel fittings and hardware shall meet AASHTO M 181, Type I, Grade 1 Barbed wire support arms shall withstand a load of 250 pounds applied vertically to the outermost end of the arm.

162-2.7 CONCRETE. Plain and reinforced concrete used in the support of structures or frames shall conform to the requirements of Item P-610.

162-2.8 MARKING. Each roll of fabric shall carry a tag showing the kind of base metal, kind of coating, the gage of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal, and kind of coating.

162-2.9 GATE LOCKS. Gate locks shall be provided for each gate and shall be brass, restricted keyway padlocks with a shackle that is 3/8 inch in diameter having a closed clearance of 2-1/4 inches. The locks shall have control key removable cores and each lock shall have a separate replacement core. All cores shall be keyed differently. The Contractor shall provide 4 keys per lock, and 2 core-removal keys.

162-2.10 KEYLESS LOCKS. When specified, a changeable combination lock shall be furnished with pedestrian gates. The keyless lock shall have a 4- or 5-digit mechanism and shall be an Ilco Unican Model 1011 or approved equal. A sign, 12 inches by 12 inches, shall be securely mounted on the inside of the gate. The sign shall be shielded from view from outside of the gate by means of a hinged 12-inch by 12-inch cover or other means approved by the Engineer. The cover shall have the legend “LIFT AND RECORD COMBINATION FOR REENTRY”. The sign shall be aluminum sheet with white reflective coating. Letters shall be black and a minimum of 3/4-inch tall.

CONSTRUCTION METHODS

162-3.1 GENERAL. The fence shall be constructed according to the details on the Plans and as specified herein using new materials. The Contractor shall be responsible for establishing the fence alignment as shown on the Plans. After the fence line has been staked and prior to fence installation, the Contractor shall review the alignment with the Engineer and make required adjustments to avoid conflicts.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet or such length that the stock can be kept in the proper field. The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

162-3.2 CLEARING FENCE LINE. All trees, brush, stumps, logs, and other debris which would interfere with the proper construction of the fence in the required location shall be removed a minimum width of 10 feet on each side of the fence centerline before starting fencing operations.

162-3.3 INSTALLING POSTS. All end posts, corner posts and pull posts shall be set in concrete at the required dimensions and depths and at the spacing shown on the Plans. Line posts may be either set in concrete as shown on the Plans or driven a minimum of 5 feet embedment. Pull posts shall have a maximum spacing of 250 feet.

Posts shall be spaced as shown on the Plans but in no case shall spacing be more than 10 feet. The post holes shall be in proper alignment so that there is a minimum of 3 inches of concrete on all sides of the posts. The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within 7 days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned embedment depth, a hole 2 inches larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches. After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required embedment depth.

162-3.4 INSTALLING TOP RAILS. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

162-3.5 INSTALLING BRACES. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

162-3.6 INSTALLING FABRIC. The wire fabric shall be firmly attached to the posts and braced in the manner shown on the Plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than 1 inch or more than 4 inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched thereon to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches or less.

162-3.7 ELECTRICAL GROUNDS. Electrical grounds shall be installed along the fence between gate openings and at intervals not exceeding 500 feet. Electrical grounds shall also be installed where a power line passes over the fence. The ground shall be accomplished with a copper clad rod 8 feet long and a minimum of 5/8 inch diameter driven vertically until the top is 6 inches below the ground surface. A No. 6

solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, Paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

162-3.8 CLEANING UP. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction.

METHOD OF MEASUREMENT

162-4.1 Chain-link fence will be measured along the top of the fence from center to center of end posts, excluding the length occupied by gate openings.

162-4.2 Gates will be measured as complete units.

BASIS OF PAYMENT

162-5.1 Payment will be made at the contract unit price per linear foot for fence and per each for gates.

Work and materials involved in clearing and disposal of material along the fence line, rock excavation, and ground rod installation are subsidiary.

Payment will be made under:

Item F162.010.0008	8-feet Chain-Link Fence – per linear foot
Item F162.030.0004	Single Swing Gate, 4-feet Wide – per each

MATERIAL REQUIREMENTS

AASHTO M 181	Chain-Link Fence
AASHTO M 280	Metallic-Coated (Carbon) Steel Barbed Wire
ASTM A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A123	Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A392	Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A491	Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
ASTM A653	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A824	Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM A1011	Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High Strength Low Alloy with Improved Formability, and Ultra High Strength
ASTM B117	Operating Salt Spray (Fog) Apparatus
ASTM B221	Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes

ASTM B429	Aluminum-Alloy Extruded Structural Pipe and Tube
ASTM F668	Polyvinyl Chloride(PVC) and Other Organic Polymer Coated Steel Chain-Link Fence Fabric
ASTM F1043	Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM F1083	Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F1183	Aluminum Alloy Chain Link Fence Fabric
ASTM F1345	Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric
ASTM G152	Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G154	Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ASTM G155	Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials
FAA-STD-019	Lighting and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment

ITEM F-170 STEEL BOLLARD

DESCRIPTION

170-1.1 This item consists of replacing and/or installing new steel bollards as shown on the Plans or as directed by the Engineer.

MATERIALS

170-2.1 Use materials that conform to the following:

a. Steel Pipe. Use standard weight, Grade B, galvanized, welded, or seamless pipe meeting ASTM A53.

b. Concrete. Use commercial grade concrete with a minimum 28-day compressive strength of 2,500 pounds per square inch (psi) or an approved, pre-mixed, sacked concrete.

c. Paint. Use single component, moisture cure, polyurethane (SC-MC-U) zinc primer. Use single component, moisture cure, aliphatic polyurethane (SC-MC-ALIP-U) safety yellow paint for the top coats.

d. Retroreflective Bands. Use flexible high intensity sheeting, pressure sensitive type, cut to form 6-inch wide reflector bands meeting AASTM D4956, Type III-A. Use sheeting with a smooth sealed outer surface.

e. Bollard Cover. HDPE molded plastic bollard cover shall be compatible with the bollard dimensions specified in the Plans. HDPE material shall contain ultraviolet protection additives and have a flexural modulus of 200,000 psi and a tensile strength of 4,000psi. Color shall be yellow unless otherwise specified in the Plans. Use manufacturer's recommended adhesive.

CONSTRUCTION REQUIREMENTS

170-3.1 Install bollards plumb, in hand or mechanically dug holes, backfilled with the specified material, and thoroughly compacted to the satisfaction of the Engineer.

170-3.2 PAINTING. Paint bollards with one coat of primer and two top coats of safety yellow. Ensure that the surfaces are free of all oil, grease, dirt, abrasive residues, and all other foreign substances prior to application of coatings. Maintain the surface to be coated at a minimum temperature of 5°F above the dew point for the duration of coating application. Adhere to these preparation requirements in addition to any requirements by the coating manufacturer. Repair any nicks, scratches or other paint damage resulting from shipping and handling at the site.

170-3.3 REFLECTIVE BANDS. Apply a minimum of two white retroreflective bands placed 3-4 inches from the top with a maximum of 6 inches between the bands.

METHOD OF MEASUREMENT

170-4.1

a. Lump Sum. No measurement of quantities will be made.

b. Unit Prices. By the number of bollards specified, installed and accepted as completed units in place. Where replacement is specified, each unit shall include removal and installation.

BASIS OF PAYMENT

170-5.1 Payment will include all labor, equipment, materials, and personnel to complete the work described in the Plans.

Payment will be made under:

Item F170.010.0000	Steel Bollard – per each

ITEM G-100 MOBILIZATION AND DEMOBILIZATION

DESCRIPTION

100-1.1 This item consists of preparatory work and operations, including but not limited to operations necessary to move personnel, equipment, and supplies to the project site; to establish offices, buildings and other facilities, except as provided under Item G-130; to perform all other work and operations, including costs incurred, before beginning work on the project; and to complete similar demobilization activities, including submittals such as as-builts, certificates, payrolls, civil rights reports, equipment warranties, etc.

100-2.1 POSTED NOTICES. Prior to commencement of construction activities, the Contractor must display posters as provided under Section GCP 70. These notices must remain posted until final acceptance of the work by the Department.

METHOD OF MEASUREMENT

100-3.1 Payment for mobilization and demobilization will be made in partial payments as follows:

a. When equipment and supplies are landed in serviceable condition at the project site and other necessary preparation have been completed so that work can commence on other pay items, 60% of the pay item.

b. When 25% or more of the original contract is earned, an additional 20%.

c. With Final Payment, the remaining 20%.

The Department reserves the right to require submittal of invoices, receipted bills, payrolls, and other appropriate documents to justify any or all payments under this item.

BASIS OF PAYMENT

100-4.1 Payment will be made at the contract lump sum price for mobilization and demobilization. This price and payment shall be full compensation for all costs associated with this item.

Payment will be made under:

Item G100.010.0000 Mobilization and Demobilization – per lump sum

ITEM G-115 WORKER MEALS AND LODGING, OR PER DIEM

DESCRIPTION

115-1.1 This item consists of complying with the Alaska Department of Labor and Workforce Development (DOLWD) requirements for Worker Meals and Lodging, or Per Diem; as described in the Laborers' and Mechanics' Minimum Rates of Pay (Pamphlet 600), current issue.

Ensure subcontractors comply with the DOLWD requirements. The Pamphlet 600 is available on the DOLWD Division of Labor Standards and Safety internet page: https://labor.alaska.gov/lss/pamp600.htm.

Ensure facilities meet the Alaska Administrative Code 8 AAC 61.1010 and 8 AAC 61.1040 Occupational Safety and Health Standards, 18 AAC 31 Alaska Food Code, and U. S. Code of Federal Regulations 29 CFR Section 1910.142 Temporary Labor Camps.

Do not consider the cost of Meals and Lodging or Per Diem in setting wages for the worker or in meeting wage requirements under AS 23.10.065 or AS 36.05.

METHOD OF MEASUREMENT

115-2.1 Progress payments for Worker Meals and Lodging, or Per Diem will be computed as equivalent to the percentage, rounded to the nearest whole percent, of the original contract amount earned.

BASIS OF PAYMENT

115-3.1 Payment will be made at the contract lump sum price for Worker Meals and Lodging, or Per Diem. This price and payment shall be full compensation for all costs associated with this item.

Payment will be made under:

Item G115.010.0000	Worker Meals and Lodging, or Per Diem – per lump sum

ITEM G-120 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM

DESCRIPTION

120-1.1 Provide Disadvantaged Business Enterprises (DBEs), as defined in Title 49 CFR Part 26, the opportunity to participate fairly with other contractors in the performance of contracts financed with federal funds. The Contractor and subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor will carry out applicable requirements of 49 CFR Part 26 in the award and administration of U.S. DOT assisted contracts.

The Department, in coordination with the Federal Aviation Administration (FAA), adopted a Race-Neutral DBE Program in the Central and Southcoast Regions with a DBE Utilization Goal of 6.1% for Southcoast Region and 8.3% for Central Region's FAA Federal-Aid program. Although the Race-Neutral program does not establish or require individual project DBE Utilization Goals, 49 CFR establishes the Bidder is responsible to make a portion of the work available to DBEs and to select those portions of the work or material needs consistent with the available DBEs to facilitate DBE participation.

If the Department, in collaboration with our contractors, does not meet the overall program DBE Utilization Goal and cannot demonstrate good faith effort to meet the program goal, the program may be modified to Race-Conscious, with individual DBE Utilization Goals established for each Federal-Aid project. The Department and FAA will use the data collected under Item G-120 to evaluate the program for compliance with Item G-120 and with 49 CFR Part 26.

120-1.2 INTERPRETATION. This section implements the requirements of 49 CFR Part 26, and the Department's federally approved DBE Program.

120-1.3 ESSENTIAL CONTRACT PROVISION. Failure to comply with the provisions of this section is a material breach of contract, which may result in cancelation of intent to award, contract termination, or other remedy as DOT&PF deems appropriate. Failure to comply with this section is justification for debarment action as provided in AS 36.30.640(4).

120-1.4 DEFINITIONS AND TERMS.

a. **Civil Rights Office.** The Department's Civil Rights Office. (CRO)

b. **Commercially Useful Function.** Action within the scope of the Contract where a Disadvantaged Business Enterprise (DBE) is responsible for execution of the work and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. The DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself.

c. **Contract Compliance Officer.** Individual within the Department's CRO with the authority to administer the Department's compliance programs.

d. **Disadvantage Business Enterprise (DBE).** A commercial entity which is a for-profit small business certified in accordance with 49 CFR Part 26 and listed in the Alaska DBE Directory.

e. **DBE Broker.** A DBE certified for the delivery of creditable materials, supplies, equipment, transportation/hauling, insurance, bonding, etc., within its certified category, that is necessary to complete the project. A DBE Broker of materials certified in a supply category must be responsible for scheduling the delivery of materials and ensuring that the materials meet specifications before credit will be given.

f. DBE Key Employee. Employee of the DBE who is identified by the DBE owner in the DBE's certification file at the CRO.

g. DBE Manufacturer. A DBE certified in a supply category that changes the shape, form, or composition of original material in some way. The DBE Manufacturer must provide that altered material to the general public or the construction industry at large on a regular basis.

h. DBE On-Site Representative. On-site representatives approved by the DBE owner and the CRO to represent a DBE owner. These representatives must have technical knowledge and the ability to answer questions regarding the work being performed on a project.

i. DBE Regular Dealer. A DBE certified in a supply category who operates in a manner consistent with industry practice and who:

(1) maintains an in-house inventory on a regular basis of the particular product provided to this project; and

(2) keeps an inventory in an amount appropriate for the type of work using that product; and

(3) offers that inventory for sale to the general public or construction industry at large (private and public sectors), not just supplied as needed on a project by project basis during the construction season, except where the product requires special or heavy equipment for delivery and the DBE possesses and operates this equipment on a regular basis throughout the construction season in order to deliver the product to the general public or construction industry at large. If the distribution equipment is rented or leased, it must be on a repetitive, seasonal basis; and may additionally fabricate (assemble large components) for use on a construction project, consistent with standard industry practice, for delivery to the project.

(a) A person may be a DBE Regular Dealer in bulk items such as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business, if the person both owns and operates distribution equipment for the products. Any supplementing of DBE Regular Dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis.

j. DBE Utilization Goal. The percent of work to be performed by certified DBEs.

k. DBE Officer. Individual designated in writing as a representative of the Contractor concerning DBE issues.

l. Good Faith Effort (GFE). Bidder's actions, performed prior to bid opening and demonstrated through detailed and comprehensive documentation, to take all necessary and reasonable steps to achieve DBE participation. Lower case "good faith effort", refers to the Department's and all or contractors' collaborative efforts to meet the overall program DBE Utilization Goal.

m. Plan Holder Self-Registration List (PHSRL). The Department's online portal that allows contractors, DBEs and non-DBEs to self-register as an interested contractor to bid.

n. Race-Conscious Participation. DBE participation used to meet an individual project specific DBE Utilization Goal.

o. Race-Neutral DBE Participation. DBE participation when no DBE Utilization Goal is specified in the Contract and DBE participation that exceeds the goal amount when an individual project specific DBE Utilization Goal is specified in the Contract.

120-2.1 RESERVED.

COMPLIANCE

120-3.1 DETERMINATION OF COMPLIANCE.

a. Phase I - Bid. All Bidders' GFEs must be completed prior to bid opening.

b. Phase II - Award. The apparent low bidder shall submit evidence of DBE commitment(s) within 5 working days after receipt of written notification by the Department of the successful low bid. The apparent low bidder may not supplement its DBE efforts after opening, nor offer new or additional DBE participation after submitting the DBE Utilization Report (Form 25A-325C).

(1) Written DBE Commitment. Complete Form 25A-326 for each DBE subcontractor.

(2) DBE Utilization Report. Submit a completed DBE Utilization Report Form 25A-325C. All listed DBEs must be certified in the appropriate work categories prior to bid opening to be used to meet the DBE contract goal.

(3) GFE Documentation. Submit a completed Summary of GFE Documentation Form 25A-332A (with attachments) and Contact Report Form 25A-321A.

120-3.2 GOOD FAITH EFFORT (GFE). Although evaluation of GFE for sufficiency is not a condition of award, documenting GFE is required and is necessary for the Department's and FAA's determination of compliance with 49 CFR Part 26.

a. GFE Criteria. If the Department does not meet the overall program DBE Utilization Goal, the Department and FAA will use the following criteria to judge whether the Department, in collaboration with our contractors, demonstrated good faith effort to meet the overall program DBE Utilization Goal.

(1) Consider All Subcontractable Items. Before bid opening, seek DBE participation by considering those portions of the work or material needs consistent with the available DBEs to facilitate DBE participation.

(2) Initial DBE Notification. Contact DBEs listed in the Department's Plan Holders Self-Registration List for the particular project being bid at least 7 calendar days prior to bid opening to solicit their interest. Log each contact with a DBE firm on a Contact Report, Form 25A-321A.

Give DBEs at least 7 calendar days to quote. The bidder may reject DBE quotes received after the deadline. Responsive DBE quotes should be accepted unless they are determined non-competitive. Consistently apply deadlines for quote submission and responsiveness determinations for DBEs and non-DBEs.

Methods of initial and follow up notification are:

(a) By fax with a confirmation receipt of successful transmission to the DBE's fax number listed in the DBE Directory. A fax transmission without receipt of successful transmission is unsatisfactory.

(b) By email to the DBE's email address listed in the DBE Directory, with confirmation of successful receipt. Email without confirmation of successful receipt is unsatisfactory.

(c) By telephone solicitation made to the DBE's telephone number listed in the DBE Directory, with a record of the date and time of the telephone contact. Telephone solicitation without a record of date and time is unsatisfactory.

(d) By publication, with the names and dates of each advertisement in which a request for DBE participation was placed. Attach copies of advertisements or proof of publication.

(3) Non-Acceptance of DBE Quotes. When a DBE quote is not accepted, the work must be performed by the non-DBE subcontractor whose quote was used to provide the basis of the determination or by your own forces if your forces were the basis of the determination. Include evidence in support of the determination not to use the DBE subcontractor.

Payments received by a non-DBE subcontractor during the execution of the Contract shall be consistent with the accepted quote. This does not preclude increases due to change documents issued by the Department.

(4) Assistance to DBEs. Provide DBEs with:

(a) Information about bonding or insurance required by the bidder.

(b) Information about securing equipment, supplies, materials, or business development related assistance or services.

(c) Adequate information about the requirements of the contract regarding the specific item of work or service sought from the DBE.

(d) Document all efforts to provide assistance to DBEs on Federal-Aid projects.

(5) Follow-up DBE Notifications. If there is no response from the initial DBE notification, contact the DBEs again to determine if they will be quoting.

Failure to submit a quote by the deadline is evidence of the DBE's lack of interest in bidding. Log follow-up contacts on the Contact Report Form 25A-321A.

(6) GFE Evaluation. The Department will review the GFE documentation for content but will not evaluate sufficiency. Failure to provide GFE documentation may result in cancellation of the notice of intent to award and forfeiture of the bid security according to Subsection 30-03.

b. Reserved.

120-3.3 DBE CREDITABLE AND NON CREDITABLE WORK.

a. DBE Creditable Work. The Commercially Useful Function work items and creditable dollar amounts shown on the DBE Utilization Report, Form 25A-325C, shall be included in any subcontract, purchase order or service agreement with that DBE.

b. DBE Decertification.

(1) If a DBE performing a Commercially Useful Function loses its DBE certification at any time prior to execution of a subcontract, purchase order or service agreement, as the result of a determination of ineligibility pursuant to 49 CFR Part 26.87, the work of that firm will not be credited toward the DBE Utilization Goal and the Contractor must either:

(a) meet the contract goal by subcontracting with an eligible DBE firm or demonstrate a GFE to do so; or

(b) continue with the decertified DBE and find other work not already committed to DBEs in an amount that meets or exceeds the DBE Utilization Goal.

(2) If a DBE performing a Commercially Useful Function loses its DBE certification after execution of a subcontract, purchase order or service agreement, as the result of a determination of ineligibility pursuant to 49 CFR Part 26.87, the de-certified DBE may continue to perform, and the work may be credited toward the DBE Utilization Goal.

(3) If a DBE goes out of business and cannot perform the work, the Contractor must meet the contract goal by subcontracting with an eligible DBE Firm or demonstrate a GFE to do so.

The provisions of 120-3.03(3) Termination of a DBE and 120-3.03(4) DBE Replacement or Substitution do not apply to this section.

A Contractor must notify the CRO within one business day if they become aware of any change in a DBE's circumstances that might lead to a DBE's decertification.

c. Termination of a DBE.

(1) In accordance with 49 CFR 26.53(f)(1) the Contractor shall not terminate a DBE without good cause and the prior written consent of the Engineer. For purposes of this paragraph, good cause includes the following circumstances:

(a) DBE defaults on their obligation for any reason;

(b) The DBE fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE to perform its work on the subcontract results from the bad faith or discriminatory action of the Contractor.

(c) The DBE fails or refuses to meet the Contractor's reasonable, nondiscriminatory bond requirements;

(d) The DBE becomes bankrupt, insolvent, or exhibits credit unworthiness;

(e) The DBE is ineligible to work on public works projects because of suspension and debarment proceedings pursuant 2 CFR Parts 180, 215, and 1,200 or applicable state law;

(f) The Engineer determines the DBE is not a responsible contractor.

(g) The DBE voluntarily withdraws from the project and provides a written notice of its withdrawal;

(h) The DBE is ineligible to receive DBE credit for the type of work required;

(i) A DBE owner dies or becomes disabled with the result that the DBE is unable to complete its work; or

(j) Other documented good cause that the Engineer determines, compels the termination of the DBE, provided that good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE was engaged or so that the Contractor can substitute another DBE or non-DBE after contract award.

(2) The Contractor must give written notice to the DBE of its intent to request to terminate and/or substitute, and the reason for the request. The request to terminate and/or substitute must be submitted to the Engineer.

(3) The Contractor must give the DBE 5 working days to respond to the written notice. Any response from the DBE must be submitted to the Engineer.

d. DBE Replacement or Substitution.

(1) The Contractor shall submit to the Engineer a written request to replace or substitute a DBE who fails or refuses to execute a written subcontract or who is terminated under 120-3.03(3).

(2) If the Contractor cannot obtain replacement DBE participation, the DBE Utilization Goal will not be adjusted. However, the Engineer may consider the following criteria as satisfying that portion of DBE participation that cannot be replaced:

(a) The Contractor was not at fault or negligent and that the circumstances surrounding the replacement or substitution were beyond the control of the Contractor; and

(b) The Contractor is unable to find replacement DBE participation at the same level of DBE commitment and has adequately performed and documented the GFE expended in accordance with Subsection 120-3.02; or

(c) It is too late in the project to provide any real subcontracting opportunities for DBEs.

If the Engineer agrees that additional DBE participation is not available, the DBE may be replaced or substituted with a non-DBE or the Contractor may self-perform the work.

120-3.4 COMMERCIALLY USEFUL FUNCTION (CUF).

a. Creditable Work. Measuring the DBE Utilization Goal will be based upon the actual dollars paid to the DBEs for creditable CUF work on this project. This is determined by the Engineer in accordance with this section. CUFs are limited to:

(1) Prime Contractors;

(2) Subcontractors;

(3) Manufacturers;

(4) Regular Dealers;

(5) Brokers; or

(6) Joint Ventures

b. Determination of CUF. In order for the CUF work of the DBE to be credited toward the goal, the Contractor will ensure that the DBE is certified in the appropriate category at the time of the submittal of the subcontract, or the issuance of a purchase order or service agreement. Subcontracts, purchase orders and service agreements shall be consistent with the written DBE commitment.

(1) The CUF performed by a DBE certified in a supply category will be evaluated by the Engineer to determine whether the DBE performed as either a broker, regular dealer, or manufacturer of the product provided to this project.

(2) The following factors will be used in determining whether a DBE trucking company is performing a CUF:

(a) The DBE must be responsible for the management and supervision of the entire trucking operation for which it is performing on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting DBE goals.

(b) The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.

(c) The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.

(3) The Contractor will receive credit for the CUF performed by DBEs as provided in this Section. Contractors are encouraged to contact the Engineer in advance of the execution of the DBE's work or provision of goods or services regarding CUF and potential DBE credit.

(4) The DBE may perform work in categories for which it is not certified, but only work performed in the DBE's certified category meeting the CUF criteria may be credited toward the DBE Utilization Goal.

(5) DBE work shall conform to the following requirements to be a CUF:

(a) It will be necessary and useful work required for the execution of the Contract.

(b) The scope of work will be distinct and identifiable with specific contract items of work, bonding, or insurance requirement.

(c) It will be performed, controlled, managed, and supervised by employees normally employed by and under the control of the certified DBE. The work will be performed with the DBE's own equipment. Either the DBE owner or DBE On-Site Representative will be at the work site and responsible for the work. Leased equipment may also be used provided the DBE has exclusive use of the equipment and it is operated by a driver the DBE employs. In remote locations or rare situations, a DBE may use equipment and/or personnel from the Contractor or its affiliates. Should this situation arise, a prior arrangement must be in place. The duration of the arrangement must be short term and prior written approval from the Engineer must be obtained.

(d) The manner in which the work is sublet or performed will conform to standard industry practice within Alaska, as determined by the Department. The work or provision of goods or services will have a market outside of the DBE program (and must also be performed by non-DBE firms within the Alaskan construction industry). Otherwise, the work or service will be deemed an unnecessary step in the contracting or purchasing process and no DBE credit will be allowed.

There will be no DBE credit for lower-tier non-DBE subcontract work.

(e) The cost of the goods and services will be reasonable and competitive with the cost of goods and services outside the DBE program within Alaska. Materials or supplies needed as a regular course of the Contractor's operations such as fuel, maintenance, office facilities, portable bathrooms, etc. are not creditable.

The cost of materials actually incorporated into the project by a DBE subcontractor is creditable toward the DBE goal only if the DBE is responsible for ordering and scheduling their delivery and fully responsible for ensuring that they meet specifications. The cost of materials purchased from the contractor or its affiliates is not creditable.

(f) Subcontract work, with the exception of truck hauling, shall be sublet by the same unit of measure as is contained in the Bid Schedule unless approved in advance by the Engineer.

(g) The DBE will control all business administration, accounting, billing and payment transactions. The Contractor cannot perform these functions for the DBE.

In accordance with AS 36.30.420(b), the Engineer may inspect the offices of the DBE and audit their records to assure compliance.

c. Rebuttal of a Finding of No CUF. Consistent with the provisions of 49 CFR Part 26.55(c)(4)&(5), before the Engineer makes a final finding that no CUF has been performed by a DBE, the Engineer will coordinate transmittal of the presumptive finding to the Contractor, who will in-turn, notify the DBE. The Contractor will provide the DBE the opportunity to provide rebuttal information. The Contractor shall present the information to the Engineer.

The Engineer will make a final determination on whether the DBE is performing a CUF. Under no circumstances will the Contractor take any action with respect to the DBE until the final determination is made. The Engineer's decisions on CUF matters are subject to review by the Department, but are not administratively appealable to the DOT&PF.

d. Monthly Required Reporting. On a monthly basis, the Contractor shall submit the Monthly Summary of DBE Participation, Form 25A-336, to the Engineer. Reports are due by the 15th of the following month. Also attach copies of canceled checks or bank statements that identify payer, payee, and amount of transfer to verify payment information shown on the form.

DETERMINING DBE CREDIT

120-4.1 The Contractor is entitled to count toward the DBE Utilization Goal, monies actually paid to certified DBEs for CUF work performed by the DBE as determined by the Engineer. The Contractor will receive credit toward the DBE Utilization Goal, as follows:

a. Credit for the Commercially Useful Function of a DBE prime contractor is 100 percent of the monies actually paid to the DBE under the contract for creditable work and materials in accordance with 49 CFR Part 26.55.

b. Credit for the CUF of a subcontractor is 100 percent of the monies actually paid to the DBE under the subcontract for creditable work and materials.

c. Credit for the CUF of a subcontractor performing hauling/transportation is 100 percent of the monies actually paid to the DBE under the subcontract for creditable work for those firms certified in the 100 percent category. Credit for the CUF of a subcontractor performing hauling/transportation is 5 percent of the monies actually paid to the DBE under the subcontract for creditable work for those firms certified in the 5 percent credit category.

d. Credit for the CUF of a manufacturer is 100 percent of the monies paid to the DBE for the creditable materials manufactured.

e. Credit for the CUF of a regular dealer of a creditable material, product, or supply is 60 percent of its value. The value is the actual cost paid to the DBE not to exceed the bid price for such item.

f. Credit for the CUF of a broker performed by a DBE certified in a supply category for providing a creditable material, product or supply is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5 percent of the cost of the procurement contract for the creditable item.

g. Credit for the CUF of a broker performed by a DBE certified in a bonding or insurance category is limited to a reasonable brokerage fee, not to exceed 5 percent of the premium cost.

h. Credit for the CUF of a joint venture (JV) either as the prime contractor or as a subcontractor may not exceed the percent of the DBE's participation in the JV agreement, as certified by the CRO. The DBE joint venture partner will be responsible for performing all of the work as delineated in the certified JV agreement.

ACHIEVEMENT OF DBE GOALS

120-5.1 Work under this item is subsidiary to other contract items and no payment will be made for meeting or exceeding the DBE Utilization Goal.

If the Contractor fails to utilize the DBEs listed on Form 25A-325C as scheduled or fails to submit proof of payment, requested documentation, or otherwise cooperate with a DBE review or investigation, the Department will consider this to be unsatisfactory work. If the Contractor fails to utilize GFE to replace or substitute a DBE, regardless of fault (except for Subsection 120-3.03(4)(b)(3)), the Department will also consider this unsatisfactory work. Unsatisfactory work may result in disqualification of the Contractor from future bidding under Subsection 20-13 and withholding or progress payments consistent with Subsection 90-06.

ITEM G-130 SERVICES TO BE FURNISHED BY THE CONTRACTOR

DESCRIPTION

130-1.1 Furnish and maintain facilities and services specified in the Contract for the Department's project administrative personnel to use during the project. Services include heat, electrical power (NEC compliant), water and any others required to operate the facilities. All furnished facilities remain the property of the contractor when the work is completed.

The Engineer may delete any G-130 Items, by Directive within five working days after the Preconstruction Conference. If any G-130 Items are deleted within the specified period, Subsection 90-09, Eliminated Items, shall not apply to the deleted G-130 Items.

REQUIREMENTS

130-2.1 FIELD OFFICE. Furnish and maintain a suitable office for the Engineer to use during construction. Make the Field Office available for occupancy two weeks before commencing work on the project through two weeks after Project Completion

a. Submit office proposal to the Engineer prior to procurement or transporting office to the project. The Engineer will approve the office general condition, location, access, features, and physical layout prior to beginning any office setup work. If this office is part of your building, completely partition it from the rest of the structure and provide a separate outside door equipped with a lock.

b. Provide at least the following minimum requirements, or as approved by the Engineer:

(1) Floor space of at least 500 square feet (ft^2)

(2) Window area of at least 60 ft^2

(3) Lockable outside door(s)

(4) 6 each plastic folding tables, 8 feet long

(5) Shelf space of at least 24 linear feet

(6) Adequate heating and cooling devices, and fuel or power to run the devices, to maintain an office temperature between 65°F and 75°F

(7) Adequate ventilation

(8) Continuous supply of drinking water from an approved source or commercial supplier

(9) Toilet and Sanitary facilities including adequate hand soap, hand sanitizer, toilet paper, and paper towels

(10) Janitorial services at least weekly

(11) In addition to any power required for adequate heating and cooling devices, provide electrical service and facilities as referenced in 130-2.8a

(12) Internet service and phone as referenced in 130-2.7.

(13) One multifunction Color Printer/Scanner/Copier meeting the following requirements:

(a) New or like-new condition

(b) Printing/copying at least 32 pages per minute (ppm)

(c) Scan speed of 40 ppm at 400 dots per inch (DPI) in color, at a minimum

(d) Print/Scan/Copy 8.5 inches by 11 inches and 11 inches by 17 inches in color, at a minimum

(e) Supports network scanning (FTP and SMB Support)

(f) Supports network printing (PCL and Postscript)

(g) Network card included

(h) Automatic Document Feeder

(i) Furnish ink and toner and perform repairs and maintenance as necessary

(j) The Printer/Scanner/Copier remains property of the Contractor upon completion of the contract.

(14) Make the field office accessible according to the requirements of 2006 U.S. DOT ADA Standards for Transportation Facilities. Provide at least one designated handicap parking space.

(15) One AED (Automated External Defibrillator), with carrying case and properly marked wall cabinet. Provide training on how to use the AED.

(16) One combination Smoke and Carbon Monoxide Detector minimum. Provide combination Smoke and Carbon Monoxide Detectors in any location requested by the Engineer.

(17) One 25 Person Trauma First Aid Kit.

(18) 2 mobile hotspots with month-to-month data Plans. Include car charger and 5 gigabytes of data usage per month.

c. Provide electrical power to the Department's portable concrete compressive strength lab, as identified in 130-2.8i, if there are any bridge items in the bid schedule.

d. Provide electrical power to the Department's portable nuclear storage trailer as identified in 130-2.8h.

e. Provide the following to the Department's portable asphalt lab if there are any asphaltic materials in the bid schedule and item 130-2.2 Field Laboratory does not appear in the bid schedule.

(1) Electrical service as identified in 130-2.8d Asphalt Laboratory.

(2) Internet service as specified for the Field Laboratory.

All long distance calls made by State personnel will be paid by the State. Installation and maintenance fees, local calls, connection fees and internet service provider fees, and all other fees shall be paid by the Contractor. Paper used by the copier/scanner/printer will be paid by the State.

130-2.2 FIELD LABORATORY. Furnish and maintain a field laboratory for the Engineer to use exclusively throughout the contract. Provide a completely functional installation two weeks before commencing construction work through two weeks after Project Completion.

a. Site. Grade and compact a site for the lab acceptable to the Engineer. Locate and level the structure on this site. If subsequent ground movement causes an unlevel or unstable condition, re-level or re-locate the facility as directed.

b. Main Lab. Provide a weatherproof structure suitable to field test construction materials, with the following minimum functional requirements:

(1) Floor space of 300 ft^2

(2) Two 10-ft^2 windows that open and lock

(3) Lockable door(s)

(4) Work bench(es), 2-1/2 feet wide 16 feet long, 3 feet tall

(5) Shelf space, 1 foot by 16 feet

(6) One 18-inch deep sink with attached industrial faucet with hand sprayer attachment and approved drain

(7) A gravity-fed 250-gallon tank or pressurized constant water supply of acceptable quality.

(8) Electrical service as indicated in 130-2.8b Field Laboratory

(9) Heating equipment suitable to maintain a uniform room temperature of 65°F to 75°F

(10) Storage cabinet, 3 feet wide by 3 feet tall by 3 feet deep, lockable, securely fixed to an inside wall with a hinged door opening outward

(11) Office desk and 2 chairs

(12) One combination Smoke and Carbon Monoxide Detector minimum. Provide Combination Smoke and Carbon Monoxide Detectors at any location requested by the engineer.

(13) One 25 person Trauma First Aid Kit.

(14) Continuous supply of drinking water from an approved source or commercial supplier

(15) Toilet and Sanitary Facilities including adequate hand soap, hand sanitizer, toilet paper, and paper towels

(16) Internet service and phone as referenced in 130-2.7.

If the lab is a mobile unit mounted on axles and wheels, block the structure under the frame so that the wheels do not touch the ground and the blocking rests firmly on the prepared site.

c. Auxiliary Lab. Provide a separate weatherproof shed within 20 feet of the main lab structure with the following minimum functional requirements:

(1) Floor 8 feet by 12 feet, ceiling height 8 feet

(2) Door 4 feet wide and window 5 ft^2 that opens and locks

(3) Electrical service as identified in 130-2.8 c, Field Laboratory Out Building

(4) Work table 1-1/2 feet wide, 3 feet long, 3 feet tall, capable of supporting 250 pounds and affixed to an inside wall as directed

(5) Concrete-slab floor, 8 feet by 8 feet and 4 inches thick, cast-in-place or pre-cast. Install anchor bolts in the floor to accommodate the mounting pattern of the Gilson sieving machine at a location as directed.

(a) Comply with 1.above for slab foundation requirements.

(b) Found the slab directly on the prepared site.

d. Access. For all types of installations, if the entryway is located higher than a single 7-inch rise, provide the following:

(1) Stairway, 3 feet wide with 11-inch tread and 7-inch rise

(2) Landing, 4 feet by 4 feet centered on the entryway

(3) Handrail(s) firmly affixed to the stairway

e. Lab Equipment and Services. Provide the following lab equipment and services:

(1) Propane necessary for the lab operation, including two 100-pound tanks, regulators, hoses, fittings, and incidentals for a functional system

(2) Specialized sampling equipment such as belt templates or belt sampling devices as required

(3) Fuel and power necessary to continuously operate the facilities

f. Provide the following to the Department's portable asphalt lab if there are any asphaltic materials in the bid schedule.

(1) Electrical service as identified in 130-2.8d Asphalt Laboratory.

(2) Internet service as specified for the Field Laboratory.

130-2.3 CURING SHED. Furnish and maintain a suitable weather tight shed for curing concrete test cylinders, with a suitable tank(s) for curing concrete test cylinders.

Provide a tank(s) large enough to contain at least 6 test cylinders, each 4 inches by 8 inches, from each pour that you propose to make during any 28-day period. Use a tank(s) at least 18 inches high, insulated, and constructed of heavy duty plastic or non-corrosive metal. Construct a lid to provide access to the tank(s).

Provide suitable heating to maintain the temperature in the tank between 70°F and 77°F at all times when curing the test cylinders. In addition, provide suitable thermometers in the shed and tank(s) to check the temperature.

Provide a supply of calcium hydroxide (high-calcium hydrated lime) sufficient to maintain a fully saturated water bath in the tank(s). Provide a source of potable water.

Provide one combination smoke alarm and carbon monoxide detector.

Provide electrical service as identified in 130-2.8e Curing Shed.

130-2.4 CAMP FACILITIES. Furnish and maintain suitable camp facilities for Department employees and other authorized personnel. The Special Provisions will list an estimated number of employees.

Provide the following camp facilities:

a. Lodging (Bunkhouse and Bedding)

b. Meals (Mess Hall and Kitchen)

c. Sanitary and Other Facilities

Provide all camp facilities according to the applicable chapters of the State of Alaska Department of Labor, *Occupational* and *Industrial Structures Code*, and the State of Alaska Department of Environmental Conservation, *Food Service Regulations*.

Camp facilities for your employees, that meet these requirements, may also be used for State employees.

These Specifications do not exclude the use of roadhouses or lodges located near the project that are available for your use. The Engineer may approve a roadhouse, lodge, or camp, providing the accommodations conform with contract requirements.

Provide camp facilities for use by State employees and other authorized personnel while you are engaged in work at the project site, or in material sources used to supply materials to this project.

Department employees and other authorized personnel must sign a meal and/or lodging sheet after each meal and each night's lodging.

When you use camp facilities, completely remove and dispose of all garbage and/or trash piles, cesspools, septic tanks and leach fields as required by applicable laws and regulations and as directed.

130-2.5 NUCLEAR TESTING EQUIPMENT STORAGE SHED. Design, furnish and maintain a weatherproof, heated, and ventilated nuclear densometer/testing equipment storage shed for the Engineer to use exclusively throughout the contract. Install the building at least 15-feet from an occupied area at a location approved by the Engineer. Install the shed at least one week before the commencement of construction activities and maintain it until one week after Project Completion. Provide sufficient floor area for the nuclear testing equipment and a portable electric heater to maintain a minimum room temperature of 50°F. Design the building with enough floor area to provide sufficient clearance between the equipment, heater, and combustibles. Provide a commercial grade metal-clad exterior entrance door of 3 feet width minimum width by 6-feet and 8 inches height with dead-bolt lockset. Hang the door so that hinge pins are not accessible from the exterior. Provide the Engineer with 2 keys to control access. Provide a 5/16-inch by 10 feet long welded steel security chain securely attached inside the structure with tamperproof hardware for the Engineer to secure the testing equipment. Provide electrical service as identified in 130-2.8g Nuclear Testing Equipment Storage Shed. Secure the structure to the ground with tamperproof anchors to resist wind loads and prevent unauthorized movement of the building. The Nuclear Testing Equipment Storage Shed remains the property of the Contractor. Remove the shed from the site following project completion. The Nuclear Testing Equipment Storage Shed must be windowless.

130-2.6 STORAGE CONTAINER. Furnish, transport and maintain a weathertight, lockable, steel enclosed 20 feet long by 8 feet wide by 8 feet high wooden floored container for the storage of the Department's materials, supplies and testing equipment (but not nuclear equipment). Provide twenty equally spaced fastening points on the interior walls that are capable of securing the Department's contents. Door opening dimensions of the storage container shall be greater than 60 square feet. Supply necessary equipment to lift and move container with minimal disturbance to the Department's contents. The container shall not be moved by skidding or hook lift. The Contractor shall be listed as the shipper on all documents listing and acknowledging receipt of the Department's goods for shipment.

Deliver an empty and clean container to the Regional Materials Laboratory, or location acceptable to the Engineer, three weeks prior to transporting to the project site. Allow 7 days for the Department to load the container. Transport the loaded container to the project site. Set up container at a location approved by the Engineer prior to commencing construction work.

130-2.7 FIELD COMMUNICATIONS. Furnish and maintain a satellite communications system that includes internet and phone for the Engineer to use exclusively throughout the contract. Provide a completely functional installation 2 weeks before commencing construction work through one month after Project Completion.

Two weeks prior to procuring the field office and field laboratory, submit to the Engineer the proposed communications system consisting of phone and internet service. Obtain the Engineer's approval of the communications system prior to procuring the system.

Furnish and install high speed internet service and telephone service, with all necessary ancillary equipment. Provide internet and phone jacks in the field office and field laboratories in locations identified by the Engineer. Furnish one mobile satellite phone in addition to the phone system in the field office.

The internet system shall have a send and receive capability supporting 1.0 Megabytes per second (Mbps) download speed or higher and 0.5 Mbps or higher upload speed at all times. The internet system shall have a minimum monthly data usage of 10 Gigabytes (GB). Include a wireless router and an appropriately sized battery backup for the internet system. The system shall be separate from the internet system of the contractor for exclusive use of the Department.

The telephone system shall consist of commercially available telephones with the necessary equipment for each line. Provide one telephone that includes a built in digital answering machine.

Internet and telephone service shall be supplied and operational no more than two weeks after the field laboratory has been set up on site. Service Plans shall be provided and remain in effect for the duration of the use of the field laboratory and field laboratory

130-2.8 ELECTRICAL POWER. Furnish and maintain a constant source of power to the facilities specified in the contract for the Department's use during the project. Provide a completely functional installation 2 weeks before commencing construction work through 2 weeks after Project Completion.

a. Field Office. Provide electrical services as follows:

(1) Heating/Cooling adequate to maintain temperatures between 65°F to 75°F

(2) Electrical current: 120/240 Volts of Alternating Current (VAC), 60 cycle on 24-hour basis

(3) Wiring system to support a 40 Amperes user load demand with two 20 Amperes circuits

(4) Outlets spaced every six feet on the interior wall, consistent with local codes

(5) Eight 100 Watts incandescent or sixteen 40 Watts florescent, or equivalent LED fixtures

b. Field Laboratory. Provide electrical services as follows:

(1) Heating/Cooling adequate to maintain temperatures between 65°F to 75°F

(2) Electrical current: 120/240 VAC, 60 cycle on 24-hour basis

(3) Wiring system to support a 60 Amperes user load demand with two 20 Amperes circuits, GFI Protected

(4) Outlets spaced every six feet on the interior wall, consistent with local codes

(5) Four 100 Watt incandescent or eight 40 Watts florescent, or equivalent LED fixtures

(6) Exhaust fan: minimum airflow capacity of 5 cubic feet per second (cfs)

c. Field Laboratory Out Building. Provide electrical services as follows:

(1) Heating/Cooling adequate to maintain temperatures between 65°F to 75°F

(2) Electrical current: 120/240 VAC, 60 cycle on 24-hour basis

(3) Wiring system to support a 20 Ampere user load demand, GFI Protected

(4) Three conveniently spaced outlets on the interior wall, consistent with local codes

(5) Two 100 Watts incandescent or four 40 Watts fluorescent, or equivalent LED fixtures

(6) Exhaust fan: minimum airflow capacity of 5 cubic feet per second (cfs)

(7) One 30 Amperes 110 Volts circuit (asphalt cut off saw)

d. Asphalt Laboratory Provide electrical services as follows:

(1) Electrical current: 120/240 VAC, 60-cycle on a 24-hour basis

(2) 100 Amperes service

(3) At least one 15 Amperes lighting circuit

(4) Outlets, six duplex outlets conveniently spaced around the lab, consistent with local codes

(5) Lights, switch by door and either four 100 Watt incandescent or eight 40 Watts fluorescent, or equivalent LED fixtures.

(6) Exhaust fan, minimum airflow capacity of 5 cubic feet per second (cfs).

(7) One 240 Volt 50 Amperes circuit (Asphalt Burn off oven)

(8) 2 240 Volts 20 Amperes circuit for each (of two) aggregate ovens. (If a large oven is used power required depending on oven demands)

e. Curing Shed. Provide electrical services as follows:

(1) Heating/Cooling adequate to maintain temperatures between 70°F to 77°F

(2) Two 100 Watt incandescent or four 40 Watt fluorescent, or equivalent LED fixtures

f. Storage Container. Provide electrical services as follows:

(1) Electrical current: 120/240 VAC, 60-cycle on a 24-hour basis

(2) Wiring system to support a 20 Amperes user load demand, GFI Protected

(3) Two conveniently spaced outlets on the interior wall, consistent with local codes

(4) Four 100 Watts incandescent or eight 40 Watts fluorescent, or equivalent LED fixtures

g. Nuclear Testing Equipment Storage Shed. Provide electrical services as follows:

(1) Heating/Cooling adequate to maintain minimum temperatures of 50°F

(2) Electrical current: 120/240 VAC, 60-cycle on a 24-hour basis

(3) Two 100 Watts incandescent or four 40 Watts fluorescent, or equivalent LED fixtures

(4) Wiring system to support a 20 Ampere user load demand

h. Nuclear Testing Equipment Storage Shed (State Provided). Provide electrical services as follows:

(1) Electrical current, 120/240 VAC, 60-cycle on 24-hour basis

(2) Wiring system to support a 20 Amperes user load demand

i. Portable Concrete Compressive Laboratory. Provide electrical services as follows:

(1) Electrical current: 120/240 VAC, 60 cycle on 24-hour basis

(2) Wiring system to support a 20 Ampere user load demand

If Nuclear Testing Equipment Storage Shed is deleted the electrical power requirement are still required per 130-2.8h.

If the contract contains bridge items that require concrete or grout provide electrical power to the Department's Portable Concrete Compressive Laboratory per 130-2.8i.

METHOD OF MEASUREMENT

130-3.1 MEAL. By each meal served to authorized personnel, based on signed meal sheets.

130-3.2 LODGING. By each night's lodging received by authorized personnel based on signed lodging sheets.

130-3.3 NUCLEAR TESTING EQUIPMENT STORAGE SHED. By the number of storage sheds specified, to include all components, installed and accepted as completed units and ready for equipment storage.

130-3.4 STORAGE CONTAINER. By the number of storage containers specified, to include all components, installed and accepted as completed units and ready for materials and equipment storage.

BASIS OF PAYMENT

130-4.1 LUMP SUM ITEMS. Payment for items G130.010.0000, G130.020.0000 and G130.030.0000 will be made as follows:

a. A percentage of the lump sum amount, to be determined by the Engineer, will be paid as full compensation for furnishing the facility at the site.

b. The balance of the lump sum amount will be prorated over the anticipated active construction period with a portion included as part of each interim payment, for maintenance, repairs, providing all utilities, and for removing it from the site. If anticipated construction period changes, the final increment will be held until final payment.

Item G130.010.0000 Field Office, includes initial telephone and Internet service costs to provide operational connections.

When Item G130.110.0000, Field Communications appears in the bid schedule, internet and telephone service will be measured and paid under G130.110.0000, and are not subsidiary to G130.010.0000 and G130.020.0000.

130-4.2 MEAL. Includes all labor, materials, tools, equipment and supplies required to provide meals to all authorized personnel assigned to, or associated with, the project.

130-4.3 LODGING. Includes all labor, materials, tools, equipment and supplies required to provide lodging for all authorized personnel assigned to, or associated with, the project.

130-4.4 NUCLEAR TESTING EQUIPMENT STORAGE SHED. At the contract unit price to include all labor, materials, tools, equipment and supplies required to furnish and install the shed before commencement of construction, to maintain it for the duration of the project and to remove the shed and electrical service after project completion. Electrical service and utility costs are subsidiary to this item.

130-4.5 STORAGE CONTAINER. At the contract unit price to include all labor, materials, tools, equipment and supplies required to deliver the storage shed to the regional office for loading, to deliver it to the project office, to install it before commencement of construction, to maintain it for the duration of the project, to remove the shed and electrical service after project completion, to deliver it to the regional office for unloading, and to remove the storage shed. Electrical service and utility costs are subsidiary to this item.

130-4.6 SCALES. Furnishing the following is subsidiary: platform scales, scale operators, tickets, scale house, and the ECWS, including all supplies such as weigh tickets, paper, printer ribbons, etc., and all maintenance and repair services necessary to keep the system functional.

130-4.7 ENGINEERING COMMUNICATIONS. Installation and maintenance of equipment and monthly invoice costs will be paid for by Contingent sum under Pay Item G130.110.0000, Field Communications. Provide invoices from vendor for installation, maintenance, and monthly subscription costs.

Payment will be made under:

Item G130.010.0000	Field Office – per lump sum
Item G130.020.0000	Field Laboratory – per lump sum
Item G130.060.0000	Nuclear Testing Equipment Storage Shed – per each
Item G130.090.0000	Engineering Communications – per contingent sum

ITEM G-131 ENGINEERING TRANSPORTATION

DESCRIPTION

131-1.1 Furnish and maintain vehicles for the exclusive use of the Engineer and their staff throughout the duration of the project.

REQUIREMENT

131-2.1 Provide the specified number of the following vehicle types:

a. Truck. Full-size four wheel drive pickup or sport utility vehicle. Less than 3 model years old, in good condition and with less than 36,000 miles on the odometer. Equip vehicles with mud/snow tires, strobe beacons (Whelen 360 or equivalent) and two-way radios set on the airport Common Traffic Advisory Frequency (CTAF).

b. ATV. All-terrain vehicle, fully enclosed cab, 4x4, 300 cc minimum, with a 500-lb capacity trailer. Less than 3 model years old, in good condition. Equip with securely attached two-way radio set on the airport Common Traffic Advisory Frequency (CTAF). Equip with a rotating beacon or strobe light.

c. Snowmobile. A snowmobile with 440 cc minimum engine size, and with a 500-lb capacity sled. Less than 3 model years old, in good condition.

d. Boat. An aluminum boat 20-foot long, and rated to carry a minimum of 1,000 pounds. A motor capable of moving the loaded boat at 20 mph. Less than 3 model years old, in good condition.

The Contractor shall furnish all fuels and maintenance. The Contractor is responsible for normal wear and tear, and any other incidental damage, including broken windshields that might arise during the Department's operation and use.

The Department is responsible for physical damage to any vehicle provided under this section if proximately caused by its negligent operation. The Department will provide non-owned auto liability insurance providing third party liability coverage for any accident during the Department's operation and use.

Obtain the Engineer's approval of vehicles prior to their shipment to the site. Vehicles remain the property of the Contractor and shall be removed from the site following the completion of the work.

METHOD OF MEASUREMENT

131-3.1 Lump sum items will not be measured for payment.

The quantity of per each items will be the number of vehicles provided and maintained for use for the duration of the project at the contract unit price.

BASIS OF PAYMENT

131-4.1 Payment will be made as follows:

a. A percentage of the contract unit price, to be determined by the Engineer, will be paid as full compensation for furnishing the vehicles at the site.

b. The balance of the contract unit price will be prorated over the anticipated active construction period, with a portion included as part of each interim payment, for maintenance, fuel and repairs,

and for removing vehicles from the site. If the anticipated construction period changes, the final increment will be held until final payment.

Payment will be made under:

Item G131.010.0000	Engineering Transportation (Truck) – per each
Item G131.025.0000	Engineering Transportation (UTV) – per each

ITEM G-135 CONSTRUCTION SURVEYING AND MONUMENTS

DESCRIPTION

135-1.1 GENERAL. Perform surveying and staking essential for the completion of the project and perform the necessary calculations required to accomplish the work in conformance with the Plans and specifications and standard survey and engineering practices.

The Contractor shall provide all survey work including, but not limited to: project layout, cross sections, slope stakes, grade stakes, as-built measurements, and quantity measurements. Immediately upon completion of initial cross sections, the Contractor shall furnish reduced and checked survey notes to the Engineer. From time to time throughout the work, as requested by the Engineer, the Contractor shall take appropriate sections and shall provide the Engineer with reduced and checked notes from which quantity calculations for progress payment purposes can be accomplished. Notes shall be kept in a neat, orderly, and legible form according to professional surveying practices.

Upon completion of each phase of the work, the Contractor shall furnish the Engineer with all necessary measurements for completion of the as-built drawings. The Contractor shall include identification and location of project features where actual locations differ from locations shown on the Plans. All original survey notes and field books shall become the property of the Department and shall be delivered to the Engineer as a condition to final payment on this contract.

Furnish and install survey monuments and monument cases in conformance with the Plans or as directed.

Furnish and maintain facilities, equipment and services specified in this section for Digital Terrain Modeling (DTM). All furnished facilities and equipment remain the property of the Contractor once the work is completed.

135-1.2 DEFINITIONS.

a. Monument: A fixed physical object marking a point on the surface of the earth; used to commence or control a survey; mark the boundaries of a parcel of land; or the centerline of a right-of-way corridor. Monuments will be Primary or Secondary, as shown on the Plans.

b. Point: An identified spot located on the surface of the earth. For purposes of this definition, a point can be either physical or electronic depending on the context in which it is used. Physical points include a PK nail, wooden hub, rebar, large nail or other structure capable of being utilized as a marker.

c. Witness Corner: A ~~material mark~~ monument or point usually placed on a property or survey line, at a known distance from a property corner or other survey point. A witness corner is employed to witness the location of a corner/point that cannot be monumented at its true location.

d. Reference Monument: A ~~material mark or point~~ monument placed at a known distance and direction from a property corner or other survey point, usually not on a property or survey line. A reference monument is employed to perpetuate a corner/point that cannot be monumented at its true location or where the corner monument is subject to destruction.

e. Surveyor: The Contractor's Professional Land Surveyor placed in "responsible charge", and currently registered in the State of Alaska as defined in AS 08.48.341.

f. Break Line: A break line defines the horizontal location where TIN lines must break, and snap to the vertical location of the break line.

g. Catch Point: In the cross section, the point at which the fill or cut slope intersects the edge of the existing ground.

h. CAD: Computer-Aided Design.

i. CORS: Continuously Operating Reference Station.

j. DTM: Digital Terrain Model. A computer generated 3D model representing the project terrain, and based on the association of features such as alignments, profiles, sections, grading lines, points, and surfaces.

k. GLONASS: A radio-based satellite navigation system operated by Russia. GLONASS is an alternative and is complementary to the United States Global Positioning System.

l. GNSS: Global Navigation Satellite System.

m. GPS: Global Positioning System; A radio-based satellite navigation system operated by the United States.

n. Hinge Point: In the cross section, the point at which any slope intersects another slope of different angle.

o. Neat-line: Defines the geometric limits of a material, as indicated by the typical section, profile, and alignment.

p. NGS: National Geodetic Survey; United States Government Agency that provides information and products related to the definition and management of the NSRS.

q. NSRS: The National Spatial Reference System.

r. OPUS: On-line Positioning User Service; The National Geodetic Survey operates OPUS as a means to provide GPS users easier access to the NSRS.

s. PPK: Post Processed Kinematic; PPK surveys are similar to RTK surveys, except there is no radio communication between the reference station and the rover, so the rover cannot process a position in “real time”. Survey data from both the reference station and rover is imported into GPS processing software to determine the measured position.

t. RTK: Real Time Kinematic; RTK surveys utilize two or more receivers with at least one receiver remaining stationary over a known coordinate. The radio at the reference station broadcasts its position to the rovers and the system processes the baselines in “real time” allowing for project coordinate information to be gathered and analyzed during the actual field survey.

u. Slope Staking: The process of using measurements and calculations to determine where to begin a cut or fill, the slope ratio, and the depth of the cut or fill.

v. Static: Static survey methods require multiple GPS receivers to collect data over the course of a long period of time. The data collected by the receivers is downloaded into a GPS processing software program to determine the measured position.

w. Tessellation Spacing: The distance along a line or an arc that a TIN point is created.

x. TIN: Triangulated Irregular Network; A vector based representation of a physical land surface.

y. Weeding: A procedure used to limit the frequency of information displayed.

MATERIALS

135-2.1 MONUMENT CASES. Castings shall conform to AASHTO M 105, Class 30A. Castings shall be coated with a bituminous damp-proof coating. Bolting tops shall be used.

135-2.2 PRIMARY MONUMENT. A minimum 2-3/8 inch diameter nonferrous pipe at least 30 inches long, with a minimum 4-inch flange at the bottom and having magnets attached at the top and bottom. A minimum ~~2-1/4~~3-1/4-inch diameter nonferrous metal cap must be permanently attached to the top. Mark the cap around the outside edge with the words “STATE OF ALASKA DOT&PF". Permanently stamp every monument with the Surveyor’s registration number, the year set, and the point/corner identification. Orient cap so that the data may be read when the reader is facing north, except for centerline monuments that will be oriented to be read facing up-station.

135-2.3 SECONDARY MONUMENT. A minimum 5/8-inch by 30-inch rebar with a 2-inch aluminum cap attached to the top. Permanently stamp every secondary monument with the Surveyor’s registration number, the point/corner identification, and the year set.

CONSTRUCTION REQUIREMENTS

135-3.1 GENERAL. Use competent, qualified personnel and suitable equipment for construction surveying activities. The Surveyor’s personnel shall be supervised and trained in the avoidance of systematic errors. The Surveyor’s personnel shall be familiar with geodetic concepts and least-squares adjustments. Correcting errors resulting from the operations of said personnel shall be at the Contractor expense. The Contractor is responsible for the accuracy of the work. ~~the layout work required and f~~

Furnish all equipment including but not limited to vehicles, traffic control devices, stakes, measuring tapes, levels, rods, GPS receivers, total stations, safety devices, templates, straight-edges and other devices necessary for establishing, checking and maintaining the required points, lines and grades.

Schedule a mandatory Pre-Survey Conference with the Engineer, Contractor, Surveyor, and all personnel who are to be involved in the survey work, two weeks prior to beginning survey work. The purpose of this meeting will be to discuss methods and practices of accomplishing the required survey work.

Furnish computer services to accomplish the work. All data shall be signed by the Surveyor ~~Check data received from the computer~~ to certify for completeness and accuracy. As soon as practical after completion of the work, and in no case later than acceptance of the project, deliver field books, computer forms and computer output data to the Engineer. Furnish all computer generated data in a file format and medium that is compatible with Department software. This data becomes the property of the Department.

Supervise construction surveying personnel. Correct errors resulting from the operations of said personnel at Contractor expense. The Contractor is responsible for the accuracy of the work.

Work classified as Land Surveying under AS 08.48, and work involving the location, control, and monumentation of construction centerline and right-of-way, shall be performed by or directly under the responsible charge of a Professional Land Surveyor.

Follow the ~~Department’s Construction Surveying Requirements~~ *State of Alaska DOT&PF Construction Surveying Requirements*.

The Department will provide sufficient centerline or reference thereto, and at least one benchmark to enable the establishment of planned elevations and centerline.

Furnish field survey notes. Keep field notes in standard hardbound notebooks in a clear, orderly, and neat manner consistent with the *State of Alaska DOT&PF Construction Surveying Requirements*. ~~Departmental procedures, including titles, numbering, and indexing.~~ Make field books available for inspection by the Engineer’s project personnel at any time. Legible copies of the reduced field notes shall be made daily. Store the field books in the Engineer’s Project Office during periods of non-use. Copies of the field books shall be kept in a separate secure location.

Furnish traffic control necessary for surveying activities in accordance with the latest edition of the Alaska Traffic Manual (ATM). Outfit all field employees with appropriate High Visibility Clothing conforming to the

requirements of ANSI/ISEA 107-2004, Class 2 for tops or Class E for bottoms, and Level 2 retroreflective material.

The Engineer may randomly spot check the Contractor's surveys, staking, and computations. The Department assumes no responsibility for the accuracy of the work.

The Engineer has the right to communicate directly with the Surveyor. Any communication regarding changes to the original scope of work shall go through the Contractor.

~~Perform the following:~~

~~**a.** Staking necessary to delineate clearing and/or grubbing limits.~~

~~**b.** Cross sections necessary for determination of excavation and embankment quantities, including intermediate and/or re-measure cross sections as needed. Take cross sections after clearing and grubbing has been completed.~~

~~**c.** Slope staking.~~

~~**d.** Staking of signs, culverts, minor drainage structures and other appurtenances, including the necessary checking to establish the proper location and grade to best fit the conditions on site.~~

~~**e.** Bridge staking.~~

~~**f.** Setting finishing stakes.~~

~~**g.** Measurement of pay quantities that require measurement.~~

~~**h.** Staking of right-of-way and material source limits.~~

~~**i.** Staking, referencing and other actions required to preserve or restore land monuments and property corners.~~

~~**j.** As-built surveying as required under Section 50-08 Survey Control. Tie as-built measurements and locations to project horizontal and vertical survey control.~~

~~**k.** Staking and hubbing of bottom of excavation and the top of each layer in the pavement structure.~~

~~**l.** Provide interim calculations for measured items to the Engineer prior to progress payments for each specific item. Ensure that the calculations are completed, checked, and signed by the person in responsible charge of the work.~~

~~**m.** Other surveying and staking necessary to complete the project.~~

a. Responsibilities of the Surveyor. The Surveyor is responsible for:

(1) Maintaining registration as a Professional Land Surveyor in the State of Alaska.

(2) Maintaining familiarity with the site conditions and progress of the project.

(3) Determining the accuracy required for each survey stake.

(4) Following the *State of Alaska DOT&PF Construction Surveying Requirements*.

(5) Notifying the Engineer of conflicts and changes necessary due to utilities, match point variations, design revisions, or other variables.

(6) Slope Staking.

(7) Staking all clearing and/or grubbing limits. Clearly identify all trees that are specified to remain.

(8) Staking and hubbing all layers of material shown in the typical sections, including the bottom of excavation, top of borrow, top of base course, and top of surcharge.

(9) Staking all culverts, curbs, inlets, and other drainage appurtenances.

(10) Staking all bridge and pedestrian over/under-crossings.

(11) Staking all right-of-way and material source limits.

(12) Layout of all temporary and permanent pavement markings, and pavement marking devices.

(13) Bi-weekly settlement platform elevation monitoring.

(14) Development of DTM's, and plotted cross sections.

(15) As-built and Topographic surveying.

(16) Removal and disposal of all flagging, lath, stakes and other staking material after the Project is completed. Burning of material is not allowed on the project.

(17) All other surveying and staking necessary to complete the project.

~~Notify the Engineer immediately if a Department-established reference point is discovered to be in error or a reset point is not in relationship to the adjacent centerline points.~~

~~Furnish a notekeeper to record field survey notes, including documentation for quantity computations for payment. Ensure that the notekeeper is thoroughly familiar with generally accepted standards of good survey notekeeping practice and the Department's Construction Surveying Requirements.~~

~~The Engineer may randomly spot check the Contractor's surveys, staking, and computations. After the survey or staking has been completed, provide the Engineer with a minimum of 72 hours notice before performing work, and furnish the appropriate data, to allow for random spot checking. The Department assumes no responsibility for the accuracy of the work.~~

~~n.~~**b. Submittal Requirements.** Measure, compute, and plot all field-measured pay item quantities, including but not limited to excavation and disposal of asphalt cement concrete (AC), Portland cement concrete (PCC) pavement, and classified/unclassified excavation volumes. Stake for measurement and calculation of excavation quantities after AC and PCC pavement removal. ~~Submit a proposed method of measuring and computing volumes to the Engineer in writing for approval before performing any field work under this item.~~

Provide item quantities, including computations and plots to the Engineer prior to payment for each specific item. The Department will review and accept or modify the quantities provided.

Digital terrain modeling (DTM) ~~may~~ will be used in determining earthwork quantities ~~as an alternative to before and after cross sections by average end area if the Engineer has agreed in writing to the DTM method prior to commencement of any field work. If DTM is approved and used,~~ pProvide plotted cross-sections on 50-foot stations with elevations, offsets and computed end areas in square feet for each section prior to earthwork payments for each item. Provide these cross-sections and associated data for the entire area of earthwork computations along with the terrain model.

Accomplish staking in accordance with the following:

(1) Perform the topographic survey by grid or cross section method of surveying 25 feet beyond the project match lines. Take elevation shots at 25-foot intervals, at all terrain breaks, and at topographic features.

(2) Record and locate all baselines and connect them to the project's centerline, both horizontally and vertically.

(3) Upon completion of the before and after survey, provide the Engineer a grid layout sheet showing the baseline, stations and all spot elevations.

(4) Provide the Engineer a contour map of the original ground and an identical size map showing the final elevations with 0.5 foot contour intervals. Provide the Engineer with plotted cross-sections for each station grid with elevations and offsets shown.

At the end of each day's work, the surveyor shall email a copy of the downloaded raw data from the data collector, in its original format, to the Engineer. If editing is deemed necessary, send a separate email with the amended electronic data and a change log annotating the changes.

Provide thein ~~in~~ above products to the Engineer before payment will be made for that work. Provide as-builts and electronic data to the Engineer prior to final inspection.

~~**135-3.2 CROSS-SECTION SURVEYS.** When required, obtain right-angle cross sections to the construction centerline at the interval detailed in the Department's Construction Surveying Requirements.~~

~~The following will be supplied by the Department:~~

~~**a.** Construction Plans and Specifications.~~

~~**b.** Design Cross Sections, if any.~~

~~**c.** State of Alaska Land Survey Monument Record forms.~~

~~**d.** Department's Construction Surveying Requirements. One copy.~~

~~**e.** Design centerline grades.~~

~~The following shall be required of the Contractor:~~

~~**a.** Field Books (Level, Cross-Section, Slope Stake, etc.). Use "Rite-in-the-Rain" or similar weather resistant hardbound field books. Field books become the property of the Department upon completion of the work.~~

~~**b.** Label the books and number the pages. Make a heading in the appropriate book (date, weather, names and duties of crew members) at the beginning of each day's work.~~

~~**c.** Update the index of the appropriate book at the end of each day's work.~~

~~**d.** Reduce, check, and adjust level notes.~~

~~**e.** The notekeeper shall compute the cross-section level notes and slope stake catches and a different crew member shall check the computation on a continual basis in the field.~~

~~**f.** Enter the grade data, shoulder width and/or ditch distance, stationing, slope, etc., in the slope stake books.~~

~~**g.** Maintain the position and identifying marks of slope stakes and reference points until used for their intended purpose.~~

~~**h.** Correct errors by drawing a line through them and writing the correct entry directly above. Erasures will not be allowed.~~

~~**i.** Return field books and copies of the field books to the Project office at the end of each work day or as directed.~~

~~**j.** Provide copies of grade sheets and temporary bench mark elevations to the Engineer 48 hours before beginning work on unclassified excavation or embankment.~~

~~**k.** The Contractor's survey crews shall comply with approved traffic control plans. Coordinate crew activities with the Worksite Traffic Supervisor.~~

~~**l.** Keep a survey Party Chief diary, and give a copy of the diary to the Engineer each day. The diary shall contain the following information:~~

~~**(1)** Date.~~

~~**(2)** Weather.~~

~~**(3)** Crew members' names and duties.~~

~~**(4)** Type and location of work performed.~~

~~**(5)** Hours worked.~~

~~**(6)** Type of equipment used (brand) and date equipment was double centered or "peg" test was performed.~~

~~**(7)** Signature of person in responsible charge.~~

~~**m.** Submit the survey field notes, for the specific area, relating to monument referencing, before beginning clearing, grubbing or excavation.~~

~~**n.** Draw cross-sections and complete quantity calculations for all earthwork quantities.~~

135-~~3.3~~-3.2 MONUMENTS. Install primary and secondary monuments, as called for in the Plans, at the positions established by the Department. Prior to the start of construction, reference monuments, to include property markers/corners and accessories, that may be disturbed or buried during construction. In addition, reference monuments designated for referencing on the Plans. Prepare and record Monument Record Forms in the appropriate Recorder's Office before disturbing monuments. Monument Record Forms may be obtained from the Engineer. Re-establish monuments in their original position before completion of the project. Prepare and file a Monument Record Form for each reestablished monument.

Keep records and report to the Engineer evidence that a monument has been disturbed and is no longer reliable or cannot be located and is presumed to be missing. Establish a minimum of two in-line reference points, or three swing-tie reference points in situations where in-line referencing is not desirable. Set reference points outside of the construction limits. Measure distances from the monument to the nearest 0.01 foot. Record referencing of monuments in a separate field book stamped by the Surveyor.

Replace existing monuments disturbed by construction with Primary or Secondary Monuments meeting the requirements of subsections 135-2.1 through 3. When it is impractical to establish a monument in its original position, install a witness corner (WC). Place the WC to a property corner on the property line when the other property corner that defines said line is existing or there has been sufficient retracement to define said line. In other cases, place a reference monument (RM) perpendicular to the centerline at the station of the original position and at a distance from the original position measured in whole feet.

Those monuments found that are not shown on the Plans will be recognized by the Engineer when the following is provided by the Surveyor: Field notes identifying type and location of the monument, and a description of the point the monument marks, with the reason to preserve its location. Monuments not

shown on the Plans will be considered additional work and paid by Item G135.020.0000, Extra Three Person Survey Party.

The Surveyor shall complete a State of Alaska Land Survey Monument Record form for each primary and secondary monument referenced, removed, installed, relocated or replaced. Provide the required survey information on the form according to statutory requirements, including section, township and range. Meet requirements for recording at the District Recorder's Office in which the project is located for each monument record. Deliver conforming copies of the recorded forms to the Engineer before monument removal or disturbance, and after setting any final monuments requiring monument records.

Set each monument and monument case accurately to lines established at the required location and in a manner as to ensure being held firmly in place. Set existing monuments and monument cases to be adjusted to new elevations in the manner and at the elevations directed.

Primary Airport Control (PAC) and Secondary Airport Control (SAC) monuments are present in the project area as shown on the Plans. This control is important and if disturbed, must be reestablished by the Contracting Agency. For this reason, the Contractor is required to employ all reasonable measures to preserve the existing control monuments in an undisturbed condition. If a PAC or SAC is disturbed by the Contractor's actions, the Contractor shall reimburse the State of Alaska for the cost of replacing monuments, performing geodetic surveys and related data processing, and filing the completed survey with the National Geodetic Surveys office. The estimated cost for reestablishing a disturbed monument is approximately $50,000, but costs will vary depending on location, season, availability of staff, and other factors.

135-3.3 SURVEY CONTROL. The basis of project control is identified in the *Survey Control Sheet*. Use the calibration parameters shown in the *Survey Control Sheet* to Calibrate/Localize/Convert to the local project coordinate system. Contact the DOT&PF Central Region Survey Manager through the Engineer for calibration parameters if they are not shown in the plans. Independently recover and verify all survey control points shown in the *Survey Control Sheet*. Establish and verify new reference points where required, to replace missing points. Notify the Engineer immediately if a reference point is discovered to be in error, or a reset point is not in harmonious relationship to the existing control points. Provide the Engineer a signed hard copy verifying vertical loop closure of project control points.

The use of RTK is not an acceptable method for establishing additional horizontal or vertical control. Horizontal control points may be established using Static GPS or conventional traversing methods. Vertical control points shall be established with differential levels.

Survey accuracy requirements shall conform to the minimums listed in the *State of Alaska DOT&PF Construction Surveying Requirements*.

135-3.4 GPS SURVEYS. The specifications described in this Section are not intended to discourage the use of new GPS procedures and techniques. Procedures that are not defined by this specification may be allowed if approved by the DOT&PF Central Region Survey Manager, through the Engineer.

1. General Requirements:

    a. All surveying shall be done in the local project coordinate system.

    b. OPUS shall be used for the determination of Reference Station positions only, and shall not be used directly for producing final positions for any Static, Fast Static, RTK or PPK surveys. OPUS may be used as a tool for verification of the final positions obtained from these types of surveys.

2. GPS Equipment: Survey Grade dual frequency GPS receivers shall be used. For static surveys these shall be set up on adjustable leg tripods at a minimum. Fast or Rapid Static GPS surveys require a bipod at a minimum. RTK or PPK surveys may use fixed or adjustable poles, or secure lashings to vehicles.

3. GPS Reference Stations:

a. All Reference Stations shall be approved by the DOT&PF Central Region Survey Manager through the Engineer, prior to conducting any GPS surveys.

b. Primary Reference Stations shall meet current NGS CORS standards. Secondary Reference Stations may be used temporarily when a Primary Reference Station is not available.

c. Primary Reference Stations shall be permanently mounted and shall not change throughout the duration of the project.

d. Secondary Reference Stations may be tripod mounted, however, GPS receivers shall never be mounted on aluminum tripods.

e. All Reference Stations shall be tied to an OPUS derived position, and on the NAD83 datum. Submit GPS data files for a minimum of 2 days, 12 hours per day, 5 second epoch to OPUS to determine the final position. The OPUS derived position shall be determined at the beginning of the project, and shall not change throughout the duration of the project unless approved by the Engineer. Notify all users immediately if any changes are made to the Reference Station's position. If OPUS is unable to process a position, the Reference Station shall be tied to existing project control.

f. Reference Stations shall be physically located in clear view of the sky. Avoid locations near cellular towers or other areas that may disrupt satellite signal reception. Avoid locations near large flat surfaces such as buildings, large signs, fences, and other objects that may cause multi-path interference.

g. Reference Stations shall be located to provide maximum coverage of the project area.

h. Store 5 second epoch data, and post data online for use by the Engineer.

i. GNSS enabled Reference Stations are allowed.

4. RTK Surveys:

a. The Surveyor shall follow prudent practices when conducting RTK surveys. The NGS has published a manual titled *National Geodetic Survey User Guidelines for Single Base Real Time GNSS Positioning*, v3.1 issued in April 2014. The Surveyor shall become familiar with this manual, in order to better understand prudent practices. Copies of the manual may be available upon request or may be downloaded from the following web site: http://www.ngs.noaa.gov/PUBS_LIB/.

b. RTK surveys may not be used to permanently mark or delineate Right-Of-Way.

5. Local Coordinate Calibration:

a. Use GPS calibration parameters if they are provided on the *Survey Control Sheet.* If GPS calibration parameters are not given, develop a local site calibration based on existing project control. All included control points shall have WGS84 positions that were observed by either a GPS Static or Fast Static network, as well as the final adjusted project control coordinate values that match the values listed on the *Survey Control Sheet*. The calibration shall consist of the following conversion parameters; Rotation, Translation, Scale, and GPS derived orthometric heights. Values listed on the *Survey Control Sheet* shall be held fixed in any adjustment, barring any large residuals. Notify the Engineer of any large residuals so that the problems can be identified and corrected. Submit a signed hard copy of the calibration parameters, residuals, and related control points to the Engineer for approval before staking activities begin.

b. Perform a local calibration each time the coordinates of the reference station change.

6. GPS Data Summary Report:

   a. Generate reports for all surveyed points, including the Point Number, Northing, Easting, Elevation, Point Code, Annotation(s), Date, Time, residuals, observation (start and stop) times, and antenna height information. Summary reports shall bear the signature and seal of the Surveyor.

   b. The Engineer may require the Contractor to re-survey specified points at no cost to the Department if the Survey doesn't meet the minimum accuracy requirements defined in the *State of Alaska DOT&PF Construction Surveying Requirements*.

7. Weather Conditions: The Surveyor shall follow prudent practices when conducting GPS surveys in inclement weather. The following is recommended as a guideline:

   a. Regularly observe surface and solar weather forecasts prior to planning survey activities.

   b. Use sound practical judgment when performing surveys during inclement weather conditions.

   c. Observations should never be conducted during an electrical storm.

   d. Note significant or unusual weather conditions in the field notes, data collector, or receiver.

135-3.5 TOPOGRAPHIC SURVEYS. Topographic surveys shall be conducted under the direct supervision of the Surveyor. The purpose of a topographic survey is to gather field data to determine the configuration (relief) of the surface of the earth (ground). Use all data collected to generate topographic DTM surfaces as defined in subsection 135-3.7, Digital Terrain Models. All data becomes the property of the State of Alaska. Conduct topographic surveys as follows:

1. General Requirements:

   a. Collect topographic data within the right-of-way limits.

   b. Keep all shots 50 ft or closer, as necessary to accurately define all surface features.

   c. Keep a field book of notes describing changes or errors of rod heights, point descriptors, or other annotations necessary to verify all electronic data.

   d. Identify each point with a point number. Multiple points with the same point number are not permitted.

   e. Identify each shot with the appropriate point code. Break line points shall be separately identifiable from ground shots.

   f. Append any additional information required to further describe a point with point annotations.

   g. Develop a summary of standard point codes for all points used on the project.

   h. Develop a summary of standard point descriptors to identify all point codes used on the project (i.e. *Edge of Pavement* is the point descriptor corresponding to the *EP* point code).

2. Functional Requirements: The purpose of a topographic survey is to develop an appropriate DTM as defined in subsection 135-3.7. Conduct a topographic survey to meet the appropriate functional requirements as defined below:

   a. *As-built Surfaces* – Conduct a survey of all finished surfaces, embankments, ditches and other topographic features as required to accurately define the project topography.

b. *Excavation Surfaces* – Conduct a survey of original grade (upper) surfaces, and bottom of excavation (lower) surfaces, as necessary to produce DTM volumetric quantities. Follow the requirements listed below:

(1) Upper surface – Survey prior to excavation. Topographic data may be collected prior to grubbing and/or pavement removal, and adjusted by the average depth removed as measured in the field.

(2) Lower surface – Survey after the final grade has been established by excavation.

c. *Embankment Surfaces* – Conduct a survey of excavated or original grade (lower) surfaces, and top of embankment (upper) surfaces, as necessary to produce DTM volumetric quantities. Follow the requirements listed below:

(1) Upper surface – Survey after the final grade has been established.

(2) Lower surface – Survey prior to the placement of embankment. If only grubbing or pavement removal is required prior to placement of embankment, the topographic data may be collected prior to grubbing and pavement removal and adjusted by the average depth removed, as measured in the field. If excavation is required prior to placement of embankment, survey only after excavation activities have been completed.

3. Accuracy Tolerance Limits: The Surveyor shall check into and collect primary control monument locations to ensure the data being collected meets the minimum *Horizontal* and *Vertical Accuracy Tolerances*. This shall serve as a basis of acceptance for the topographic data collected by the Surveyor. The *Horizontal* and *Vertical Accuracy Tolerances* will be used to check for systematic error, and will be evaluated by comparing all control check shots taken during the topographic survey to the monument's location as defined on the *Survey Control Sheet*. The *Volumetric Accuracy Tolerance* will be used to check for random and operator error, and will be evaluated by comparing the Contractor furnished DTM with an independent DTM developed by the Department. The *Volumetric Accuracy Tolerance* shall be applied only to survey data that is used to calculate volumetric quantities.

a. *Horizontal Accuracy Tolerance* – Check shots shall be within ± five hundredths (0.05) of a foot of the monument's horizontal position. If any of the data doesn't meet the minimum the horizontal tolerance, the Engineer may require the Contractor to re-survey the non-conforming points at no additional cost to the Department.

b. *Vertical Accuracy Tolerance* – Check shots shall be within ± one tenth (0.10) of a foot of the monument's vertical position. If any of the data doesn't meet the minimum vertical tolerance, the Engineer may direct the Contractor to re-survey the non-conforming points at no additional cost to the Department.

c. *Volumetric Accuracy Tolerance* – The Department will determine the volumetric error on randomly selected areas, including at least 20% of the area within the slope limits. The Department will calculate the volumetric error as follows:

(1) Determine the *net volume* by comparing the Contractor's DTM to the Department's DTM.

(2) Determine the *accepted volume* by comparing the Department's DTM to the appropriate neat-line surface.

(3) Determine the volumetric error by dividing the *net volume* by the *accepted volume*.

The Engineer may require the Contractor to re-survey any areas that exceed 5% error at no additional cost to the Department.

4. Control Check Requirements: Collect local project control data at the following minimum frequency:

a. Every time the instrument is turned on, at the beginning of the survey session.

b. Prior to every time the instrument is turned off, at the end of the survey session.

c. Every time the instrument is moved (radial survey).

d. Every time the backsight is moved (radial survey).

e. Every time the actual or broadcasted position of the Reference Station changes (GPS survey).

5. Deliverables: Provide copies of the following to the Engineer:

a. Plotted and electronic as-built surfaces (developed per subsection 135-3.7) showing major and minor contours. Standard contour intervals shall be 5 ft (major) and 1 ft (minor).

b. All field books noting any errors, corrections, or changes to the data.

c. All electronic survey data in a comma delimited ASCII file in PNEZD format (Point number, Northing, Easting, Elevation, and Description).

d. Letter of conformance signed and sealed by the Surveyor, certifying that the Topographic Survey meets the minimum *Horizontal* and *Vertical* accuracy requirements. Attach all backup data and calculations.

135-3.6 AS-BUILT SURVEYS. As-built surveys shall be conducted under the supervision of the Surveyor. The as-built survey shall document the final locations of roadways, topographic surfaces, structures, and utilities within the ROW project limits. The Surveyor shall maintain communication with the Contractor, Sub-Contractor or Utility Company as necessary to coordinate surveying activities. Surveying activities shall be conducted as soon as possible as each phase of the project is completed, and to avoid scheduling conflicts. The survey will be used to verify that the contracted work items conform to the plans and specifications. All survey data becomes the property of the State of Alaska.

1. General Requirements:

a. Topographic Survey in accordance with Subsection 135-3.5, Topographic Surveys.

b. Utility Survey of all existing and re-located utilities. Record the horizontal and vertical location of all underground and overhead utilities. Take digital photos of all exposed utility crossings. Identify the location of each photo taken, including the approximate northing, easting, and bearing.

c. Structural Survey of all existing and re-located structures, including bridges, tunnels, manholes, signs, fences, guard rails, walls, and foundations.

2. Deliverables: Provide copies of the following to the Engineer:

a. Plotted as-built drawings showing the final surveyed locations of all roadways, topographic surfaces, structures, and utilities. Plotted drawings shall be identified by the Project name and number, and bear the signature and seal of the Surveyor.

b. Printed color photos, identifying the location of all underground utility crossings.

c. All field books used to conduct the as-built survey.

d. All DTM and point data files generated by the as-built survey.

135-3.7 DIGITAL TERRAIN MODELS. Develop all Digital Terrain Models using CAD software that is compatible with the latest release of software used by the Department. All DTM's shall be approved by the Engineer.

1. DTM Development Methods: Develop all DTM's using the appropriate method as defined below:

a. *Engineering Method* - Use this method to define all neat-line surfaces. Develop the DTM by associating all appropriate engineered features such as alignments, profiles, sections, daylight surfaces, grading lines, and other features.

(1) CAD software shall generate and automatically update surfaces based on the association of alignments, profiles, sections, grading lines, and other parameters necessary to accurately represent neat-line geometry.

(2) Limit tessellation spacing to allow an accurate representation of a surface feature. The Engineer may require changes to the tessellation spacing, if necessary to allow an accurate representation of the feature.

(3) If the Contractor excavates or fills beyond the neat-line limit without the direction of the Engineer, only the neat-line limit shall be used.

b. *Topographic Method* - Use this method to define all topographic surfaces. Each vertex of a triangle in the TIN shall be formed by a field measured data point and shall be located by its (XYZ) coordinate. Develop the TIN surface by connecting Topographic Survey points to their nearest neighboring points (in XY), except as outlined below;

(1) Break Lines – Create break lines by connecting Topographic Survey points that are identified by their appropriate break line descriptors. Break lines shall snap to vertices on adjacent break lines when two break lines intersect. Break lines shall not cross. Use break lines to establish the following features:

(a) Centerline.

(b) Edge of pavement.

(c) Shoulder hinge points.

(d) Bottom of ditch.

(e) Ditch back slope catch point.

(f) Ridge lines.

(g) Rim of pits or significant depressions.

(h) Areas of slope change or undulations in slope.

(i) Bottom of valleys or draws.

(j) Hydraulic features.

(k) Around buildings and structures (including top and bottom of walls).

(2) Boundaries – Boundaries break the TIN lines and define the edge of the surface. Use boundaries to trim all non-relevant edges from the DTM. Use either non-destructive or destructive trimming as necessary to preserve the accuracy of the DTM. Use boundaries to establish the following features:

(a) Outer boundary of the DTM.

(b) Edge of a void inside the surface.

(c) Edge of an island inside of a void.

(3) Surface Editing – Surface Editing allows changes that more accurately represent the actual terrain. Use surface editing to delete or swap edges of the triangulated network as necessary to best represent the actual site condition. Mathematically computed points for the purpose of surface smoothing may be used only if approved by the Engineer. The creation of contour lines for the purpose of DTM surface extraction is not acceptable.

c. *Combination Method* - Use this method when the Engineer approves a change to the neat-line limit.

(1) In areas where the Engineer approves a change to the neat-line limit, develop new surfaces using the *Topographic Method*.

(2) Replace the neat-line surface with the new topographic surfaces to create an appropriate single surface.

135-3.8 CONTRACTOR FURNISHED COMPUTATIONS. Provide computations for volumetric pay items using DTM's developed per subsection 135-3.7. Cross sections developed from the appropriate DTM's will be used as a supplementary quality control check on DTM parameters and quantities, and not for pay. The Contractor may use the *Average End Area Method* in accordance with subsection 90-02c(1) of the GCPs, only if approved in writing by the Engineer.

1. Deliverables: Provide copies of the following to the Engineer:

a. Plotted cross sections from the DTM surfaces. Develop separate cross sections for each volumetric pay item. More than one pay item per plotted cross section is not allowed.

(1) Plot every 50 ft on Station, including intermediate stations as required to define angle points, curves, or other significant changes in the geometry.

(2) Show the elevation and offset information for all vertex points. Weeding vertex point labels is not allowed. Elevation and offset information may be shown on a separate report if the amount of information exceeds what can be legibly shown on the plot.

(3) Show the area for each cross section.

(4) Label each plot with the project name, project number, pay item number, and pay item name.

(5) Label each plot with the Surveyor's Company name and address.

b. Plotted profiles from the DTM surfaces. Develop separate plots for each volumetric pay item. Each plot shall only identify the profiles appropriate to the volumetric pay item.

(1) Plot the profile along the alignment centerline as shown in the plans.

(2) Label each profile as original ground, bottom of excavation, and the top or bottom of embankment, as appropriate.

(3) Label topographic profiles with elevation and station information, using a weeding frequency of every 100 ft, or as necessary to match the frequency shown on the plans.

(4) Label the neat-line profiles with elevation and station information every 100 ft, and for the beginning, end, and VPI of all vertical curves and grade breaks. Label the percent slope between all grade breaks, to the fourth significant decimal.

(5) Label each plot with the project name, project number, pay item number, and pay item name.

(6) Label each plot with the Surveyor's Company name and address.

c. Electronic Data

(1) Provide copies of all Topographic, Neat-line, and Combination surfaces to the Engineer. Include all electronic features (alignments, profiles, sections, etc.) used to generate the surfaces.

(2) All data shall be delivered on a clearly labeled CD-ROM or DVD, unless specified otherwise by the Engineer. The label shall include the project name, project number, Surveyor's company name, and date. All data becomes the property of the State of Alaska.

(3) DTM files shall be saved in Autodesk, TIN, XML, or other approved formats compatible with Department software.

d. Volume Reports

(1) Provide interim volume reports showing quantities between every 50 ft station. The volume reports shall be summarized to allow the Department to reference the quantities per individual plan sheet, or as defined in any earthwork summary shown on the plan sheets.

(2) Provide a final volume report reflecting the final total quantity. Attach all data, calculations, and plots to the report. The report shall be signed, sealed, and dated by the Surveyor. This report shall be used as the basis for final pay.

135-3.9 CONTRACTOR FURNISHED ENGINEERING TOOLS. Furnish and maintain Engineering Tools as directed by the Engineer, for the exclusive use of the Engineer throughout the duration of the project. The Contractor shall furnish all equipment specifications to the Engineer for approval, prior to furnishing equipment. The equipment shall be in good working condition not more than 1 model year old. The Contractor shall insure and indemnify the Department against normal wear and tear, damage, theft, and all other events that may cause a loss of function of the furnished tools. The equipment shall be returned to the Contractor upon completion of the project, or when services are terminated by the Engineer. Furnish training for the Engineer's staff, as directed by the Engineer.

a. Global Positioning System (GPS) Rover Unit. Provide GPS Rover Unit as requested by the Department. ~~All components shall be fully compatible to provide a stand-alone GPS Rover Unit. The Rover Unit shall be an "all on the pole" system equipped with the following:~~

~~**(1)** Receiver~~

~~**(a)** Bluetooth compatible.~~

~~**(b)** Meet waterproof specification IPX7.~~

~~**(c)** Shockproof for a drop onto a hard surface from a height of 4 feet.~~

~~**(d)** Dual frequency receiver capable of tracking at least twelve 12 satellites simultaneously on parallel channels.~~

~~**(e)** Capable of Real-Time Kinematic (RTK), Static, and Fast Static occupations.~~

~~**(f)** Capable of receiving L1, L2, and Global Navigation Satellite System (GNSS) frequencies.~~

~~**(g)** Antenna model shall have undergone antenna calibration by the National Geodetic Survey (NGS).~~

(h) Ensure the receiver contains the manufacturer's latest firmware upgrades.

(i) Provide the manufacturer's user guide.

(2) Controller

(a) Bluetooth compatible.

(b) Equipped with onboard software allowing for the configuration of RTK, Post Processed Kinematic (PPK), or Static rover modes.

(c) Meet waterproof specification IPX7.

(d) Shockproof for a drop onto a hard surface from a height of 4 feet.

(e) Full QWERTY keyboard with numeric keypad, and/or equivalent touch screen interface.

(f) Capable of collecting data in WGS84 and displaying local project coordinates.

(g) Equipped with onboard software that allows automatic point logging.

(h) Capable of creating and storing line work in DFX or DWG format.

(i) Equipped with onboard software to allow the user to stake out points, 3D lines, and DTM surfaces. Software shall allow the user to read cut/fill elevations relative to a Digital Terrain Model (DTM) surface.

(j) Capable of importing, exporting, and storing point, line, and DTM data.

(k) Capable of showing satellite, radio, and battery status.

(l) Equipped with onboard software that allow the user to create and manage survey jobs, point data, coordinate systems, and alignments.

(m) Equipped with a removable memory storage device with a minimum capacity of 512 megabytes (MB).

(n) Capable of storing custom configuration settings for the GPS Rover Unit.

(o) Ensure the controller contains the manufacturer's latest firmware upgrades.

(p) Provide the manufacturer's user guide.

(3) Radio System

(a) Meet waterproof specification IPX7.

(b) Support a frequency compatible with the Reference Station.

(c) Capable of storing multiple radio frequencies.

(d) Compatible with the Reference Station's broadcasting format and protocol.

~~**(e)** Power and programming cables.~~

~~**(f)** Provide the manufacturer's user guide.~~

~~**(4)** Batteries~~

~~**(a)** Provide all batteries required to fully power and operate the GPS Rover Unit.~~

~~**(b)** Batteries shall be capable of powering their respective equipment continuously, for not less than 6 hours under normal operating conditions.~~

~~**(c)** Each battery shall be rechargeable and commercially available.~~

~~**(d)** Provide an identical replacement backup battery for each primary battery required.~~

~~**(e)** Provide all power connectors necessary to connect the batteries to the equipment.~~

~~**(f)** Provide battery chargers to allow all onboard batteries to be charged simultaneously, and that safeguard against overcharging.~~

~~**(5)** Rod~~

~~**(a)** Fixed height (non-adjustable).~~

~~**(b)** Mounting hardware for GPS controller and radio.~~

~~**(c)** Pole grip with bubble level.~~

~~**(d)** Detachable bipod.~~

~~**(e)** Interchangeable flat and pointed footings.~~

~~**(f)** Quick release adapter for the GPS receiver.~~

~~**(6)** Carrying Case~~

~~**(a)** Hard Shell.~~

~~**(b)** Shockproof.~~

~~**(c)** Waterproof.~~

~~**(d)** Capacity to hold all components of the GPS rover, minus the rod.~~

b. Continually Operating Reference Station (CORS). Provide CORS as requested by the Department.

c. GPS Base/Repeater Station. Provide GPS Base/Repeater Station as requested by the Department. ~~All components shall be fully compatible to provide a stand-alone GPS Base/Repeater Station setup. The setup shall include the following:~~

~~**(1)** Receiver~~

~~**(a)** Meet waterproof specification IPX7.~~

~~**(b)** Shockproof for a drop onto a hard surface from a height of 4 feet.~~

~~**(c)** Dual frequency receiver capable of tracking at least 12 satellites simultaneously on parallel channels.~~

~~**(d)** Antenna model shall have undergone antenna calibration by the NGS.~~

~~**(e)** Ensure the receiver contains the manufacturer's latest firmware upgrades.~~

~~**(f)** Carrying case.~~

~~**(g)** Tribrach with optical plummet and height rod.~~

~~**(h)** Provide the manufacturer's user guide.~~

~~**(2)** Controller~~

~~**(a)** Equipped with onboard software allowing for configuration as a GPS reference station in RTK, PPK, Static, and Fast Static modes.~~

~~**(b)** Capable of logging raw observations for post processing.~~

~~**(c)** Capable of showing satellite, radio, and battery status.~~

~~**(d)** Meet waterproof specification IPX7.~~

~~**(e)** Shockproof for a drop onto a hard surface from a height of 4 feet.~~

~~**(f)** Full QWERTY keyboard with numeric keypad, and/or equivalent touch screen interface.~~

~~**(g)** Equipped with a removable memory storage device with a minimum capacity of 512 MB.~~

~~**(h)** Equipped with 1 primary and 1 secondary power input port.~~

~~**(i)** Ensure the controller contains the manufacturer's latest firmware upgrades.~~

~~**(j)** Provide the manufacturer's user guide.~~

~~**(3)** Radio~~

~~**(a)** Transmission power, 25 Watts minimum.~~

~~**(b)** Meet waterproof specification IPX7.~~

~~**(c)** Shockproof for a drop onto a hard surface from a height of 4 feet.~~

~~**(d)** Support a frequency compatible with the Reference Station.~~

~~**(e)** Capable of storing multiple radio frequencies.~~

~~**(f)** Compatible with the CORS broadcasting format and protocol.~~

~~**(g)** Ensure the radio has a current license to broadcast in accordance with FCC requirements.~~

~~**(h)** Ensure the radio broadcast frequency doesn't conflict with other nearby broadcasting sources.~~

~~**(i)** Equipped with onboard software/firmware allowing for configuration as either a Reference Station or a Repeater Station.~~

~~**(j)** Carrying case.~~

~~**(k)** Antenna.~~

~~**(l)** Antenna/pole mounting adapter.~~

~~**(m)** Provide the manufacturer's user guide.~~

~~**(4)** Tripods – Provide one of each:~~

~~**(a)** Conventional tripod with extendible range pole. Include carrying case.~~

~~**(b)** Conventional wood tripod.~~

~~**(5)** Batteries~~

~~**(a)** Provide all batteries required to fully power and operate the GPS Base/Repeater Station.~~

~~**(b)** Batteries shall be capable powering their respective equipment continuously, for not less than 6 hours under normal operating conditions.~~

~~**(c)** Each battery shall be rechargeable and commercially available.~~

~~**(d)** Provide an identical replacement backup battery for each primary battery required.~~

~~**(e)** Provide all power connectors necessary to connect the batteries to the equipment.~~

~~**(f)** Provide battery chargers to allow all batteries to be properly charged, and that safeguard against overcharging.~~

d. Computer Hardware. Provide computer hardware as requested by the Department.

e. Computer Software. Provide computer software as requested by the Department.

135-~~3.4~~-3.10 OFFICE ENGINEERING. Calculate finish grades for the embankments as specified according to Plans and/or specifications. Use information available in the field, on as-builts, or as provided by the Engineer. This work shall be performed by or under the responsible charge of a Professional Land Surveyor or a Professional Engineer currently registered in the State of Alaska.

135-~~3.5~~-3.11 FINAL TRAVERSE. Within 30 days after the Engineer receives a letter stating that construction activities that may disturb the monuments have ceased, the Surveyor shall run a final closed traverse to verify the positional accuracy of installed survey monuments. Tie into the traverse the primary and secondary monuments placed or replaced and undisturbed Department-provided control points. Meet the requirements of a secondary monument for traverse points established during this work. The Surveyor

shall sign and stamp a letter that lists each monument and its coordinates. The letter shall certify that the monuments are each located within 0.1 foot of their proposed position based on the project survey control points provided by the Department. Deliver the certification letter and field notes for this work to the Engineer.

135-~~3.6~~-3.12 EXTRA THREE PERSON SURVEY PARTY. This pay item is for extra, additional, or unanticipated work made necessary by changes in the project. Work performed under pay item G135.020.0000 may include field work, office engineering, or any work described under the construction requirements of item G-135.

135-3.13 FINISH GRADE CHECKING. Perform all survey work required to verify that the finished surface of all surface course meets the requirements for grade as specified in SubsectionP-299-3.7, Surface Test. Multiple surveys may be necessary in areas that require reworking.

METHOD OF MEASUREMENT

135-4.1 MEASUREMENT. The work will be measured according to GCP Section 90, as directed by the Engineer, and as follows:

a. Lump Sum. No measurement of quantities will be made.

b. Hour. By the number of hours, as directed by the Engineer and as recorded by certified payrolls.

c. Contingent Sum. As specified by the Engineer in the Directive authorizing the work.

BASIS OF PAYMENT

135-5.1 PAYMENT. Pay Items include all necessary personnel, equipment, transportation, traffic control devices, and supplies to accomplish the work described in the Contract, or as directed by the Engineer.

a. Pay Item G135.010.0000 Construction Surveying by the Contractor, includes all Contractor surveying work described in the Contract.

b. Pay Item G135.020.0000 Extra Three Person Survey Party, includes payment by the hour for extra, additional or unanticipated work made necessary by changes in the project. Adjustment according to GCP Subsection 90-04 is not allowed for this pay item. Work accomplished by a three person survey party will be paid at 100% of the contract unit price, by a two person survey party at 75% of the contract unit price, or by a one person survey party at 32% of the contract unit price, for Pay Item G135.020.0000.

c. Pay Item G135.030.0000 Monuments by the Contractor, includes all monument work described in the Contract.

d. Pay Item G135.040.0000 Extra Surveying by the Contractor, includes payment according to a Directive from the Engineer authorizing the work. This pay item is for extra, additional, or unanticipated work made necessary by changes in the project.

e. Pay Item G135.050.0000 Contractor Furnished Engineering Tools. The Engineer shall issue a directive defining and authorizing the work. Payment for a GPS Rover, Base/Repeater Station, CORS, or Computer System will be made on a time and materials basis in accordance with subsection 90-05c(5) of the GCPs, Leased or Rented Equipment. Payment for training will be made on a time and materials basis in accordance with subsection 90-05. If the training is beyond the Contractor's or their subcontractors' ability or expertise, payment will be made in accordance with subsection 90-05e, Work by a Specialty Subcontractor. The Engineer may withhold payment for

this item if the minimum specifications are not met. The Engineer may issue a directive at any time to terminate or re-authorize the work, at no additional cost to the Department.

f. Pay Item G135.060.0000 Contractor Furnished Computations. This item includes all work required to develop and furnish quantity computations in accordance with methods required by the contract. Earthwork computations, digital terrain model development, plotted cross sections, quantity reports, and associated topographic surveying are subsidiary to this item. The Engineer may withhold payment for this item if the minimum specifications are not met. 10% of the contract lump sum bid price will be withheld until final computations are accepted by the Engineer. If the Contractor excavates or fills beyond the neat-line limit without the direction of the Engineer, the calculated volume shall only extend to the neat-line limit.

Payment will be made under:

Item G135.010.0000	Construction Surveying by the Contractor – per lump sum
Item G135.020.0000	Extra Three Person Survey Party – per hour
Item G135.050.0000	Contractor Furnished Engineering Tools – per contingent sum
Item G135.060.0000	Contractor Furnished Computations – per lump sum

ITEM G-150 EQUIPMENT RENTAL

DESCRIPTION

150-1.1 This item consists of furnishing construction equipment, operated, fueled and maintained, on a rental basis for use in construction of the proposed improvements and in performing work incidental to construction at the direction of the Engineer as such work is generally defined in these Plans and Specifications. Construction equipment is defined as that equipment actually used for performing the items of work specified and shall not include support equipment such as, but not limited to, hand tools, power tools, electric power generators, welders, small air compressors and other shop equipment needed for maintenance of the construction equipment.

REQUIREMENTS

150-2.1 EQUIPMENT FURNISHED. The construction equipment to be provided under this contract shall be that shown in the Special Provisions or the bid schedule supplemented by such non-rental maintenance equipment and support equipment as the Contractor elects to provide. The equipment shall be of modern design and in good working condition and shall be maintained in good working condition throughout the life of the project. All equipment to be used in the construction of this project as noted in the Bid Schedule shall be made available for inspection by the Engineer prior to its shipment to the project site. Each item of equipment shall have company numbers clearly displayed for ready identification. The Engineer shall have the authority to prohibit the use of rental payment for any equipment which is not maintained in good working condition or which has a production capacity below construction industry standards.

150-2.2 EQUIPMENT OPERATORS. Equipment operators shall be competent and experienced and shall be capable of operating the equipment to its capacity. The Contractor shall replace those operators who, in the opinion of the Engineer, misconduct themselves, either on the job or in the community, or are incompetent or negligent in the operation of the equipment.

150-2.3 HOURS OF OPERATION AND TIMEKEEPING. The Engineer shall begin recording time for payment each shift when the equipment begins work on the project. Time during which the equipment is being serviced or repaired shall not be included. The stated equipment rental rates shall apply only to that time during which the equipment is actively engaged in construction, as directed by the Engineer. No standby payment will be made for any piece of equipment prior to, during the life of, or after the project has been completed. "Stuck Time" payment shall be made for each piece of equipment that becomes stuck while actively engaged in construction work on the airport and shall be limited to 1 hour per shift for each piece of equipment that becomes stuck.

150-2.4 CONSTRUCTION METHODS. The work shall be constructed according to the Plans, Special Provisions and as directed by the Engineer.

METHOD OF MEASUREMENT

150-3.1 The serial number and brief description of each item of equipment listed in the bid schedule will be recorded by the Engineer, and they will record the number of hours, or fractions thereof to the nearest one-quarter hour, during which the equipment is actively engaged in construction of the project. The furnishing and operating of equipment of heavier type, larger capacity, or higher horsepower than specified will not entitle the Contractor to any extra compensation over their applicable contract unit price. Each day's activity will be recorded on a separate sheet or sheets, which shall be verified and signed by the Contractor's representative at the end of each shift, and a copy will be provided to the Contractor's representative. No idle time will be recorded unless authorized by the Engineer.

BASIS OF PAYMENT

150-4.1 Payment will be made at the contract unit price bid for equipment rental per hour. This payment shall be full compensation for all fuel, operator's and mechanic's wages, parts, tools, maintenance items, shop equipment, camp, camp personnel wages, and all other incidentals necessary to keep the equipment in good condition and available for work on the project. No payment for equipment standby time resulting from unfavorable weather, or any other reason, is implied or intended and no payment therefore will be made by the Department. No payment will be made separately or directly for embankments.

Payment will be made under:

Item G150.010.0075	Equipment Rental, Dozer 75-hp Minimum – per hour

ITEM G-300 CRITICAL PATH METHOD SCHEDULING

DESCRIPTION

300-1.1 Provide and maintain a Critical Path Method (CPM) progress schedule for the project. Use the schedule in coordinating and monitoring of all work under the Contract including activity of subcontractors, manufacturers, suppliers, and utility companies, and reviews by the Department. Update the CPM schedule, as required.

Provide construction Plans.

SUBMITTAL OF SCHEDULE

300-2.1 Submit a detailed initial CPM Schedule at the pre-construction conference for the Engineer's acceptance as set forth below.

The construction schedule, for the entire project, may not exceed the specified contract time.

Allow the Engineer 14 days to review the initial CPM Schedule. If revisions are required, make them promptly. The finalized CPM Schedule must be completed and accepted prior to commencement of any work on the project.

REQUIREMENTS AND USE OF SCHEDULE

300-3.1

a. Schedule Requirements. Prepare the CPM schedule as a Precedence Diagram Network developed in the activity-on-node format which includes:

(1) Activity description

(2) Activity duration

(3) Resources required for each of the project activities, including:

(a) Labor (showing work days per week, holidays, shifts per day, and hours per shift)

(b) Equipment (including the number of units of each type of equipment)

(c) Materials.

Show on the activity-on-node diagram the sequence and interdependence of all activities required for complete performance of all items of work under this Contract, including shop drawing submittals and reviews and fabrication and delivery activities.

No activity duration may be longer than 15 work days without the Engineer's approval.

The Engineer reserves the right to limit the number of activities on the schedule.

Consider that schedule float time is shared equally with the Department.

The contract completion time will be adjusted only for causes specified in this Contract.

b. Schedule Updates. Hold job site progress meetings with the Engineer for the purpose of updating the CPM Schedule. Meet with the Engineer monthly, or as deemed necessary by the Engineer.

Review progress and verify finish dates of completed activities, remaining duration of uncompleted activities, and any proposed logic and/or time estimate revisions. Submit a revised CPM schedule within 5 working days after this meeting showing the finish dates of completed activities and updated times for the remaining work, including any addition, deletion, or revision of activities required by Contract modification.

c. Work Plans. In addition to the CPM schedule, submit a work plan every 2 weeks during construction, detailing your proposed operations for the forthcoming two weeks. Include:

(1) Work activities

(2) Manpower involved by trade

(3) Work hours

(4) Equipment involved

(5) Location of the work to be performed

METHOD OF MEASUREMENT

300-4.1 CPM Scheduling will not be measured for payment. Refer to GCP Section 90 for requirements regarding lump and contingent sum items.

BASIS OF PAYMENT

300-5.1 At the lump sum price for CPM Scheduling.

Payment will be made under:

Item G300.010.0000 CPM Scheduling – per lump sum

ITEM G-700 TRAFFIC CONTROL FOR AIRPORTS

DESCRIPTION

700-1.1 Provide suitably equipped airport flagger(s) with no other assigned duties to monitor and control the Contractor's personnel and equipment crossing or occupying any portion of the Air Operations Area of the airport, as required under Section 80-04 Limitation of Operations. The airport flagger shall have no other assigned duties.

REQUIREMENTS

700-2.1 Furnish airport flaggers and all necessary equipment. Equip each airport flagger assigned to an aircraft operations area with a two-way radio that broadcasts and receives on the designated Common Traffic Advisory Frequency (CTAF) for the project airport as found in the Alaska Supplement of the United States Government Flight Information Publication. Provide each airport flagger with a two-way radio to contact construction equipment and other airport flaggers on the project. Equip each airport flagger for vehicular traffic control with a flagging paddle that conforms to the requirements of the Alaska Traffic Manual.

Locate each airport flagger at a position as shown on the Plans or as described in the Safety Plan, or at an alternate location as directed by the Engineer. Ensure that each airport flagger maintains their assigned post at all times. Airport flagger positions will be adjusted as conditions warrant.

METHOD OF MEASUREMENT

700-3.1 Airport flagger will be measured by the hour for the actual number of hours that each airport flagger performed as directed by the Engineer.

BASIS OF PAYMENT

700-4.1 Payment will be made at the contract unit price for each Airport Flagger per hour. The hourly rate for Airport Flagger is set at $58.00 per hour for this contract. The Engineer does not require a change order/directive for this pay item.

Payment will be made under:

Item G700.010.0000 Airport Flagger – per contingent sum

ITEM G-705 WATERING FOR DUST CONTROL

DESCRIPTION

705-1.1 Furnish all equipment and labor necessary to supply watering for dust control as required by the approved traffic control plans or as directed by the Engineer. This item is for dust control outside of the construction work area. Dust control within the work area is incidental to the contract and no separate payment will be made.

REQUIREMENTS

705-2.1 WATERING. Furnish, haul, and place water for dust control as directed. Use water trucks capable of adjusting the rate of water flow from the operator's position. Distribute a light-water spray pumped from a tanker in a uniform spray pattern to cover a minimum 30-foot width in one pass and without causing erosion. Gravity flow will not be allowed. The Engineer will control water application.

If you take water from a lake, stream, or other natural water body, first obtain a water removal permit from the Alaska Department of Natural Resources (DNR). Comply with the Alaska Department of Fish and Game and/or DNR Office of Habitat Management and Permitting screening requirements for all water removal operations.

METHOD OF MEASUREMENT

705-3.1 By the 1,000 gallons (M-gallon) of water applied. The water will be measured by means of calibrated tanks or distributors, accurate water meters, or by weighing. If by weight, convert to gallons at 8.34 pounds per gallon. If by volume, convert to gallons at 7.48 gallons per cubic foot.

BASIS OF PAYMENT

705-4.1 The contract price includes all resources required to provide watering, as directed.

Payment will be made under:

Item G705.010.0000	Watering for Dust Control – per Mgal

ITEM L-101 AIRPORT ROTATING BEACONS

DESCRIPTION

101-1.1 This item shall consist of removal and disposal of existing beacons; furnishing and installing new airport rotating beacons. This work shall include the mounting, leveling, wiring, conduit, painting, servicing, and testing of the beacon. In addition, this item also includes all materials and incidentals necessary to place the beacon in operating condition as a completed unit to the satisfaction of the Engineer. This item shall include a mounting platform if specified in the Plans.

MATERIALS

101-2.1 GENERAL.

a. Airport lighting equipment and materials covered by FAA Advisory Circulars (ACs) shall be certified and listed under AC 150/5345-53, Airport Lighting Equipment Certification Program (ALECP). The AC 150/5345-53, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction web page: https://www.faa.gov/airports/engineering/. ~~This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction internet page: http://www.faa.gov/airports_airtraffic/airports/construction/.~~

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

101-2.2 BEACON. The beacon shall be type L-801A, ~~or L-802A,~~ Class II, with metal-halide lamp(s), meeting the requirements of AC 150/5345-12, Specification for Airport and Heliport Beacons.

a. The beacon shall be supplied with an arctic kit to provide supplemental heating to the beacon mechanisms and bearings for operations in extreme weather. If the manufacturer does not offer an optional arctic kit, the beacon shall be modified as outlined in this paragraph. The beacon shall, at a minimum, be equipped with a 400 W strip heater installed to keep the motor and beacon housing warm during extreme cold weather conditions. An air-sensing thermostat shall be supplied with contacts rated for 16 A, 120 V. The thermostat shall be constructed so that contacts close on descending temperatures adjustable between 0 °F and 30 °F, +/- 4 °F. The contacts shall open on rising temperatures at 15 °F above closing temperature.

b. The internal heater and internal thermostatic control kit shall be field wired separate from the beacon lights and motor (see beacon wiring diagram on the Plans).

c. The beacon contactor shall be 2-pole, 30 A, with an operating coil designed for 120 V, 60 Hz., and shall be mounted in the control panel with its operating coil circuit connected through an on-off-auto switch as shown on the Plans.

101-2.3 BEACON INSTALLATION. Beacon shall be installed as shown on the Plans and in compliance with AC 150/5340-30, Design and Installation Details for Airport Visual Aids.

101-2.4 PANEL BOARDS AND BREAKERS. Panel boards and breakers shall conform to the requirements of Federal Specification W-P-115, Panel, Power Distribution.

101-2.5 WEATHERPROOF CABINETS. The weatherproof cabinets shall conform to NEMA Standards and shall be constructed of steel not less than No. 16 USS gauge.

101-2.6 WIRE. For ratings up to 600 V, thermoset wire conforming to Federal Specification J-C-30, Type XHHW-2 shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the Plans or in the Sspecifications.

101-2.7 CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of UL Standard 6 and 514B. Intermediate metal conduit and fittings shall conform to the requirements of Underwriters Laboratories, UL Standard 1242 and 514B.

101-2.8 PAINT.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer compatible with the manufacturer's recommendations for the intermediate or topcoat.

b. Priming paint for galvanized metal surfaces shall be a zinc-rich epoxy primer paint per MIL-DTL-24441/19C, Formula 159, Type III. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a ready-mixed non-fading paint meeting the requirements of Master Painter's Institute (MPI) Reference #9 (gloss). The color shall be per Federal Standard 595, International Orange Number 12197.

d. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint per the Master Painter's Institute, Reference #9, Exterior Alkyd, Gloss, volatile organic content (VOC) Range E2.

e. Priming paint for wood surfaces shall be mixed on the job by thinning the above-specified orange or white paint with 1/2 pint of raw linseed oil to each gallon.

f. Factory-applied paint shall be manufacturer's standard prime and finish coats or powder-coated finish.

101-2.9 DISCONNECT SWITCH. Switch shall be a 600V AC, 30A minimum, heavy-duty motor-rated, multi-pole switch as indicated on the Plans. Provide switch in a NEMA type 4X metal enclosure.

CONSTRUCTION METHODS

101-3.1 PLACING THE BEACON. The beacon shall be mounted on a beacon tower, platform, or building roof as shown in the Plans.

101-3.2 HOISTING AND MOUNTING. The beacon shall be hoisted to the mounting platform by using suitable slings and hoisting tackle. Before fastening the beacon to the mounting platform, the mounting holes shall be checked for correct spacing. Beacon base or mounting legs shall not be strained or forced out of position to fit incorrect spacing of mounting holes. The beacon base shall be raised first, set in position, and bolted in place. The beacon shall then be raised and assembled to the base.

101-3.3 LEVELING. After the beacon has been mounted in place, it shall be accurately leveled. The leveling shall be checked in the presence of the Engineer and shall be to the Engineer's satisfaction.

101-3.4 SERVICING. Before placing the beacon in operation, the Contractor shall check the manufacturer's manual for proper servicing requirements. Follow the manufacturer's servicing instructions for each size of beacon. If not included in the manufacturer's instructions, the Contractor must also:~~Before placing the beacon in operation, the Contractor shall accomplish the following:~~

a. Clean and polish all glassware, both inside and outside, using a type of cleaner which will not scratch the lens, and clean the interior of the beacon.

b. Clean interior of beacon base and check for alignment of parts.

c. Clean and lubricate all mechanical system according to manufacturer's recommendations. Assure that all subassemblies are properly aligned and working properly.

d. Secure lamps properly in the sockets.

101-3.5 BEAM ADJUSTMENT. After the beacon has been mounted and leveled, the vertical angle of the beams shall be adjusted. The final beam adjustments shall be made at night so that results can be readily observed. The beams shall be adjusted to the vertical angle directed by the Engineer or as shown in the Plans, except that, in no case shall the vertical angle of the beams be less than 2° above the horizontal.

101-3.6 BEACON MOUNTING PLATFORM. Where the beacon is to be mounted at a location other than a beacon tower and where a special mounting platform is required, the construction of this mounting platform and any necessary lightning protection equipment shall be according to the details shown in the Plans.

101-3.7 WIRING. The Contractor shall furnish all necessary labor and materials and shall make complete above ground electrical connections according to the wiring diagram furnished with the project Plans. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electrical Code (NEC).

If underground cable for the power feed from the transformer vault to the beacon site and duct for this cable installation is required, the cable and duct shall be installed according to Item L-108, Underground Cable, and Item L-110, Underground Electrical Duct.

If obstruction lighting is specified, the Contractor shall connect the tell-tale relay mechanism in the beacon to energize the tower obstruction light circuit when failure of the beacon service (primary) lamp occurs.

~~I~~If lightning protection is specified in the Plans, it shall be installed per L-103, Airport Beacon Towers, subsection 103-2.3.~~f lightning protection is specified in the Plans or specifications as a part of this item, it shall be according to subsections 103-2.3 in Item L-103, Beacon Tower.~~

101-3.8 PANEL AND CABINET. If shown in the Plans, the Contractor shall furnish and install, at the top of the beacon tower or mounting platform, a circuit-breaker panel consisting of four 15-ampere breakers mounted in a weather-proof cabinet to provide separate protection for the circuits to the beacon lamps, motor, obstruction lights, and other equipment. The cabinet shall be located on the side of the beacon platform, as directed by the Engineer.

101-3.9 CONDUIT. All exposed wiring shall be run in not less than 3/4 inch galvanized rigid steel conduit. Outdoor rated, liquid-tight, flexible metal conduit may be used for the final connection at the beacon equipment. No conduit shall be installed on top of a beacon platform floor. All conduit shall be installed to provide for drainage. If mounted on a fixed steel beacon tower, the conduit shall be fastened to the tower members with "wraplock" straps, clamps, or approved fasteners, spaced approximately 5 feet apart. The conduit shall be fastened to wooden structures with galvanized pipe straps and with galvanized wood screws not less than No. 8 nor less than 1-1/4 inches long. There shall be at least two fastenings for each 10-foot length.

101-3.10 BOOSTER TRANSFORMER. If shown in the Plans or specified in job specifications, a booster transformer to compensate for voltage drop to the beacon shall be installed in a suitable weatherproof housing under or on the tower platform or at the base of the tower. The installation shall be as indicated in the Plans and described in the specifications. If the booster transformer is required for installation in the transformer vault, it shall be installed according to L-109, Transformer Vault and Vault Equipment. No separate measurement or payment will be made for the booster transformer.

101-3.11 PHOTOELECTRIC CONTROL. If shown in the Plans or specified in job specifications, the Contractor shall furnish and install an automatic control switch at the location indicated in the Plans. The switch shall be a photoelectric type. It shall be a standard commercially available unit suitable for aviation service complying with UL 773, with supply voltage rating of 105-277V AC, integral surge protection, -40°F to 140°F operating temperature range, and EEI-NEMA standard twist-lock mounting with base. It shall be installed, connected, and adjusted according to the manufacturer's instructions.

101-3.12 OBSTRUCTION LIGHTS. Unless otherwise specified, the Contractor shall install on the top of the beacon tower or mounting platform two L-810 obstruction lights on opposite corners. These lights shall be mounted on conduit extensions to a height of not less than 4 inches above the top of the beacon. They shall be connected in series into the tell-tale circuit with the necessary relay and wiring connections.

101-3.13 PAINTING. If construction of a wooden mounting platform is required as part of the Plans or these Specifications, all wooden parts of the platform shall be given one priming coat of white or international-orange paint after fabrication but before erection and one body and one finish coat of international-orange paint after erection.~~If construction of a wooden mounting platform is stipulated in the specifications as part of this item, all wooden parts of the platform shall be given one priming coat of white or aviation-orange paint after fabrication but before erection and one body and one finish coat of aviation-orange paint after erection.~~ Steel mounting platforms shall be given one priming coat of corrosion-inhibiting primer before erection and one body and one finish coat of aviation-orange paint after erection. All equipment installed under this item and exposed to the weather shall be given one body and one finish coat of aviation-orange or white paint as required. This shall not include factory-finished or galvanized beacon, beacon base, obstruction lights, breaker cabinet, conduit, and transformer cases. It shall not include lightning rods or obstruction light globes.

The paint shall be applied uniformly in the proper consistency by skilled painters. Apply the paint uniformly at the proper consistency. The finished paint shall be free from sags, holidays, and smears. Each coat of paint shall be given ample time to dry and harden before the next coat of paint is applied. A minimum of three (3) days shall be allowed for drying on wood surfaces, and a minimum of four (4) days shall be allowed for drying on metal surfaces. Painting shall not be performed in cold, damp, foggy, dusty, or frosty atmospheres, or when the air temperature is below 40°F, or started when the weather forecast indicates such conditions for the day.~~The finished paint shall be free from sags, holidays, and smears. Each coat of paint shall be given ample time to dry and harden before the next coat of paint is applied. A minimum of 3 days shall be allowed for drying on wood surfaces, and a minimum of 4 days shall be allowed for drying on metal surfaces. Painting shall not be done in cold, damp, foggy, dusty, or frosty atmospheres, or when air temperature is below 40 °F, nor started when the weather forecast indicates such conditions for the day.~~

All surfaces shall be cleaned before painting. The surfaces shall be dry and free from scale, grease, rust, dust, and dirt when paint is applied. All knots in wood surfaces shall be covered with shellac immediately before applying the priming coat of paint. Nail holes and permissible imperfections shall be filled with putty.

The ready-mixed paint shall be thinned for the priming and body coats according to the manufacturer's recommendations. In the absence of such recommendations, the following shall apply:

a. Body coats (for both wood and steel surfaces) - add 1/2 pint of turpentine to each gallon of ready-mixed paint for body coats.

b. Finish coats (for both wood and steel surfaces) - the ready-mixed paint shall be used as it comes from the container for finish coats.

101-3.14 TESTING. The installation shall be fully tested in operation as a completed unit prior to acceptance. These tests shall include operation of the lamp-changer and performing insulation resistance and voltage readings. The insulation resistance to ground of the beacon supply circuit shall be not less than 1,000 megohms when measured ungrounded. Testing equipment shall be furnished by the Contractor. Tests shall be conducted in the presence of the Engineer and shall be to their satisfaction.

101-3.15 SPARE PARTS. Provide a quantity of spare parts, including two spare lamps. Deliver spare parts to airport maintenance as directed by the Engineer.

METHOD OF MEASUREMENT

101-4.1 The quantity to be paid for shall be the number of beacons installed as completed units in place, accepted, and ready for operation.

101-4.2 Removal of existing rotating beacons shall be subsidiary to installation of new rotating beacons and no separate payment will be made.

101-4.3 Spare parts to be paid by actual invoiced material and delivery cost, plus 15 percent markup.

BASIS OF PAYMENT

101-5.1 Payment will be made at the contract unit price for each completed and accepted job.

101-5.2 Spare parts are paid for under item *L125.170.0000 Spare Parts*.

Payment will be made under:

Item L101.020.0000 Rotating Beacon, Medium Intensity, L-801A - per each

REFERENCES

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

Advisory Circulars (AC)

AC 150/5345-7	*L-824 Underground Cable for Airport Lighting Circuits*
AC 150/5345-12	*Airport and Heliport Beacons*
AC 150/5340-30	*Design and Installation Details for Airport Visual Aids*
AC 150/5345-53	*Airport Lighting Equipment Certification Program*
Commercial Item Description A-A-3067	Paint: Alkyd, Exterior, Low VOC
Fed.Spec. J-C-30	Cable and Wire, Electrical (Power, Fixed Installation)
Fed. Spec. TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
Fed. Spec. TT-P-664D	Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
Fed.Spec. W-P-115	Panel, Power Distribution
Fed. Std. 595	Colors Used in Government Procurement
MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)
MIL-P-24441/19C	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

National Fire Protection Association (NFPA)

NFPA-70	National Electrical Code (NEC)
NFPA-780	Standard for the Installation of Lightning Protection Systems

Underwriters Laboratories (UL)

UL Standard 6	Electrical Rigid Metal Conduit - Steel
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 1242	Electrical Intermediate Metal Conduit - Steel

ITEM L-103 AIRPORT BEACON TOWERS

DESCRIPTION

103-1.1 This item shall consist of removal and disposal of existing beacon tower; furnishing and installing an airport beacon tower as shown on the Plans and according to these specifications. This work shall include the clearing of the site, erection of the tower, installation of lightning protection, painting, and all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer. See advisory circular (AC) 150/5340-30 Design and Installation Details for Airport Visual Aids for additional installation information about airport beacon towers.

MATERIALS

103-2.1 GENERAL. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

103-2.2 TOWER. The beacon tower shall conform to the requirements of AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*, Chapter 6. The tower and foundation shall be designed according to the International Building Code, for a minimum basic wind speed of 120 mph (3 second gust), exposure category C or D (use D if next to large bodies of open water or a coastal area), and importance factor III. Verify the structure is capable of withstanding snow and earthquake loads. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and submit them to the Department for review.

The beacon tower shall be either of the following:

a. Fixed Tubular Steel Tower. The tubular steel tower shall be formed of 60,000 psi (Grade 60) ASTM A572 steel, with galvanized prime and painted finish.

b. Hinged Pole Tower. The beacon tower shall be a galvanized hinged steel pole with painted finish. Provide a pole formed of high strength 50,000 psi (Grade 50) ASTM A572 steel. The pole shall be self-supporting without the use of guy wires, of the height specified in the bid schedule, and have a winch with an automatic brake and a removable hand crank or other approved mechanism to lower the top of the beacon pole to ground level. Provide a counterweighted top section with a tall, sturdy mounting platform for the rotating beacon. Ensure that the beacon pole tower components and assemblies, are designed and rated to meet design loads.

103-2.3 LIGHTNING PROTECTION. Lightning protection shall comply with NFPA-780, Standard for the Installation of Lightning Protection Systems.

a. Air Terminal~~Lightning Rod~~. The lightning rod shall consist of a galvanized steel, copper, or copper-clad rod with the upper end drawn to a point and of sufficient length as required by the equipment being protected.

b. Down Conductor. The down conductor cable for lightning protection shall consist of No. 2/0 AWG or larger bare stranded copper wire. ~~The tower steel may be utilized as the down conductor. A flexible grounding braid, minimum No. 2 AWG equivalent, shall be provided across the hinge point of hinged pole towers or mechanical joints of fixed towers.~~

c. Ground Rod. The ground rod shall be 3/4~~¾~~ inch diameter by 10-foot long, made of copper or copper clad metal. The tower shall be grounded at the base as shown in the Plans and as specified.

103-2.4 PAINT.

a. Priming paint for galvanized steel towers shall be zinc dust-zinc oxide primer paint conforming to MIL-P-24441/19C~~B~~. If necessary, add not more than 1/2 pint of turpentine to each gallon of paint.

b. Priming paint for ungalvanized steel towers shall be a high solids alkyd primer conforming to Fed. Spec. TT-P-664D.

c. Orange paint for the body and finished coats on metal and wood surfaces shall consist of a ready-mixed nonfading paint meeting the requirements of Fed. Spec. TT-E-489. The color shall be according to Federal Standard 595, Aviation Gloss Orange, Number 12197.

d. White paint for steel tower shall be ready-mixed paint conforming to Commercial Item Description A-A-3067.

103-2.5 FOUNDATION. Construct foundation as shown on the Plans. Foundation to pole base connections must be adjustable by tightening or loosening bolts with a wrench and adjusts within a minimum 5-degree tolerance without compromising the wind rating.

FYI – The Note to Designer in the draft states: Note to Designer: If a foundation design is not included on the Plans, it shall be Contractor designed…..(add as 2.5a) the foundation based on the soil bearing capacity of the soils located at the pole site (using a factor of safety of 3 or more) and design loads on the wind cone.

Design the foundation as necessary to resist pole lateral, uplift, and overturning forces. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and shall demonstrate the foundation design is adequate to support the specified loads and resist forces. Submit the design and calculations to the Department for review.~~Provide a foundation conforming to detailed requirements on Plans that is adjustable by tightening or loosening bolts with a wrench and adjusts within a minimum 5-degree tolerance without compromising the wind rating. Design the foundation based on the soil bearing capacity of the soils located at the pole site (using a factor of safety of 3 or more) and design loads on the beacon tower. Design the foundation as necessary to resist pole lateral, uplift, and overturning forces. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and shall demonstrate the foundation design is adequate to support the specified loads and resist forces. Submit the design and calculations to the Department for review.~~

CONSTRUCTION METHODS

103-3.1 CLEARING AND GRADING. The site on which the beacon tower is to be erected shall be cleared and leveled. All trees and brush shall be removed from the area within a distance of 25 feet from the tower or as called for in the Plans. Stumps shall be removed to a depth of 18 inches~~1-1/2 feet~~ below finished grade and the excavation filled with earth and tamped. If a transformer vault or other structure is included as part of the installation, the area shall be cleared to a distance of 25 feet from these structures. The ground near the tower shall be leveled to permit the operation of mowing machines. The leveling shall extend at least 2 feet outside the tower legs. All debris removed from the tower site shall be disposed of by the Contractor to the satisfaction of the Engineer and according to Federal, state, or local regulations.

103-3.2 EXCAVATION AND FILL. Excavation for the tower footings or base shall be carried to a minimum of 4 inches below the footing depth. The excess excavation below the footing depth shall then be backfilled with gravel or crushed stone meeting the requirements of either P-152, P-154, P-207, or P-209 and compacted to the required level. The footing plates shall be installed, and a thickness of not less than 18 inches of the same gravel or crushed stone shall be placed immediately above the footing plates in layers of not over 6 inches. Each layer above the footing plates shall be thoroughly tamped in place. The remainder of the backfill may be of excavated earth placed in layers not to exceed 6 inches. Each layer shall be thoroughly compacted by tamping.

Where solid rock is encountered, which prevents the carrying of the foundation legs to the required depth but which is of sufficient strength to use hold-down bolts, the tower anchor posts shall be cut off at the required length and the hold-down bolts shall be installed as indicated in the Plans with the approval of the

Engineer. Each tower leg shall be anchored to the rock by means of two 7/8 inch diameter by 3 foot long expansion or split bolts and shall be grouted with neat portland cement into holes drilled into the natural rock. Except as required for rock foundations, the footing members shall not be cut off or shortened. If excavated material is of such character that it will not readily compact when backfilled, the Engineer may order the excavation backfilled with concrete or other suitable material.

The concrete footing for fixed towers shall be installed according to the manufacturer's recommendations. Portions of the footing in the topsoil layer shall not be included in the footing height.

Concrete foundation for hinged pole shall be in accordance with these specifications and the manufacturer's drawings and recommendations. Concrete shall meet the requirements of P-610, Structural Portland Cement Concrete. Do not grout between the base plate and the foundation, allow air to circulate through the pole to prevent moisture accumulation.

103-3.3 ERECTION. Detail erection drawings furnished by the manufacturer shall be strictly followed during construction.

Fixed towers shall be erected in sections from the ground up unless otherwise specified. In final assembly, all bolts and fastenings shall be installed, and the structure shall be plumb, true, square, and level. Nuts shall be taken up to a firm bearing after which the bolts shall, if necessary, be cut to proper length to protrude three full threads. Approved locknuts shall be placed on each bolt over the regular nut. Ladder bolts shall be inserted with the head to the outer face of the tower. Diagonal, leg, and handrail bolts shall be installed with nuts on the outer face of the tower, unless otherwise specified. Bent parts shall be straightened before erection without damage to the protective coating. Surfaces abraded or bared of protective coating shall be painted with the proper priming paint as specified in these specifications.

The Contractor shall install the ladder on the side of the tower adjacent to the driveway or most accessible approach to the tower. Tubular beacon towers shall be erected according to the manufacturer's recommendations. The safety cable shall be located on the side of the tower adjacent to the driveway or most accessible approach to the tower.

103-3.4 LIGHTNING PROTECTION. The Contractor shall furnish lightning protection complying with NFPA-780, Standard for the Installation of Lightning Protection Systems, consisting of a lightning rod, down conductor, and at least one ground plate or rod for each beacon tower. The lightning rod shall be installed at the top of the tower with the tip of the rod extending not less than 10 inches above the top of the highest equipment being protected.

Down-conductor cables shall be securely fastened to the surface of the tower leg at 5-foot intervals with suitable bronze fasteners having bronze or noncorrosive metal bolts. Sharp turns or bends in the down conductor will not be permitted. Where the tower steel is used as the down conductor, the attachment of the lightning rod to the tower and/or mounting platform shall be sufficient to provide electrical connection to the tower steel.

All connections of cable to cable, cable to lightning rods, and cable to ground plates or rods shall be made with approved type solderless connectors or noncorrosive metal and shall be of substantial construction.

The down-conductor cable shall be securely attached to ground rods or plates placed at least 2 feet away from the tower foundations. The ground rod shall be driven into the ground so that the top is at least 0.5 foot below grade. The down-conductor shall be firmly attached to the ground plate or rod by means of exothermic welding. Plates shall be embedded in the area of permanent moisture.

The complete lightning protection installation shall be accomplished to the satisfaction of the Engineer. The resistance to ground of any part of the lightning protection system shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod.

103-3.5 PAINTING. The Contractor shall furnish all materials and labor for painting the beacon tower. The color scheme for the steel tower shall be five equal spaces of alternating orange and white paint.

a. **Parts to be Painted.** Tower parts (except those parts to be exposed to earth) shall be primed and painted prior to erection. Tower parts shall be factory finished where possible. All tower parts placed below ground level or within 1 inch above ground level shall be given two coats of approved bituminous paint.

   The paint shall be applied uniformly in the proper consistency by skilled painters. The finished paint shall be free from sags, holidays, and smears. Division lines between colors shall be sharply defined. Each coat of paint shall be given ample time to dry and harden before the next coat is applied. A minimum of 4 days shall be allowed for drying on metal surfaces. Painting shall not be done in cold, damp, foggy, dusty, or frosty atmospheres, or when air temperature is below 40 °F, nor started when the weather forecast indicates such conditions for the day.

   All surfaces shall be cleaned before painting. The surfaces shall be dry and free from scale, grease, rust, dust, and dirt when paint is applied. Finished damaged during shipping or erection shall be repaired in accordance with these specifications or the manufacturer's recommendations as applicable.

The number of coats of paint applied shall be according to the following instructions:

b. **Steel Towers, Galvanized.** One priming coat of zinc dust-zinc oxide primer and one body and one finish of white or orange paint (as required by the color scheme).

c. **Steel Towers, Not Galvanized.** One priming coat of corrosion-inhibiting primer and one body and one finish coat of white or orange paint (as required by the color scheme).

The above specified orange and white ready-mixed paints shall be thinned for the body coats according to the manufacturer's recommendations. In the absence of such recommendations, the following shall apply:

d. **Body Coats.** Add not more than 1/2 pint of turpentine to each gallon of ready-mixed paint.

e. **Finish Coats.** The ready-mixed paint shall be used as it comes from the container.

METHOD OF MEASUREMENT

103-4.1 The quantity to be paid for under this item shall be the number of airport beacon towers installed as completed units in place, accepted, and ready for operation.

103-4.2 Refer to Item P-610 for requirements regarding all work and materials to place Portland cement concrete. Portland cement concrete is subsidiary to L-103 items requiring its use.

103-4.3 Removal of existing beacon towers and foundations shall be subsidiary to the installation of beacon towers and no separate payment will be made.

BASIS OF PAYMENT

103-5.1 Payment will be made at the contract unit price for each completed and accepted job.

Payment will be made under:

Item L103.010.0030 30-feet Hinged Pole Beacon Tower - per each

REFERENCES

AC 150/5340-30	*Design and Installation Details for Airport Visual Aids*
MPI Reference #8	Alkyd, Exterior, Flat (MPI Gloss Level 1)
MPI Reference #9	Alkyd, Exterior, Gloss (MPI Gloss Level 6)
ASTM A572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
Commercial Item Description A-A-3067	Paint, Alkyd, Exterior, Low VOC
Fed. Spec. TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
Fed. Spec. TT-P-664D	Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
Fed. Std. 595	Colors Used in Government Procurement
MIL-P-24441/19C	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III
NFPA-780	Standard for the Installation of Lightning Protection Systems

ITEM L-107 AIRPORT WIND CONES

DESCRIPTION

107-1.1 This item shall consist of [removal and disposal of existing wind cones and foundations;] furnishing and installing lighted and unlighted airport wind cones according to these specifications and according to the dimensions, design, and details shown in the Plans.

For lighted wind cones, the work shall include the furnishing and installation of a support for mounting the wind cone, and a concrete foundation. The item shall also include all cable connections, the furnishing and installing of the wire and conduit and conduit fittings from the wind cone to the first handhole, the furnishing and installation of all lamps, ground rod and ground connection, the testing of the installation, and all incidentals necessary to place the wind cone in operation as a completed unit to the satisfaction of the Engineer.

For unlighted wind cones, the work shall include the furnishing and installation of a support for mounting the wind cone and a concrete foundation.

MATERIALS

107-2.1 GENERAL.

a. Airport lighting equipment and materials covered by FAA specifications shall be certified and listed under AC 150/5345-53, Airport Lighting Equipment Certification Program. This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction internet page: http://www.faa.gov/airports_airtraffic/airports/construction/.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

107-2.2 WIND CONES. The 8-foot and 12-foot wind cones and assemblies shall conform to the requirements of AC 150/5345-27, Specification for Wind Cone Assemblies. The pole supporting the wind cone for L-807 wind cones shall be a steel pole hinged in the middle. The pole supporting the wind cone for L-806 wind cones shall be frangible.

~~**a.** Type L-807, Style I-A, Size 1, externally lighted wind cone.~~
~~**b.**~~**a.** Type L-807, Style I-B, Size 1, internally lighted wind cone.
~~**c.** Type L-807, Style I-A, Size 2, externally lighted wind cone.~~
~~**d.** Type L-807, Style I-B, Size 2, internally lighted wind cone.~~
~~**e.**~~**b.** Type L-806, Style I-B, Size 1, internally lighted wind cone.
~~**f.** Type L-807, Style II, Size 1, unlighted wind cone.~~
~~**g.** Type L-807, Style II, Size 2, unlighted wind cone.~~
~~**h.** Type L-806, Style II, Size 1, unlighted wind cone.~~

107-2.3 ELECTRICAL WIRE AND CABLE. Wire in conduit rated up to 5,000 V in conduit shall conform to AC 150/5345-7, Specification for L-824 Underground Cable for Airport Lighting Circuits. For ratings up to 600 V, cross-linked polyethylene insulated wire type XHHW-2, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the Plans.

107-2.4 CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of UL Standard 6, 514, and 1242.

107-2.5 FOUNDATION. Provide a foundation conforming to detailed requirements on the Plans that is adjustable by tightening or loosening bolts with a wrench and adjust within a minimum 5-degree tolerance without compromising the wind rating. Design the foundation based on the soil bearing capacity of the soils

located at the pole site (using a factor of safety of 3 or more) and design loads on the wind cone. Design the foundation as necessary to resist pole lateral, uplift, and overturning forces. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and shall demonstrate the foundation design is adequate to support the specified loads and resist forces. Submit the design and calculations to the Department for review.

Concrete for foundations shall be proportioned, placed, and cured according to Item P-610, Structural Portland Cement Concrete.

107-2.6 PAINT.

a. Priming paint for non-galvanized metal surfaces shall be a high solids alkyd primer conforming to Fed. Spec. TT-P-664D.

b. Primer for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-P-24441C/19B. Use MIL-24441 thinner per paint manufacturer's recommendations.

c. Orange paint for the body and the finish coats on metal surfaces shall consist of a ready-mixed nonfading paint meeting the requirements of Fed. Spec. TT-E-489. The color shall be according to Federal Standard 595, Aviation Gloss Orange, Number 12197.

d. Factory-applied paint shall be manufacturer's standard prime and finish coats or powder-coated finish.

107-2.7 WINDSOCK. The windsock fabric shall be standard international orange.

CONSTRUCTION METHODS

107-3.1 INSTALLATION. The support pole shall be installed on the concrete foundation in accordance with these specifications and the manufacturer's drawings. Do not grout between the base plate and the foundation to allow for air circulation and inhibit corrosion inside the pole.

a. Notify the Engineer at least 24 hours prior to placement of concrete. Allow concrete bases to cure for 7 days after pouring before installing the pole

b. Backfill. Material used as backfill around the footing of the wind cone foundation shall be gravel or sand consisting of crushed or naturally occurring granular material. All materials shall be free of frozen lumps and clay particles.

107-3.2 COUNTERWEIGHT. The Contractor shall furnish and install a counterweight on the hinged support for the 12-foot wind cone. The counterweight may consist of lead weights which may be furnished with the "A" frame assembly or it may consist of concrete poured around the bottom of the hinged support. Where concrete is used, the counterweight shall be approximately 12 inches wide by 2 feet deep and should weigh approximately 500 pounds. The counterweight shall be 25 to 50 pounds less than the weight needed to balance the assembly. The counterbalancing must operate to the satisfaction of the Engineer.

107-3.3 ELECTRICAL CONNECTION. The Contractor shall furnish all labor and materials and shall make complete electrical connections according to the wiring diagram furnished with the Plans and the manufacturer's instructions. The electrical installation shall conform to the requirements of the latest edition of National Fire Protection Association, NFPA-70, National Electrical Code (NEC).

Underground cable from the transformer vault to the wind cone site and duct for this cable installation shall be installed, tested, and paid for according to Item L-108, Underground Cable, and Item L-110, Underground Electrical Duct.

107-3.4 BOOSTER TRANSFORMER. If shown in the Plans, a booster transformer to compensate for voltage drop to the lamps shall be installed in a suitable weatherproof housing. The booster transformer

shall be installed as indicated in the Plans and described in the specifications. If the booster transformer is required for installation remotely from the wind cone, it will be paid for as part of the wind cone pay item.

107-3.5 GROUND CONNECTION AND GROUND ROD. The Contractor shall furnish and install a ground rod, grounding cable, and ground clamps for grounding the “A” frame of the 12-foot assembly or pipe support of the 8-foot support near the base. The ground rod shall be 3/4-inch diameter by 10 feet long and shall be copper or copper clad. The ground rod shall be driven into the ground adjacent to the concrete foundation so that the top is at least 0.5 foot below grade. The grounding cable shall consist of No. 6 AWG minimum bare stranded copper wire or larger and shall be firmly attached to the ground rod by means of exothermic welding. The other end of the grounding cable shall be securely attached to a leg of the “A” frame or to the base of the pipe support with noncorrosive metal and shall be of substantial construction. The resistance to ground shall not exceed 25 ohms. If a single rod grounding electrode has a resistance to earth of over 25 ohms, then install one supplemental rod not less than 10 feet from the first rod. No ground rod is required at the unlighted wind cone.

107-3.6 PAINTING. Three coats of paint shall be applied (1 prime, 1 body, and 1 finish) to all exposed material installed under this item except the fabric cone, obstruction light globe, and lamp reflectors. This shall not apply to factory-finished or galvanized components or assemblies.

107-3.7 LIGHT SOURCES. The Contractor shall furnish and install light sources per the manufacturer’s instruction book for the source type designated on the Plans.

107-3.8 WINCH AND PADLOCK. The Contractor shall furnish and install a suitable locking ratchet winch for lowering and raising the hinged top section.

A padlock shall also be furnished by the Contractor for securing the hinged top section to the fixed lower section. The padlock shall be keyed to match the padlock on the electrical equipment enclosure where present. Three keys for the padlock shall be delivered to the Engineer.

107-3.9 TESTING. Furnish all necessary labor, equipment and appliances for testing all material and equipment as specified herein. No work will be accepted until all applicable tests have been performed. Tests shall not begin until the work has been approved by the Engineer. All tests shall be neatly tabulated on a reproducible "Test Sheet" which shall be signed and dated by the Contractor upon completion of the test. Test and demonstrate to the Engineer the following:

a. That all lighting, power, and control circuits are continuous, and free from short circuits.

b. That all circuits are free from unspecified grounds.

c. That the resistance to ground of all non-ground 5000 V circuits is not less than 2,000 megohms. Where additions are made to existing circuits, only the new section shall be tested. The resistance to ground of 600 V capacity shall be 1,000 megohms for the insulation test.

d. That all circuits are properly connected according to applicable wiring diagrams.

e. That all circuits are operable.

107-3.10 GUARANTEE. Furnish a written guarantee that any materials or workmanship found defective within 1 year of final acceptance shall be replaced at the Contractor's expense, promptly upon notification and to the satisfaction of the Engineer.

107-3.11 SPARE PARTS. Provide a quantity of spare parts, including one wind cone sock and LED illuminator of each type and size installed. Deliver spare parts to airport maintenance as directed by the Engineer.

METHOD OF MEASUREMENT

107-4.1 The quantity to be paid for will be the number of wind cones installed as completed units in place, accepted, and ready for operation, including wind cone, foundation, excavation and backfill, conduit and

conductors to first handhole, incidental materials, and testing required for a complete and operational installation.

107-4.2 Refer to Item P-610 for requirements regarding work and materials to place Portland cement concrete. Portland cement concrete is subsidiary to L-107 items requiring its use.

107-4.3 Removal of existing wind cones and foundations shall be subsidiary to the installation of new wind cones and no separate payment will be made.

107-4.4 Spare parts to be paid by actual invoiced material and delivery cost, plus 15 percent markup.

BASIS OF PAYMENT

107-5.1 Payment will be made at the contract unit price for each completed and accepted job.

Spare parts are paid for under Item *L125.170.0000 Spare Parts*.

Payment will be made under:

Item L107.010.0008	8-feet Lighted Wind Cone, In Place - per each
Item L107.011.0008	8-feet Lighted Wind Cone, Supplemental, In Place - per each

REFERENCES

AC 150/5345-7	*L-824 Underground Cable for Airport Lighting Circuits*
AC 150/5345-27	*Wind Cone Assemblies*
ASTM A615	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
Commercial Item Description A-A-3067	Paint: Alkyd, Exterior, Low VOC
Fed. Spec. J-C-30	Cable and Wire, Electrical (Power, Fixed Installation)
Fed. Spec. TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
Fed. Spec. TT-P-664D	Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
Fed. Spec. W-P-115	Panel, Power Distribution
Fed. Std. 595	Colors
MIL-P-24441/19B	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III
UL Standard 6	Rigid Metal Conduit
UL Standard 514	Fittings For Conduit and Outlet Boxes
UL Standard 1242	Intermediate Metal Conduit
NFPA – 70	National Electrical Code

ITEM L-108 UNDERGROUND POWER CABLE FOR AIRPORTS

DESCRIPTION

108-1.1 This item shall consist of furnishing and installing underground cable according to these specifications at the locations shown in the Plans. This item shall include the excavation and backfill of the trench, where direct buried cable is specified, and the installation of cable, grounding and counterpoise wire in trench, duct or conduit. It shall include splicing, cable marking, and testing of the installation and all incidentals necessary to place the cable in operating condition as a completed unit to the satisfaction of the Engineer. This item shall not include the installation of the duct or conduit, or furnishing, installation, or demolition of cable for FAA owned/operated facilities. This item includes the removal of underground cable as shown and described in the Plans.

MATERIALS

108-2.1 GENERAL.

a. Airport lighting equipment and materials covered by FAA specifications shall be certified and listed under AC 150/5345-53, Airport Lighting Equipment Certification Program. This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction internet page: http://www.faa.gov/airports_airtraffic/airports/construction/.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification, when requested by the Engineer.

108-2.2 CABLE. Underground cable shall conform to the requirements of AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits, and meet the following requirements.

5000 V cable shall be non-shielded, single conductor, [FAA type C, with cross-linked polyethylene insulation][~~FAA type B, ICEA S-19-81 ozone-resistant butyl rubber insulated with overall jacket of heavy duty neoprene~~]. Conductor shall be lead alloy coated, soft annealed stranded copper.

600 V cable shall be non–shielded, single conductor, with stranded annealed copper conductor, rated 190 °F, with cross-linked polyethylene insulation classified as type XHHW-2.

Underground Electrical Cable shall be No. 14 AWG, 2 Conductor, copper, 600 V, Type SOOW-A/SOOW. Cable shall remain flexible down to -40 °F. The cable connectors shall be secondary connector kits for the plug and the receptacle meeting specification L-823.

If telephone control cable is specified, shielded, polyethylene insulated and jacketed, No. 19 AWG telephone cable conforming to ICEA-S-85-625, Standard, Aircore, Polyolefin, Copper Conductor Telecommunications Cable for direct burial, shall be used.

Where counterpoise conductors are to be installed and where soil conditions would adversely affect bare copper wire, cross-linked polyethylene wire conforming to Fed. Spec. J-C-30, Type XHHW-2, 600 volt, may be used.

Cable type, size, number of conductors, strand and service voltage will be specified in the Plans and/or specifications.

108-2.3 COPPER WIRE (COUNTERPOISE OR GROUNDING). Insulated or bare copper wire for counterpoise or grounding installations shall be solid or stranded wire conforming to ASTM B3 and B8. Insulation of insulated grounding conductors shall be green, type XHHW-2.

Ground rods shall be copper-clad steel, of the length and diameter specified on the Plans, but in no case less than 3/4-inch diameter by 10-feet long.

108-2.4 CABLE CONNECTIONS. In-line connections of underground primary cables shall be of the type called for in the Plans or in the specifications, and shall be one of the types listed below. When the Plans or the specifications permit a choice of connection, the Contractor shall indicate in the bid the type of connection they propose to furnish. No separate payment will be made for cable connections.

a. **Cast Splice.** A cast splice, employing a plastic or metal mold and using epoxy resin is to be used for potting the splice. This means of splicing is the only type approved for telephone control cable.

b. **Field-attached Plug-in Splice.** Figures 3 through 7 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, employing connector kits, is approved for field attachment to single or multi-conductor cable. 600 V secondary receptacles shall be Type II, Class B, Style 11 or 12. 600 V plugs shall be Type II, Class B, Style 4 or 5. 5000 V plugs shall be Type I, Class B, Style 3. 5000 V receptacles shall be Type I, Class B, Style 10.

c. **Factory-Molded Plug-in Splice.** Specification for L-823 Connectors, Factory-Molded to Individual Conductors, are approved. 600 V cord sets shall include a Type II, Class A, Style 1 plug on a 16/2 SJO cord.

d. **Taped Splice.** Taped splices employing field-applied rubber, or synthetic rubber tape covered with plastic tape are approved. The rubber tape should meet the requirements of ASTM D4388 and the plastic tape should comply with Mil. Spec. MIL-I-24391 or Commercial Item Description A-A-55809. No. 19 AWG telephone control wires may be connected by means of wrapped and soldered splice, sealant filled butt connector, or by a method approved by the Engineer.

In all the above cases, connections of cable conductors shall be made using crimp connectors utilizing a crimping tool designed to make a complete crimp before the tool can be removed. All L-823 connectors shall be installed per the manufacturer's recommendations and listings.

108-2.5 SPLICER QUALIFICATIONS. Every airfield lighting splicer shall be qualified in making airport cable splices and terminations on cables rated at or above 5000 V AC. The contractor shall submit to the Engineer proof of the qualifications of each proposed cable splicer for the airport cable type and voltage level to be worked on. Cable splicing/terminating personnel shall have a minimum of three (3) years continuous experience in terminating/splicing medium voltage cable.

108-2.6 CONCRETE. Concrete for cable markers shall conform to Specification Item P-610 Structural Portland Cement Concrete.

108-2.7 MARKER TAPE. Marker tape shall be APWA-ULCC compliant, red polyethylene plastic, printed "Caution - Buried Electric Line Below".

108-2.8 DETECTABLE MARKER TAPE. Detectable marker tape shall be plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit, and lighting cable) with continuous legend "Caution – Buried Electrical Line Below," aluminum backed polyethylene film, minimum 6-inches (120 mm) wide x 5 mils thick.

108-2.9 INTERSTICE FILLER. When called for on the Plans underground conduit runs shall contain, in addition to the specified conductor(s), one or more runs of compressible interstice filler (as shown on the Plans). Compressible interstice filler shall be 5/8-inch closed cell backer rod (caulk backer).

108-2.10 ELECTRICAL TAPE. Electrical insulating tape shall be premium vinyl tape rated for cold temperatures meeting Mil. Spec. MIL-I-24391 or Commercial Item Description A-A-55809, similar to

"Scotch" No. 88 or approved equal. Rubber tape shall be similar to "Scotch" No. 130C linerless rubber splicing tape, or approved equal.

CONSTRUCTION METHODS

108-3.1 GENERAL. The Contractor shall install the specified cable at the approximate locations indicated in the airport lighting layout plans. The Engineer will indicate specific locations.

Notify the Engineer in writing and request inspection at least 48 hours prior to installing cables, making any splices, or covering any buried or concealed work. Immediately correct any deficiencies found during the inspection. Install cable in a manner to prevent harmful stretching of the conductors, injury to the insulation, damage to tapes and fillers or damage to the outer protective jacket or covering.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual isolation transformers. The Contractor shall be responsible for providing cable in continuous lengths for home runs or other long cable runs without connections, unless otherwise authorized in writing by the Engineer or shown in the Plans.

In addition to connectors being installed at individual isolation transformers, L-823 cable connectors for maintenance and test points shall be installed at locations shown on the Plans. Cable circuit identification markers shall be installed on both sides of L-823 connectors installed.

Provide not less than 3 feet of cable slack on each side of all connections, isolation transformers, light units, and at points where cable is connected to field equipment. Where provisions must be made for testing or for future above grade connections, provide enough slack to allow the cable to be extended at least 2 feet vertically above the top of the access structure. This requirement also applies where primary cable passes through empty light bases, junction boxes, and access structures to allow for future connections, or as designated by the Engineer.

Label the circuit conductors in each manhole, handhole, and light base by attaching a heat stamped nylon identification tag bearing the circuit designation as indicated on the Plans. Label conductors on each side of each splice and transformer and at least one location for conductors passing through unbroken. Markers shall be of sufficient length for imprinting the cable circuit designation legend on one line using letters not less than 1/4-inch in size.

108-3.2 INSTALLATION IN DUCT OR CONDUIT. This item includes the installation of the cable in duct or conduit as described below. The maximum number and voltage ratings of cables installed in each single duct or conduit, and the current-carrying capacity of each cable shall be according to the latest NEC, or the code of the local agency having jurisdiction.

The Contractor shall make no connections or joints of any kind in cables installed in conduits or ducts. Provide and install cables in continuous lengths free of splices between the points of connection indicated on the Plans.

Unless otherwise designated in the Plans, where ducts are in tiers, use the lowest ducts to receive the cable first, with spare ducts left in the upper levels. Check duct routes prior to construction to obtain assurance that the shortest routes are selected and that any potential interference is avoided.

The duct or conduit shall be installed as a separate item according to Item L-110, "Underground Electrical Duct." The Contractor shall make sure that the duct is open, continuous, and clear of debris before installing cable.

The cable shall be installed in a manner to prevent harmful stretching of the conductor, injury to the insulation, or damage to the outer protective covering. The ends of all cables shall be sealed with moisture-seal tape before pulling into the conduit and it shall be left sealed until connections are made. Where more than one cable is to be installed in a duct under the same contract, all cable shall be pulled in the duct at

the same time. The pulling of a cable through ducts or conduits may be accomplished by hand winch or power winch with the use of cable grips or pulling eyes. Pulling tensions should be governed by recommended standard practices for straight pulls or bends and shall not exceed cable manufacturer's recommendations. A lubricant recommended for the type of cable being installed shall be used where pulling lubricant is required. Duct or conduit markers temporarily removed for excavations shall be replaced as required.

The Contractor shall submit the recommended pulling tension values to the Engineer prior to any cable installation. If required by the Engineer, pulling tension values for cable pulls shall be monitored by a dynamometer in the presence of the Engineer. Cable pull tensions shall be recorded by the Contractor and reviewed by the Engineer. Cables exceeding the maximum allowable pulling tension values shall be removed and replaced by the Contractor at the Contractor's expense.

Compressible interstice filler (when shown on the Plans and as specified) shall be installed in place with the cable(s). It shall be taped as required to attach and secure it to the conductor(s) during installation.

Assemble connections in the runway and taxiway series lighting cable at the light assemblies using approved L-823 connector kits. The male end shall be coated with silicone compound. Properly seat both plug and receptacle ends onto cable and check for proper connector pin positioning prior to taping. When completed, wrap the L-823 connection with 2 layers of electrical insulating tape, 1/2 lapped extending at least 1-1/2 inch on each side of the joint. Install heat shrinkable tubing with internal adhesive as shown on Plans. Leave sufficient slack in the cables at points of connection consistent with standard trade practices; and, in the case of the runway and taxiway series lighting cable, leave sufficient slack at each light assembly to permit the connection to be made 2 feet above grade.

108-3.3 INSTALLATION IN TRENCHES. The Contractor shall not use a cable plow for installing the cable. Mechanical cable-laying equipment may be used in conjunction with a trenching machine if specified on project Plans and specifications; and it should provide for physical inspection of cable prior to backfilling. Sharp bends or kinks in the cable will not be permitted.

Cables shall be unreeled in place alongside or in the trench and shall be carefully placed along the bottom of the trench. Inspect cable as it is removed from the reel to determine that the cable is free of visible defects. ~~Support reel so that is turns easily and without undue strain on the cable.~~ Support reel so that it turns easily and without undue strain on the cable. The cable shall not be unreeled and pulled into the trench from one end.

Where two or more cables are laid parallel in the same trench, they shall be placed laterally a minimum distance of 3 inches apart, and the trench shall be widened sufficiently to accomplish this.

Cables crossing over each other shall have a minimum of 3 inch vertical displacement with the topmost cable depth at or below the minimum required depth below finished grade.

Not less than 12 inches of cable slack shall be left on each side of all connections, insulating transformers, light units, and at all other points where cable is connected to field equipment. The slack cable shall be placed in the trench in a series of S-curves. Additional slack cable shall be left in runway light bases, handholes, manholes, etc., where it is required to bring the cable above ground level to make connections. The amount of slack cable will be stipulated by the Engineer, or as shown in the Plans and specifications.

a. **Trenching.** Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored. Trenches for cables may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Road patrols or graders shall not be used to excavate the trench with their blades. The bottom surface of trenches shall be essentially smooth and free from coarse aggregate. Unless otherwise specified, cable trenches shall be excavated to a minimum depth of 1.5 feet below finished grade, except as follows:

(1) When off the airport or crossing under a roadway or driveway, the minimum depth shall be 3 feet unless otherwise specified.

(2) Minimum cable depth when crossing under a railroad track, shall be 3.5 feet unless otherwise specified.

(3) Where otherwise specified in NEC Table 300.5.

The Contractor shall excavate all cable trenches to a width not less than 6 inches. The trench shall be widened where more than two cables are to be installed parallel in the same trench. Unless otherwise specified in the Plans, all cables in the same location and running in the same general direction shall be installed in the same trench.

When rock excavation is encountered, the rock shall be removed to a depth of at least 3 inches below the required cable depth and it shall be replaced with bedding material of earth or sand containing no mineral aggregate particles that would be retained on a 1/4 inch sieve. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All excavation shall be unclassified.

b. Backfilling. After the cable has been installed, the trench shall be backfilled. The initial layer of backfill material shall be 3 inches deep, loose measurement, and shall be either earth or sand containing no mineral aggregate particles that would be retained on a 1/4-inch sieve. This layer shall not be compacted. The second layer shall be 5 inches deep, loose measurement, and shall contain no particles that would be retained on a 1-inch sieve. The remainder of the backfill shall be excavated or imported mineral and shall not contain stone or aggregate larger than 4 inches maximum diameter. The third and subsequent layers of the backfill shall not exceed 8 inches in maximum depth, loose measurement.

The second, and subsequent layers shall be thoroughly tamped and compacted to at least the density of the adjacent undisturbed soil, and to the satisfaction of the Engineer. If necessary to obtain the desired compaction, the backfill material shall be moistened or aerated as required.

Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations. The trench shall be completely backfilled and tamped level with the adjacent surface, except that when sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement. Any excess excavated material shall be removed and disposed of according to instructions issued by the Engineer.

Underground marker tape shall be installed in the trench above all direct-buried cable. If not shown on the Plans, the marker tape shall be located 6 inches above the direct buried cable or counterpoise wire if present.

c. Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the trenching, storing of dirt, cable laying, pad construction, and other work shall be restored to its original condition. The restoration shall include any necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging or mulching. All such work shall be performed according to the FAA standard turfing specifications. The Contractor will be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

108-3.4 CABLE MARKERS. When called for in the plans, the location of runway light circuits shall be marked by a concrete slab marker, 2 feet square and 4 inches thick, extending approximately 1 inch above the surface. Each cable run from the line of runway lights to the equipment vault shall also be marked at approximately every 200 feet along the cable run, with an additional marker at each change of direction of cable run. All other cable buried directly in the earth shall be marked in the same manner. The Contractor shall not install slab markers where cable lies in straight lines between obstruction light poles which are spaced 300 feet apart, or less. Cable markers shall be installed immediately above the cable. The

Contractor shall impress the word "CABLE" and directional arrows on each cable marking slab. The letters shall be approximately 4 inches high and 3 inches wide, with width of stroke 1/2 inch and 1/4 inch deep.

The location of each underground cable connection, except at lighting units or insulating transformers, shall be marked by a concrete marker slab placed above the connection. The Contractor shall impress the word "SPLICE" on each slab. The Contractor also shall impress additional circuit identification symbols on each slab if so desired by the Engineer.

108-3.5 SPLICING. Connections of the type shown in the Plans shall be made by experienced personnel regularly engaged in this type of work and shall be made as follows:

a. Cast Splices. These shall be made by using crimp connectors for jointing conductors. Molds shall be assembled, and the compound shall be mixed and poured according to manufacturer's instructions and to the satisfaction of the Engineer.

b. Field-attached Plug-in Splices. These shall be assembled according to manufacturer's instructions. These splices shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be finished by one of the following methods as indicated on the Plans: (1) wrapped with at least one layer of rubber, or synthetic rubber tape, and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint, (2) wrapped with at least one layer of rubber, or synthetic rubber tape and at least one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint and the entire assembly from cable to cable covered in heavy-wall heat shrink with internal adhesive ~~at the ends only~~, (3) on connector kits equipped with water seal flap, roll-over water seal flap to sealing position on mating connector.

c. Factory-Molded Plug-in Splices. These shall be made by plugging directly into mating connectors. In all cases, the joint where the connectors come together shall be finished by one of the following methods as indicated on the Plans: (1) wrapped with at least one layer of rubber, or synthetic rubber tape, and one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint, (2) wrapped with at least one layer of plastic tape, one-half lapped, extending at least 1-1/2 inches on each side of the joint and the entire assembly from cable to cable covered in heavy-wall heat shrink with internal adhesive at the ends only, (3) on connector kits equipped with water seal flap, roll-over water seal flap to sealing position on mating connector.

d. Taped Splices. A taped splice shall be made in the following manner:

Bring the cables to their final position and cut so that the conductors will butt. Remove insulation and jacket allowing for bare conductor of proper length to fit compression sleeve connector with 1/4 inch of bare conductor on each side of the connector. Use a penciling tool ~~sharp knife~~ to pencil insulation and jacket at approximately the same angle as a pencil point. Care must be taken to avoid nicking or injuring the conductor during removal of insulation or penciling. Do not use emery paper on splicing operation since it contains metallic particles. The copper conductors shall be thoroughly cleaned. Join the conductors by inserting them equidistant into the compression connection sleeve. Crimp conductors firmly in place with crimping tool that requires a complete crimp before tool can be removed. Test the crimped connection by pulling on the cable. Scrape the insulation to assure that the entire surface over which the tape will be applied (plus 3 inches on each end) is clean. After scraping wipe the entire area with a clean lint-free cloth. Do not use solvents.

Apply high-voltage rubber tape one-half lapped over bare conductor. This tape should be tensioned as recommended by the manufacturer. Voids in the connector area may be eliminated by highly elongating the tape stretching it just short of its breaking point. Throughout the rest of the splice less tension should be used. Always attempt to exactly half-lap to produce a uniform buildup. Continue buildup to 1-1/2 times cable diameter over the body of the splice with ends tapered a distance of approximately 1 inch over the original jacket. Cover rubber tape with two layers of vinyl

pressure-sensitive tape one-half lapped. Do not use glyptol or lacquer over vinyl tape as they react as solvents to the tape. No further cable covering or splice boxes are required.

If shielded cable is to be spliced, prepare cable as for a regular taped splice, except that the neoprene jacket shall be removed a distance not less than 5 inches from the beginning of the penciled portion. Carefully unwrap the shielding tape from that portion where jacket has been removed and cut off so that it extends about 1 inch from end of the jacket. Proceed with the taped splice as described above and tape up to 1/4 inch from the shield on both ends. Build up rubber tape to a thickness equal to the insulation thickness or 5/16 inch over connector.

Next wrap one-half lapped layer of semi-conducting tape, conforming to ASTM D4388, Type IV, over splicing tape and 1/4 inch onto the shielding tape. Wrap a fine, flat shielding braid one-half lapped over the splice extending 1/2 inch onto the metallic shielding. Solder ends of braid to metallic shielding tape. A bonding wire, (Minimum No. 14 Stranded Copper) equal to the current carrying capacity of the metallic shield, should have the individual strands wrapped around the metallic shield at both ends of the splice. These strands should be tack soldered to the shield in several places. The cable sheath should be replaced by wrapping with two one-half lapped layers of vinyl tape extending 2 inches onto the cable jacket.

The above described splice is for a straight-through splice with continuity of shielding.

Heat shrinkable tubing shall be installed following manufacturer's instructions. Direct flame heating shall not be permitted unless recommended by the manufacturer. Cable surfaces within the limits of the heat-shrink application shall be clean and free of contaminants prior to application.

108-3.6 BARE COUNTERPOISE WIRE INSTALLATION AND GROUNDING FOR LIGHTNING PROTECTION. If shown in the Plans or specified in job specifications, a stranded bare copper wire, No. 6 AWG minimum size, shall be installed for lightning protection of the underground cables. The bare counterpoise wire shall be installed in the same trench for the entire length of the insulated cables it is designed to protect, and shall be placed at a distance of approximately 4 inches from the insulated cable. The counterpoise wire shall be securely attached to each light fixture base, or mounting stake. The counterpoise wire shall also be securely attached to copper or copper-clad ground rods installed not more than 1,000 feet apart around the entire circuit.

The counterpoise system shall terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment grounding system. The connections shall be made as shown in the project Plans and specifications.

108-3.7 GROUNDING SYSTEM. If shown in the Plans or specified in specifications, a stranded bare copper wire, No. 6 AWG minimum size, shall be installed as grounding for the lighting system. The bare ground wire shall be installed in the same conduit it is designed to protect. The ground wire shall be securely attached to each light fixture base. The ground wire shall be continuous through each light base and handhole or be spliced using an irreversible compression connector. The circuit ground wire shall not rely on the mechanical ground lug in the light base for continuity. The ground wire shall also be securely attached to copper or copper-clad ground rods using exothermic connections and installed not more than 1,000 feet apart around the entire circuit.

The ground system shall terminate at the transformer vault or at the power source. It shall be securely attached to the vault or equipment grounding system. The connections shall be made as shown in the project Plans and specifications.

The housing or baseplate of each light fixture shall be bonded to the light base ground using a bare or green insulated No. 6 AWG stranded copper wire or equivalent tinned-copper braid.

108-3.8 EXISTING CIRCUITS. When the scope of work requires connection to an existing circuit, the circuit's insulation resistance shall be tested. The test shall be performed per this item and prior to any

activity that will affect the respective circuit. When the work affecting the circuit is complete, the circuit's insulation resistance shall be tested again. Tests shall be conducted in the presence of the Engineer and the results recorded on forms acceptable to the Engineer. The second reading shall be equal to or greater than the first reading or the Contractor shall make the necessary repairs to the circuit to bring the second reading above the first reading, unless otherwise approved by the Engineer. All repair costs including a complete replacement of the L-823 connectors, L-830 transformers, and L-824 cable, if necessary, shall be borne by the Contractor.

108-3.9 EXOTHERMIC BONDING. Where indicated in the Plans or specifications, bonding of counterpoise and ground wires shall be by the exothermic welding process. Only personnel experienced in and regularly engaged in this type of work shall make these connections.

Contractor shall demonstrate to the satisfaction of the Engineer, the welding kits, materials and procedures to be used for welded connections prior to any installations in the field. The installations shall comply with the manufacturer's recommendations and the following:

a. All slag shall be removed from welds.

b. Using an exothermic weld to bond the counterpoise to a lug on a galvanized light base is not recommended unless the base has been specially modified. Consult the manufacturer's installation directions for proper methods of bonding copper wire to the light base. See also AC 150/5340-30 for galvanized light base exception.

c. If called for in the plans, all buried copper and weld material at weld connections shall be thoroughly coated with 6 mm of 3M Scotchkote, or approved equivalent, or coated with coal tar material to prevent surface exposure to corrosive soil or moisture.

108-3.10 TESTING. The Contractor shall furnish all necessary equipment and appliances for testing the underground cable circuits after installation. The Contractor shall test and demonstrate to the satisfaction of the Engineer the following:

a. That all lighting power and control circuits are continuous and free from short circuits.

b. That all circuits are free from unspecified grounds.

c. That the insulation resistance to ground of all nongrounded series circuits is not less than 2,000 megohms, tested at 1000V.

d. That the insulation resistance to ground of all nongrounded conductors of 600 V circuits is not less than 1,000 megohms, tested at 500V.

e. That all circuits are properly connected according to applicable wiring diagrams.

f. That all circuits are operable. Operate each control not less than 10 times and operate each lighting and power circuit continuously for not less than 1/2 hour.

METHOD OF MEASUREMENT

108-4.1 Trenching will not be measured for payment. Excavation, backfill, bedding, and reconditioning will be subsidiary.

108-4.2 Cable, ground or counterpoise wire by unit price installed in trench shall be measured by the number of linear feet of cable, ground or counterpoise wire installed in trenches, ready for operation, and accepted as satisfactory. Separate measurement will be made for each cable or counterpoise wire installed in trench.

108-4.3 Cable, ground or counterpoise wire, and interstice filler by unit price installed in duct or conduit shall be measured by the number of linear feet measured in place, completed, ready for operation, and accepted as satisfactory. Separate measurement will be made for each cable, ground or counterpoise wire installed in duct or conduit.

108-4.4 The quantity of ground rods to be paid for under this item shall be the number of ground rods in place, completed, ready for operation, and accepted as satisfactory. If the pay item for ground rods is absent from the bid schedule, no separate payment will be made. All work, materials, and equipment required for ground rods will be subsidiary to the associated equipment or system.

108-4.5 Lump sum items will not be measured for payment.

108-4.6 Removal of underground cable shall be subsidiary to the removal of the associated equipment served by the cable as shown and described on the Plans, unless otherwise indicated.

108-4.7 Temporary jumper by unit price shall be measured by the number of linear feet of new temporary jumper cable measured in place, ready for operation, and accepted as satisfactory. The unit price shall include all conduit, terminations, securing of conduit and cables, disconnections, and reconnections required for relocation of the jumpers due to construction activities; maintenance of the jumpers for the duration of their use; and removal when no longer required.

BASIS OF PAYMENT

108-5.1 Payment will be made at the contract unit price or lump sum price for the items listed below and shown in the Bid Schedule.

Payment will be made under:

Item L108.010.2008	Underground Cable #8 AWG, Copper, 5kV FAA Type C, L-824 - per linear foot
Item L108.030.0006	#6 Bare Copper Ground Conductor - per linear foot
Item L108.070.0000	Ground Rod – per each

MATERIAL REQUIREMENTS

AC 150/5345-7	*L-824 Underground Electrical Cable for Airport Lighting Circuits*
AC 150/5345-26	*L-823 Plug and Receptacle Cable Connectors*
ASTM B3	Soft or Annealed Copper Wire
ASTM B8	Concentric-Lay-Stranded Cooper Conductor, Hard, Medium-Hard, or Soft
ASTM D4388	Rubber Tapes, Nonmetallic Semi-Conducting and Electrically Insulating
Commercial Item Description A-A-55809	Insulation Tape, Electrical, Pressure-Sensitive Adhesive, Plastic
Fed.Spec. J-C-30	Cable and Wire, Electrical Power, Fixed Installation
MIL-I 24391	Insulation Tape, Electrical, Plastic, Pressure Sensitive

ITEM L-109 AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT

DESCRIPTION

109-1.1 This item shall consist of removing an existing airport transformer vault and equipment, and constructing an airport transformer vault, a prefabricated metal housing or an electrical enclosure according to these specifications and with the design and dimensions shown in the Plans. This work shall also include the installation of conduits in floor and foundation, painting and lighting of the vault, metal housing or enclosure and the furnishing of all incidentals necessary to produce a completed unit. Included as a separate part under this item or as a separate item where an existing structure (vault, metal housing, enclosure or building) is to be utilized shall be the furnishing of all vault equipment, wiring, electrical buses, cable, conduit, and grounding systems. This work shall also include the painting of equipment and conduit; the marking and labeling of equipment and the labeling or tagging of wires; the testing of the installation; and the furnishing of all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer.

MATERIALS

109-2.1 GENERAL. Obtain approval of all materials and equipment proposed for the work. Submit to the Engineer five (5) complete listings of materials and equipment specified herein and on the Plans. The list shall be prepared to clearly identify the material or equipment by item, name, or designation used on the Plans or specifications and shall indicate where specified. The submittals shall be neatly bound, clearly indexed, and shall include applicable catalog number, cuts, wiring diagrams, performance data, operation and maintenance manuals, etc., for all material or equipment listed below or specified elsewhere in these specifications. In addition, wherever called for elsewhere in these specifications, include in the submittal certificates of compliance, manufacturer's instructions and/or shop drawings, or proposed construction or installation procedures. All materials of similar class or service shall be of one manufacturer. Capacities, sizes, and dimensions given are minimum unless otherwise indicated. All manufactured materials shall be delivered and stored in their original containers, which shall indicate clearly the manufacturer's name, brand, and identifying number.

a. Airport lighting equipment and materials covered by FAA specifications shall be certified and listed under AC 150/5345-53, Airport Lighting Equipment Certification Program. This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction internet page: http://www.faa.gov/airports_airtraffic/airports/construction/.

b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

c. Equipment and materials shall meet the Buy American requirements contained in GCP-60.

109-2.2 CONCRETE. The concrete for the vault or electrical enclosure shall be proportioned, placed, and cured according to Item P-610, Structural Portland Cement Concrete, using 3/4 inch maximum size coarse aggregate.

109-2.3 REINFORCING STEEL. Reinforcing steel bars shall be intermediate or structural grade deformed-type bars and shall meet the requirements of AASHTO M 31.

109-2.4 BRICK. Brick shall conform to ASTM C62, Grade SW.

109-2.5 STEEL CONDUIT. Rigid steel conduit or intermediate conduit and fittings shall be according to UL Standard 6 and 514. They shall be galvanized on the outside. All fittings shall conform to the same specification as the conduit.

Electrical Metallic Tubing (EMT) shall be according to UL Standard 797. All fittings shall be steel, compression type with insulated throats. EMT shall only be used in dry interior locations.

109-2.6 PLASTIC CONDUIT. Plastic conduit and fittings shall conform to the requirements of Federal Specification W-C-1094 and UL-651 schedule 40 polyvinyl chloride (PVC) suitable for use above or below ground.

109-2.7 LIGHTING. Vault, metal-housing or electrical enclosure light fixtures shall be of a vapor-proof type. Indoor lighting fixtures for metal-housing or electrical enclosures shall be LED type with frosted lens, surface mounted, approximately 4000 lumen output, 4000K color temperature.

Emergency lights shall include two LED lamp heads with battery backup and integral charging and transfer electronics with self-testing features and diagnostic indicators.

109-2.8 OUTLETS. Convenience outlets shall be heavy-duty duplex units designed for industrial service. Outlets shall be grounding-type, AC rated 20 A, 125 V, 2-pole, 3-wire NEMA 5-20R, housed in device boxes with cover plates.

109-2.9 SWITCHES. Vault, metal-housing or electrical enclosure light switches shall be single-pole switches. Switches shall be heavy-duty grade, 277 V (ac), rated for inductive and fluorescent lamp loads up to 20 A. Switches shall be of the type indicated by symbol on the Plans. Where more than 1 switch is shown at a point, they shall be set under 1 plate, unless otherwise noted.

109-2.10 PAINT.

a. Priming paint for un-galvanized metal surfaces shall be an alkyd primer without lead and chromate pigments conforming to SSPC-Paint 25.

b. White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to the Master Painter's Institute. Reference #9 Exterior Alkyd, Gloss, BOC Range E2.

c. Priming paint for wood surfaces shall be mixed on the job by thinning the above specified white paint by adding 1/2 pint of raw linseed oil to each gallon of paint.

d. Paint for the floor, ceiling, and inside walls shall be a urethane-modified alkyd floor enamel. Walls and ceiling shall be light gray and the floor shall be medium gray.

e. The roof coating for vault shall be hot asphalt material according to ASTM D2823.

109-2.11 GROUND BUS. Ground bus shall be 1/8 x 3/4 inch copper bus bar.

109-2.12 SQUARE DUCT. Duct shall be square, factory finished steel with NEMA 1 or 3R rating for interior and exterior use, respectively. The entire front of the duct on each section shall consist of hinged, removable cover for ready access to the interior. The cross section of the duct shall be not less than 4 x 4 inches except where otherwise shown in the Plans.

109-2.13 GROUND RODS. Ground rods shall be copper-clad steel, 3/4 inch x 10 feet.

109-2.14 DOORS. Doors, unless otherwise specified, shall be metal-clad fireproof Class A doors conforming to requirements of the locally adopted codes. Where required, panic bar exit hardware shall be installer per NEC requirements.

109-2.15 PREFABRICATED METAL HOUSING. The prefabricated metal housing shall be a commercially available unit.

109-2.16 FAA-APPROVED EQUIPMENT. Certain items of airport lighting equipment installed in vaults are covered by individual FAA equipment specifications. The specifications are listed below:

AC 150/5345-3	L-821 Panels for Remote Control of Airport Lighting
AC 150/5345-5	Circuit Selector Switch
AC 150/5345-7	L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-10	Constant Current Regulators and Regulator Monitors
AC 150/5345-13	L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits

The L-821 control panel shall be a custom-fabricated FAA-certified panel with controls for lighting systems as shown on the Plans. The control panel shall be wall-mounted with a NEMA 4 or 12 enclosure and shall include all components necessary for FAA certification and to accomplish the sequence of operations as described and depicted on the Plans.

109-2.17 OTHER ELECTRICAL EQUIPMENT. Constant-current regulators, distribution transformers, oil switches, cutouts, relays, terminal blocks, transfer relays, circuit breakers, and all other regularly used commercial items of electrical equipment not covered by FAA equipment specifications shall conform to the applicable rulings and standards of the Institute of Electrical and Electronic Engineers (IEEE) or National Electrical Manufacturers Association (NEMA). When specified, test reports from a testing laboratory indicating that the equipment meets the specifications shall be supplied. In all cases, equipment shall be new and a first-grade product. This equipment shall be supplied in the quantities required for the specific project and shall incorporate the electrical and mechanical characteristics specified in the specifications and Plans.

109-2.18 WIRE. Wire in conduit rated up to 5,000 volts shall conform to AC 150/5345-7, Specification for L-824 Underground Electrical Cables for Airport Lighting Circuits. For ratings up to 600 volts, thermoset wire conforming to Fed. Spec. A-A-59544, Type XHHW-2, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the Plans or in the specifications.

a. Control Circuits. Wire shall be not less than No. 12 AWG and shall be insulated for 600 volts. If telephone control cable is specified, No. 19 AWG telephone cable conforming to ICEA S-85-625 specifications shall be used.

b. Power Circuits.

(1) 600 volts maximum: Wire shall be No. 12 AWG or larger and insulated for at least 600 volts.

(2) 3,000 volts maximum: Wire shall be No. 8 AWG or larger and insulated for at least 3,000 volts.

(3) Over 3,000 volts: Wire shall be No. 8 AWG or larger and insulated for at least the circuit voltage.

109-2.19 WOOD PLATFORM FOUNDATION. If a wood platform foundation is specified, the Contractor shall construct the platform as shown in the Plans. The floor system shall consist of urethane foam core insulated panels with interior and exterior surfaces or similar manufacturer to the building structure. The panels shall be constructed on grade beams of the size shown. Grade beams may be of timber or steel. Timber shall be Douglas Fir-Larch. Timbers shall be pressure treated according to the American Wood Preservers Bureau (AWPB) FDN Standard and shall bear AWPB Quality Mark of an approved inspection agency as described in the AWPB Standard. Preservative salt retention shall be not less than 0.6 lb/ft3. Wood shall be kiln dried after impregnation. Steel grade beams shall be hot-dipped galvanized according to ASTM A123. The building shall be anchored with soil anchors meeting the requirements of Item P-650.

109-2.20 ELECTRICAL ENCLOSURE. The electrical enclosure shall be a pre-engineered structure with minimum dimensions shown on the Plans. The enclosure shall be installed on either a concrete slab or wood platform floor/foundation as shown on the Plans.

The enclosure shall meet the following requirements:

a. Panels and Facings.

(1) The enclosure may be constructed with separate interlocking panels forming the walls and roof or as a single unit. The enclosure exterior walls shall be foamed in place polyurethane core with 3/4-inch plywood on the interior surface. The exterior surface shall be 1/2 inch plywood with either a 26 gauge galvanized steel exterior skin or, fiberglass reinforced polyester. The exterior color shall be a factory applied and shall be white.

(2) The side of the facings which contact the insulation core shall have a coating that will allow core-to-facing bond to be equal or greater than the cohesive strength of the core.

b. Insulation Core.

(1) Factory foamed-in-place polyurethane between facings. Insulating value of the composite roof system shall be equal to or greater than R-38, and the wall system equal to or greater than R-19. No voids are allowed in the core.

(2) Polyurethane shall have a minimum 2 lbs/ft3 density.

(3) Polyurethane shall be certified UL flame spread 25 or less per ASTM E84.

c. The panel joints shall have tongue and groove or ship lap interlock with continuous silicone sealant tape at interior and exterior faces.

d. Panels shall be full length in single piece where practical.

e. Panels shall have State Fire Marshals approval if floor area exceeds 300 square feet.

f. Metal flashing and trim at corners, intersections, openings, eaves and ridges shall be of the same finish and 24 gauge thickness to effect a neat appearing, weather tight joint and closure. Provide wrap-around door jamb trim-flashing.

g. Enclosure shall have two 12-inch x 12-inch vent openings installed in two end or side walls. Each opening shall include a 90-degree weather hood with galvanized bird screen. One opening shall be provided with a manually adjustable damper and replaceable dust filter. One opening shall be provided with an exhaust fan and backdraft damper.

h. A refrigerator style door(s) of the dimensions shown shall be provided for the enclosure. The door(s) shall be of similar construction to the enclosure. Mounting hardware shall be of stainless steel or of forged brass with chrome plating, or approved equal. Provide neoprene weather-stripping. The door(s) shall be provided with a refrigerator safety lock with pushrod from interior, cast zinc with chrome plating. Provide lock(s) consisting of a brass, 6-pin E keyway padlock with a shackle that is 3/8 inch in diameter having a closed clearance of 2-1/4 inches. The lock shall have a control key removable core and shall have one separate replacement core. Provide 4 keys and 1 core removal key.

i. Enclosure construction shall meet the following.

Live Snow Load	70 psf
Live Floor Load	200 psf

Wind Load	110 mph, Basic wind speed, applied according to the International Building Code, Exposure Category D, Importance Factor III

Enclosure shall be an Equipment Enclosure for Runway Lighting Systems as manufactured by ALCEM, Inc., of Anchorage, Alaska; Plaschem Shelter as manufactured by Plaschem Supply & Consulting, of Anchorage Alaska; or approved equal.

j. Provide Metal Storage Cabinet and Wall Mounted Shop Desk. Provide 30 inch wide x 12 inch deep x 26 inch high wall mounted locking metal storage cabinet, and 24 inch wide x 23 inch deep x 12 inch high wall mounted shop desk securely fastened to the wall at the location and elevation shown on the drawings. Set bottom of desk surface 36 inches above floor surface.

109-2.21 FLEXIBLE METAL CONDUIT. Conduit shall be water-tight, listed for exposed or direct bury per UL-360, as a grounding conductor per NEC Article 351-9, and rated for temperatures between -67 °F and +220 °F

109-2.22 TAPES.

a. Pipe sealing tape: "Scotch" No. 48, Teflon pipe sealing or approved equal.
b. Corrosion preventive tape: "Scotch" No. 50 or approved equal.
c. Electrical insulating tape: "Scotch" No. 88 or approved equal.

109-2.23 RADIO CONTROL EQUIPMENT, L-854. Radio Control Equipment, shall be L-854, Type 1, Style A, with a field-adjustable receiver frequency set to the Common Traffic Advisory Frequency (CTAF) for the project airport as found in the Alaska Supplement of the U.S. Government Flight Publication.

109-2.24 ANTENNA FOR THE RECEIVER-CONTROLLER. Antenna shall be a heavy-duty omni-directional, tunable, ground plane antenna with vertical polarization in the 118 to 136 MHz band, designed for 100 mph winds. The antenna shall be tuned for the correct system frequency as assigned with a bandwidth of 2 MHz. The antenna shall be of 50 ohms nominal impedance and have an operating VSWR of less than 2:1 at system frequency. The antenna shall be equipped with an integral gap-type lightning arrester. The coaxial cable shall be 50-ohm, type RG-8. Antenna shall be designed to mount on 1-inch pipe support. The antenna ground planes shall be a minimum of 4 feet above the top of the adjacent roof or structure. Antenna mountings shall be fabricated as shown and noted.

109-2.25 APRON FLOODLIGHT. Apron floodlight shall be LED, 4000K color temperature, full-cutoff fixture, with light output and accessories as indicated on the Plans.

109-2.26 PHOTO ELECTRICAL CONTROL. Photo electrical control shall be a standard commercially available unit complying with UL 773, with supply voltage rating of 105-277V AC, integral surge protection, -40F to 140F operating temperature range, and EEI-NEMA standard twist-lock mounting with base. . It shall be installed, connected, and adjusted according to the manufacturer's instructions.

109-2.27 PANEL BOARDS. Panel boards shall be single phase, 3-wire, of sizes to provide all circuits and spares indicated. The branch breakers shall be bolt-in type. The enclosure shall be NEMA I with lockable flush door front, provided with a circuit index card under plastic on the interior side of the panel door; and the enclosure shall have an engraved phenolic label, lettered to indicate the voltage and current rating of the panel, attached to the panel front exterior.

The panel board circuit breakers shall be bolt-on molded case type, 120/240 V, 10,000 A interrupting capacity, with an insulation temperature rating of 60/75 °C or 75°C to operate with conductors with insulation rated up to 75°C per NEC table 310-16. 1- and 2-pole type with current ratings as indicated on Plans. Each pole of the breaker shall provide inverse time delay and instantaneous circuit protection. Breakers shall be operated by toggle type handle and have a quick-make, quick-break over center switching mechanism that is mechanically trip free so that contacts cannot be held closed against short circuits and abnormal currents. Tripping shall be

clearly indicated. Non-interchangeable trip breakers shall have sealed covers and interchangeable trip units shall have sealed trip units. Ampere ratings shall be clearly visible.

Panel board circuit breakers shall be UL listed (where procedures exist), conform to the applicable requirements of the latest NEMA Standard. Breakers shall be standard thermal-magnetic type unless otherwise noted. Circuit breakers for the duplex receptacles shall incorporate overload, short circuit, and UL Class A ground fault circuit interruption.

109-2.28 TRANSFER SWITCH. Transfer switch shall be Heavy-duty, 2-pole, 3-wire, S/N, double-throw, non-fusible type in a NEMA 1 enclosure.

109-2.29 IDENTIFICATION TIES. Identification ties shall be self-locking, heavy duty nylon ties and shall be labeled by heat stamp.

109-2.30 SERVICE ENTRANCE EQUIPMENT. The meter/main breaker combination service entrance unit for the Electrical Equipment Enclosure shall be an overhead source or an underground source as shown on the Plans, bottom (underground) load type, 125 A, 120/240 V, single phase, with 2-pole, 100 A, main breaker and 4-jaw kWh meter. The service entrance enclosure shall be raintight NEMA 3R rated with a conduit entry hub fitting on top.

The service entrance disconnect switch shall be mounted on the Snow Removal Equipment Building as shown on the Plans. Disconnect switch shall be 100 A, 240 V, 3-wire (third blade not used), S/N, with NEMA 3R enclosure, non-fused, with field installation kit.

109-2.31 PLUG CUTOUT. The plug cutout shall be a lockable, 2-pole type rated 20-amp @ 5kV, 60Hz. The plug shall be insertable in three positions for normal operations, maintenance, and testing. The plug cutout shall be mounted in a NEMA-1 enclosure with a hinged and lockable door sized to allow the plug and key to be operable by a worker standing in front of the enclosure.

109-2.32 SUPPORTS FOR WALL-MOUNTED PANELS, PANEL BOARDS, AND FIXTURES. Supports for wall mounted panels, panel boards and fixtures shall be metal channels with accessory nuts and fittings; Unistrut or approved equal, or 3/4 inch plywood panels.

109-2.33 PUSH-BUTTON STATIONS. Push-button stations shall be off-on, momentary-contact types in water/dust-tight boxes. Provide metal labels identifying the function of each section.

109-2.34 ELECTRIC HEATER. The electric heater shall be surface mounted and rated 2000 W at 240 V, with mounting kit as required. Thermostat shall be wall mounted on a suitable junction box and be of the line voltage type with an off position and a temperature range of 40 °F to 90 °F. Thermostat current rating shall be suitable to control the specified heater.

109-2.35 HARDWARE. All miscellaneous hardware items, nails, bolts, and screws shall be galvanized steel.

109-2.36 EXHAUST FAN. The exhaust fan shall be sidewall propeller fan rated for a minimum of 150 CFM at 0.20 in WG. The fan shall include wire guards on the interior and a backdraft damper at the exterior wall. The fan shall be controlled by a wall-mounted thermostat, adjustable 40-85 deg F minimum.

CONSTRUCTION METHODS

CONSTRUCTION OF VAULT, PREFABRICATED METAL HOUSING AND ELECTRICAL ENCLOSURE

109-3.1 GENERAL. The Contractor shall construct the transformer vault, prefabricated metal housing or electrical enclosure at the location indicated in the Plans. Vault construction shall be reinforced concrete, concrete masonry, or brick wall as specified. The metal housing shall be prefabricated equipment enclosure to be supplied in the size specified. The electrical enclosure shall be a pre-engineered building placed on either

a poured concrete foundation or a wood platform as specified. The mounting pad or floor details, installation methods, and equipment placement are shown in the Plans.

If the vault, metal housing or electrical enclosure are to be placed on a site not prepared for that purpose under other items of work, the Contractor shall clear, grade, and seed the area around the vault, metal housing or electrical enclosure for a minimum distance of 10 feet on all sides. The slope shall be not less than 4% away from the vault, metal housing or electrical enclosure in all directions. Cost for site work will be considered incidental to this item and no separate payment will be made.

109-3.2 FOUNDATION AND WALLS.

a. **Reinforced Concrete Construction.** The Contractor shall construct the foundation and walls according to the details shown in the Plans. Unless otherwise specified, internal ties shall be of the mechanical type so that when the forms are removed the ends of the ties shall be at least 1 inch beneath the concrete surface; the holes shall be plugged and finished to prevent discoloration. Reinforcing steel shall be placed, as shown in the drawings, and secured in position to prevent displacement during the concrete placement.

   The external surfaces of the concrete shall be thoroughly worked during the placing operation to force all coarse aggregate from the surface. Thoroughly work the mortar against the forms to produce a smooth finish free from air pockets and honeycomb.

   The surface film of all pointed surfaces shall be removed before setting occurs. As soon as the pointing has set sufficiently, the entire surface inside and outside of the vault shall be thoroughly wet with water and rubbed with a No. 16 carborundum stone, or equal quality abrasive, bringing the surface to a paste. All form marks and projections shall be removed. The surface produced shall be smooth and dense without pits or irregularities. The materials which have been ground into a paste during the rubbing process shall be spread or brushed uniformly over the entire surface (except the interior surfaces that are to be painted shall have all paste removed by washing before painting) and permitted to reset. Final exterior finish shall be obtained by rubbing with No. 30 carborundum stone, or an equal quality abrasive. The surface shall be rubbed until the entire surface is smooth and uniform in color.

b. **Brick and Concrete Construction.** When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the Plans. The outer edge of the foundation at the floor level shall be beveled 1-1/2 inches at 45 degrees. Brick walls shall be 8 inches thick, laid in running bond with every sixth course a header course. Brick shall be laid in cement mortar (1 part masonry cement and 3 parts sand) with full mortar bed and shoved joints. All joints shall be completely filled with mortar, and facing brick shall be back-parged with mortar as work progresses. All joints shall be 3/8 inch thick, exterior joints tooled concave, and interior joints struck flush. Both interior and exterior brick surfaces shall be cleaned and nail holes, cracks and other defects filled with mortar. When specified, a nonfading mineral pigment mortar coloring shall be added to the mortar. Steel reinforcing bars, 3/8 inch in diameter and 12 inches long, shall be set vertically in the center of the brick wall on not more than 2-foot centers to project 2-1/2 inches into the concrete roof slab. Lintels for supporting the brickwork over doors, windows, and louvers shall consist of two 4-inch x 3-inch x 3/8-inch steel angles. Lintels shall be painted with one coat of corrosion-inhibiting primer before installation, and all exposed parts shall be painted similar to doors and window sash after installation.

   Window sills may be concrete poured in place or precast concrete as indicated in the Plans. All exposed surfaces shall have a rubbed finish as specified under reinforced concrete construction. After completion, all interior and exterior faces of walls shall be scrubbed with a solution of muriatic acid and water in the proportions of not less than 1 part acid to 10 parts of water. All traces of efflorescence, loose mortar, and mortar stain shall be removed, and the walls washed down with clear water.

c. **Concrete Masonry Construction.** When this type of construction is specified, the foundation shall be concrete conforming to the details shown in the Plans. The concrete masonry units shall be standard sizes and shapes and shall conform to ASTM C90 and shall include the closures, jambs, and other

shapes required by the construction as shown in the Plans. Standard construction practice shall be followed for this type of work including mortar, joints, reinforcing steel for extensions into roof slab, etc. Plaster for interior walls, if specified, shall be portland cement plaster.

109-3.3 ROOF. The vault roof shall be reinforced concrete as shown in the Plans. Reinforcing steel shall be placed as shown in the drawing and secured in position to prevent displacement during the pouring of the concrete. The concrete shall be poured monolithically and shall be free of honeycombs and voids. The surface shall have a steel-troweled finish and shall be sloped as shown in the drawing. The underside of the roof slab shall be finished in the same manner as specified for walls.

One brush or mop coat of hot asphalt roof coating shall be applied to the top surface of the roof slab. The asphalt material shall be heated to within the range specified by the manufacturer and immediately applied to the roof. The finished coat shall be continuous over the roof surface and free from holidays and blisters. Smears and dribbles of asphalt on the roof edges and building walls shall be removed.

109-3.4 REINFORCED CONCRETE FLOOR. The floor shall be reinforced concrete as shown in the drawings either constructed on a previously prepared surface or on natural ground. When present, all sod, roots, refuse, and other perishable material shall be removed from the area under the floor to a depth of 8 inches, unless a greater depth is specified. This area shall be backfilled with materials consisting of sand, cinders, gravel, or stone. Fill shall be placed in layers not to exceed 4 inches and shall be thoroughly compacted by tamping or rolling. A layer of building paper shall be placed over the fill prior to placing concrete. The floor surfaces shall have a steel-troweled finish. The floor shall be level unless a drain is specified, in which case the floor shall be pitched 2% downward toward the drain. A 1/4-inch asphalt felt expansion joint shall be placed between floor and foundation walls. The floor shall be poured monolithically and shall be free of honeycombs and voids.

109-3.5 FLOOR DRAIN. If shown in the Plans, a floor drain and dry well shall be installed in the center of the floor of the equipment room. The dry well shall be excavated 4 foot x 4 foot square and to a depth of 4 feet below the finished floor elevation and shall be backfilled to the elevation of the underside of the floor with gravel which shall all pass a 2 inch mesh sieve and shall all be retained on a 1/4 inch mesh sieve. The gravel backfill shall be placed in 6 inch maximum layers, and the entire surface of each layer shall be tamped either with a mechanical tamper or with a hand tamper weighing not less than 25 pounds and having a face area of not more than 36 square inches nor less than 16 square inches. The drain inlet shall be set flush in the concrete floor. The drain shall have a clear opening of not less than 8 inches in diameter.

109-3.6 CONDUITS IN FLOOR AND FOUNDATION. Conduits shall be installed in the floor and through the foundation walls according to the details shown in the Plans. All underground conduit placed in concrete shall be painted with a bituminous compound. Conduit shall be installed with a coupling or metal conduit adapter flush with the top of the floor. All incoming conduit shall be closed with a pipe plug to prevent the entrance of foreign material during construction. Space conduit entrances shall be left closed.

109-3.7 PAINTING. The floor, ceiling, and inside walls of concrete construction shall first be given a hardening treatment, after which the Contractor shall apply two coats of paint as specified below, except that interior face brick walls need not be painted. The hardening treatment shall consist of applying two coats of either a commercial floor hardener or a solution made by dissolving 2 pounds of magnesium fluosilicate or zinc sulfate crystals in 1 gallon of water. Each coat shall be allowed to dry at least 48 hours before the next application. After the second treating coat has dried, the surfaces shall be brushed clean of all crystals and thoroughly washed with clear water. Paint for walls and ceiling shall be a light gray color approved by the Engineer. The floor paint shall be a medium gray color approved by the Engineer. Before painting, the surfaces shall be dry and clean. The first coat shall be thinned by adding 2/3 quart of spar varnish and 1/3 quart of turpentine to each gallon of paint. The second coat shall be applied without thinning. All doors, lintels, and windows shall be cleaned to remove any rust or foreign material and shall be given one body and one finish coat of white paint. Bare metal surfaces shall be given a prime coat of corrosion-inhibiting primer prior to the body and finish coats.

109-3.9 LIGHTS AND SWITCHES. The Contractor shall furnish and install a minimum of two duplex convenience outlets in the vault room. Where a control room is specified, at least two duplex outlets shall be installed.

INSTALLATION OF EQUIPMENT IN VAULT, PREFABRICATED METAL HOUSING, ENCLOSURE OR BUILDING

109-3.10 GENERAL. The Contractor shall furnish, install, and connect all equipment, equipment accessories, conduit, cables, wires, buses, grounds, and support necessary to insure a complete and operable electrical distribution center for the airport lighting system as specified herein and shown in the Plans. When specified, an emergency power supply and transfer switch shall be provided and installed.

The equipment installation and mounting shall comply with the requirements of the NEC and local code agency having jurisdiction.

109-3.11 POWER SUPPLY EQUIPMENT. Transformers, regulators, booster transformers, and other power supply equipment items shall be furnished and installed at the location shown in the Plans or as directed by the Engineer. The power supply equipment shall be set on steel "H" sections, "I" beams, channels, or concrete blocks to provide a minimum space of 1-1/2 inches between the equipment and the floor. The equipment shall be placed so as not to obstruct the oil-sampling plugs of the oil-filled units; and name-plates shall, so far as possible, not be obscured. All equipment shall be securely anchored to the floor.

If specified in the Plans and specifications, equipment for an alternate power source or an emergency power generator shall be furnished and installed. The alternate power supply installation shall include all equipment, accessories, an automatic changeover switch, and all necessary wiring and connections. The emergency power generator set shall be the size and type specified.

109-3.12 SWITCHGEAR AND PANELS. Oil switches, fused cutouts, relays, transfer switches, panels, panel boards, and other similar items shall be furnished and installed at the location shown in the Plans or as directed by the Engineer. Wall or ceiling-mounted items shall be attached to the wall or ceiling with galvanized bolts of not less than 3/8 inch diameter engaging metal expansion shields or anchors in masonry or concrete vaults.

109-3.13 DUCT AND CONDUIT. The Contractor shall furnish and install square-type exposed metallic ducts with hinged covers for the control circuits in the vault. These shall be mounted along the walls behind all floor-mounted equipment and immediately below all wall-mounted equipment. The hinged covers shall be placed to open from the front side with the hinges at the front bottom.

Wall brackets for square ducts shall be installed at all joints 2 feet or more apart with intermediate brackets as specified. Conduit shall be used between square ducts and equipment or between different items of equipment when the equipment is designed for conduit connection. When the equipment is not designed for conduit connection, conductors shall enter the square-type control duct through insulating bushings in the duct or on the conduit risers.

109-3.14 CABLE ENTRANCE SYSTEM. Incoming underground cable from field circuits and supply circuits will be installed outside the walls of the transformer vault as a separate item under Item L-108. The Contractor installing the vault equipment shall bring the cables from the trench or duct through the entrance conduits into the vault, cabinet or enclosure and make the necessary electrical connections.

109-3.15 WIRING AND CONNECTIONS. The Contractor shall make all necessary electrical connections in the vault, cabinet or enclosure according to the wiring diagrams furnished and as directed by the Engineer. In wiring to the terminal blocks, the Contractor shall leave sufficient extra length on each control lead to make future changes in connections at the terminal block. This shall be accomplished by running each control lead the longest way around the box to the proper terminal. Leads shall be neatly laced in place. Wiring shall be installed in accordance the Plans and L-108, Underground Cable. Circuits rated greater than 20 amps shall be tested in accordance with L-108, Underground Cable.

109-3.16 MARKING AND LABELING. All equipment, control wires, terminal blocks, etc., shall be tagged, marked, or labeled as specified below:

a. **Wire Identification.** The Contractor shall furnish and install self-sticking wire labels or identifying tags on all control wires at the point where they connect to the control equipment or to the terminal blocks. Wire labels, if used, shall be of the self-sticking preprinted type and of the manufacturer's recommended size for the wire involved. Identification markings designated in the Plans shall be followed. Tags, if used, shall be of fiber not less than 3/4 inch in diameter and not less than 1/32 inch thick. Identification markings designated in the Plans shall be stamped on tags by means of small tool dies. Each tag shall be securely tied to the proper wire by a nonmetallic cord.

b. **Labels.** The Contractor shall install engraved laminated acrylic or melamine identifying labels on the cases of regulators, breakers, and distribution and control relay cases as designated by the Engineer. The letters and numerals shall be not less than 3/8 inch in height and shall be of proportionate width. The Contractor shall also mark the correct circuit designations according to the wiring diagram on the terminal marking strips which are a part of each terminal block.

109-3.17 GUARANTEE. Furnish a written guarantee that any materials or workmanship found defective within one year of final acceptance shall be replaced at no additional cost to the Department, promptly upon notifications and to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

109-4.1 The quantity of vaults to be paid for under this item shall consist of the number of vaults constructed in place and accepted as a complete unit.

109-4.2 The quantity of prefabricated metal housings to be paid for under this item shall consist of the number of housings constructed in place and accepted as a complete unit.

109-4.3 The quantity of electrical enclosures to be paid for under this item shall consist of the number of enclosures constructed in place and accepted as a complete unit. Removal of existing electrical enclosures shall be subsidiary to installation of new enclosures.

109-4.4 The quantity of electrical equipment installed in a new or existing structure (vault, prefabricated metal housing electrical enclosure or building) to be paid for under this item shall consist of all equipment installed, connected, and accepted as a complete unit ready for operation. Remove of existing electrical equipment from existing structures shall be subsidiary to installation of new electrical equipment.

BASIS OF PAYMENT

109-5.1 Payment will be made at the contract unit price for each completed and accepted vault, prefabricated metal housing or electrical enclosure.

109-5.2 Payment will be made at the contract unit price for equipment supplied and installed in a new or existing structure (vault, prefabricated metal housing, electrical enclosure or building) completed and accepted.

Lighting regulators are paid for under section *L-125 Installation of Airport Lighting Systems*.

Payment will be made under:

Item L109.050.0000	Installation of Electrical Equipment in New or Existing Structure – Lump Sum
Item L109.060.0000	Relocation of Electrical Equipment Structure – per each

MATERIAL REQUIREMENTS

AASHTO M 31	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
AC 150/5340-9	*Prefabricated Metal Housing for Electrical Equipment*
AC 150/5345-3	*L-821 Panels for Remote Control of Airport Lighting*

AC 150/5345-5	*Circuit Selector Switch*
AC 150/5345-7	*L-824 Underground Electrical Cable for Airport Lighting Circuits*
AC 150/5345-10	*Constant Current Regulators and Regulator Monitors*
AC 150/5345-13	*L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits*
AC 150/5345-49	*L-854 Radio* Control *Equipment*
AC 150/5345-53	*Airport Lighting Equipment Certification Program*
ANSI/ICEA S-85-625	Aircore, Polyethylene Insulated, Copper Conductor, Telecommunications Cable
ASTM C62	Building Brick (Solid Masonry Units Made from Clay or Shale)
ASTM C90	Concrete Masonry Units, Loadbearing
ASTM D2823	Asphalt Roof-Coatings, Asbestos Containing
ASTM D4479	Asphalt Roof Coatings – Asbestos Free
Fed.Spec.A-A-59544	Cable and Wire, Electrical (Power, Fixed Installation)
Fed.Spec.W-C-571	Conduit and Fittings, Nonmetal, Rigid; (Asbestos-Cement or Fire-Clay Cement), (For Electrical Purposes)
SSPC-Paint 25	Zinc Oxide, Alkyd. Linseed Oil Primer for Use Over Hand Cleaned Steel

ITEM L-110 AIRPORT UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS

DESCRIPTION

110-1.1 This item shall consist of underground electrical ducts installed according to this specification at the locations and according to the dimensions, designs, and details shown in the Plans. This item shall include the installation of all underground electrical ducts or underground conduits [and removal of underground ducts as shown and described on the Plans]. It shall also include all trenching, marking, backfilling, removal, and restoration of any paved areas; manholes, concrete encasement, mandrelling, installation of pull ropes and duct markers, capping, and the testing of the installation as a completed duct system ready for installation of cables, to the satisfaction of the Engineer. This item includes installing manholes, drain conduits, and drywells as shown and described on the Plans.

MATERIALS

110-2.1 GENERAL. All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when so requested by the Engineer.

110-2.2 STEEL CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of UL Standard 6, 514, and 1242.

110-2.3 PLASTIC CONDUIT. Plastic conduit and fittings shall conform to the requirements of Fed. Spec. W-C-1094 Type I, suitable for underground use either directly in the earth or encased in concrete. The conduit shall be one of the following as shown on the Plans:

a. Underground Plastic Duct shall be rigid, non-metallic, conduit, Schedule 40 PVC conforming to UL Standard 651 and NEMA TC-2, nominal size as indicated on the Plans. All fittings such as elbows, couplings, connectors, expansion joints, adapters, etc., used in the installation shall be Schedule 40 PVC conforming to UL Standard 514B and NEMA TC-3.

b. Underground Plastic Duct shall be Type III, rigid, HDPE pipe, schedule 40 conforming to UL Standard 651A. The material shall have a cell classification of 334420C or better according to ASTM D3350, and shall have a third party, nationally recognized testing lab listing. The nominal size shall be as indicated on the Plans. All fittings such as saddle fittings, couplings, connectors, adapters, etc., used in the installation shall be HDPE and shall be of the same material as the duct. Fittings shall be third-party listed, watertight, and shall not rely on gaskets alone for conduit pull-out resistance. Electrofusion couplings or other welded HDPE fittings may be used, but if not third-party listed, approval of their use shall be obtained from the authority having jurisdiction prior to ordering materials and shall be included with the product submittals.

110-2.4 CONCRETE. Concrete shall conform to Item P-610, Structural Portland Cement Concrete, 1-inch maximum size coarse aggregate.

110-2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT. Liquidtight Flexible Metal Conduit - Type LFMC shall be water-tight, listed for exposed or direct bury per UL-360, as a grounding conductor per NEC Article 350, and rated for temperatures between -67 °F and +220 °F.

110-2.6 TAPES.

a. Pipe sealing tape shall be Teflon, "Scotch" No. 48 or approved equal.
b. Corrosion preventive tape shall be "Scotch" No. 50 or approved equal.

110-2.7 MARKER TAPE. Marker tape shall be APWA-ULCC compliant, red polyethylene plastic, printed “Caution – Buried Electrical Line Below.”

110-2.8 DETECTABLE MARKER TAPE. Detectable marker tape shall be plastic, detectable, American Public Works Association (APWA) Red (electrical power lines, cables, conduit, and lighting cable) with continuous legend “Caution – Buried Electrical Line Below,” aluminum backed polyethylene film, minimum 6-inches (120 mm) wide x 5 mils thick.

110-2.9 ELECTRICAL MANHOLES. Electrical manholes shall be constructed using precast or cast-in-place concrete. Concrete strength and reinforcing steel shall be as designed by the manufacturer and shall be as required to meet loading requirements indicated in the Plans. Provide cable pulling eyes, drain knockouts, ground rod knockouts or ground wire sleeves, and adjustable non-metallic cable racks as indicated in the Plans. Provide conduit knockouts on all sides of the manhole.

Manhole cover frames shall be cast into the manhole lid. Covers and frames shall be hinged and made of cast iron or galvanized steel with sizes and ratings as indicated in the Plans. Cast iron manhole covers shall be provided with a spring-assist mechanism for opening.

Covers, frames, and concrete sections used for adjustment of existing manholes shall meet the requirements of this section.

110-2.10 DRYWELLS. Drywells shall consist of buried drain rock surrounded by filter fabric installed at the ends of drain conduits to provide free drainage of excess water in the conduit system. Filter fabric shall conform to the requirements of AASHTO M288, Class 2.

TABLE 110-1. GRADATION OF DRYWELL DRAIN ROCK

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
2”	100
1-1/2”	95-100
3/4"	0-20
3/8”	0-5

CONSTRUCTION METHODS

110-3.1 GENERAL. The Contractor shall install underground ducts at the approximate locations indicated in the airport layout plans. The Engineer shall indicate specific locations as the work progresses. Ducts shall be of the size, material, and type indicated in the Plans or specifications. Where no size is indicated in the Plans or specifications, the ducts shall be not less than 2 inches inside diameter. All duct lines shall be laid so as to grade toward handholes, manholes and duct ends for drainage. Grades shall be at least 3 inches per 100 feet. On runs where it is not practicable to maintain the grade all one way, the duct lines shall be graded from the center in both directions toward manholes, handholes, or duct ends. Pockets or traps where moisture may accumulate shall be avoided.

Seal all joints in the rigid steel conduit runs with conductive corrosion inhibitor/thread sealant applied to the threaded couplings. Wrap the completed joint with 2 layers of corrosion preventative tape, 1/2 lapped and extending 1-1/2-inches on both sides of the joints.

After the conduit run has been completed, pull a standard flexible mandrel not less than 12-inches long, having a diameter approximately 1/4-inch less than the inside diameter of the conduit, through the entire length of the conduit run, after which a brush with stiff bristles of at least the diameter of the inside of the conduit shall be pulled through the entire length of the conduit run to make certain that no particles of earth, sand, or gravel have been left in the line.

All ducts installed shall be provided with a 200-pound test polypropylene pull rope for pulling the permanent wiring. Sufficient length shall be left in manholes or handholes to secure the ends to prevent it from slipping back into the duct. Where spare ducts are installed, as indicated on the Plans, the open ends shall be plugged with

removable tapered plugs, designed by the duct manufacturers, or with hardwood plugs conforming accurately to the shape of the duct and having the larger end of the plug at least 1/4-inch greater in diameter than the duct.

All ducts shall be securely fastened in place during construction and progress of the work and shall be plugged to prevent seepage of grout, water, or dirt. Any duct section having a defective joint shall not be installed. Ducts shall be supported and spaced apart using approved spacers at intervals not to exceed 5 feet.

All ducts, except steel conduit, installed under runways, taxiways, aprons, and other paved areas subject to aircraft traffic shall be encased in a concrete envelope.

Where turf is well established and the sod can be removed, it shall be carefully stripped and properly stored.

Trenches for ducts may be excavated manually or with mechanical trenching equipment. Walls of trenches shall be essentially vertical so that a minimum of shoulder surface is disturbed. Blades of road patrols or graders shall not be used to excavate the trench. The Contractor shall ascertain the type of soil or rock to be excavated before bidding. All excavation shall be unclassified.

Trenches for burial of duct or conduit shall be of sufficient width to provide a minimum of 2-inches of lateral clearance between the duct or conduit and trench walls on both sides. Trenches for burial of duct or conduit shall be of sufficient depth as to assure 1.5-feet minimum duct or conduit burial depth below finished grade, plus 4-inches minimum of below duct or conduit bedding, plus adequate over excavation depth as required to slope and grade all duct or conduit installations to drain toward light bases or hand holes.

Underground marker tape shall be installed in the trench above all duct banks and conduits. If not shown on the Plans, the marker tape shall be located 6 inches above the duct bank/conduit or counterpose wire if present.

Manholes shall be installed on a layer of compacted drain rock 12-inches thick. Filter fabric shall be placed between the undisturbed soil and the drain rock. Conduit openings shall be grouted solid with non-shrink grout after installation of conduits but prior to backfilling. When adjusting existing manholes or installing new manholes, manhole covers and frames shall be installed flush with the surrounding finish grade on all sides.

Excavate foundations, footings, slabs, pads, manholes, handholes, ducts and/or duct banks, or light base assemblies so as to permit the placing or construction of the full width, length, and depth of the structure or object and the layer of bedding material, whenever bedding is required.

110-3.2 DUCTS ENCASED IN CONCRETE. Unless otherwise shown in the Plans, concrete-encased ducts shall be installed so that the top of the concrete envelope is not less than 1.5-feet below the finished subgrade where installed under runways, taxiways, aprons, or other paved areas, and not less than 1.5-feet below finished grade where installed in unpaved areas. Ducts under paved areas shall extend at least 3-feet beyond the edges of the pavement or 3-feet beyond any underdrains which may be installed alongside the paved area. Trenches for concrete-encased ducts shall be opened the complete length before concrete is laid so that if any obstructions are encountered, proper provisions can be made to avoid them. All ducts for concrete encasements shall be placed on a layer of concrete not less than 3-inches thick prior to its initial set. Where two or more ducts are encased in concrete, the Contractor shall space them not less than 1-1/2-inches apart (measured from outside wall to outside wall) using spacers applicable to the type of duct. As the duct laying progresses, concrete not less than 3-inches thick shall be placed around the sides and top of the duct bank. End bells or couplings shall be installed flush with the concrete encasement where required.

When specified, the Contractor shall reinforce the bottom side and top of encasements with steel reinforcing mesh or fabric or other approved metal reinforcement. When directed, the Contractor shall supply additional supports where the ground is soft and boggy, where ducts cross under roadways, or where otherwise shown on the Plans under such conditions, the complete duct structure shall be supported on reinforced concrete footings, piers, or piles located at approximately 5-foot intervals.

110-3.3 DUCTS WITHOUT CONCRETE ENCASEMENT. Trenches for single-duct lines shall be not less than 6-inches nor more than 12-inches wide, and the trench for 2 or more ducts installed at the same level shall be

proportionately wider. Trench bottoms for ducts without concrete encasement shall be made to conform accurately to grade so as to provide uniform support for the duct along its entire length.

Where HDPE or steel conduit is specified, place a layer of bedding material, at least 4-inches thick (loose measurement) in the bottom of the trench to bed the duct. Use bedding material that meets the requirements for the applicable lift of material (P-152, P-154, P-299, P-209) except that 100% of the bedding material will pass a 1-inch sieve.

Where conduit other than HDPE or steel is specified, a layer of sand, at least 4-inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the duct. The bedding material shall consist of sand, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm.

Unless otherwise shown in Plans, ducts for direct burial shall be installed so that the tops of all ducts are at least 1.5-feet below the finished grade.

When two or more ducts are installed in the same trench without concrete encasement, they shall be spaced not less than 2-inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length before duct is installed so that if any obstructions are encountered, proper provisions can be made to avoid them.

110-3.4 PVC CONDUIT. Install PVC conduit where indicated on the Plans.

Fabricate the conduit runs as recommended by the conduit manufacturer. Make all joints square, tight, and leakproof. Do not allow bends or breaks in the joints. Use only solvents and cements, which are specifically recommended by the conduit manufacturer. Join together the complete run between each light base alongside the trench. Place in the trench and connect to the base assembly after the minimum cure time of the joint cement has elapsed and after inspection and approval is granted by the Engineer.

Make field cuts of the conduit true and square with a tool or lathe designed for the purpose. Debur and ream the conduit as required.

Bend PVC conduit at the job site only with a "Hot Box" or as recommended by the conduit manufacturer. Heat the conduit uniformly to obtain smooth bends without overheating. Conduit with a brown appearance shall not be used. Conduit with extremely sharp bends, kinks in the bends or which exhibits a significant visual defect shall not be used.

Install expansion fittings in each run of conduit between light base assemblies, at spacing not exceeding 60 feet. The expansion fitting shall be of the same manufacturer as the conduit and shall be installed according to the manufacturer's instruction. Expansion joints shall be installed a maximum of 10-feet from the edge light bases or hand holes and shall be installed with joints 1/4-inch expanded, resulting in a minimum requirement of four expansion joints per 190-foot run of conduit.

110-3.5 HDPE CONDUIT. Assemble high-density polyethylene conduit into runs on the surface and install in trenches after coupling of the section. Butt-weld the duct using the manufacturer's recommended procedures and equipment. Assure that the conduit is open, continuous and free of water and debris prior to installing cable. In underground conduit, pull a flexible mandrel and swab through the entire length of the conduit run immediately prior to the cable being installed.

Make changes in direction (other than long sweeping curves) and stub-ups to equipment using rigid steel conduit elbows. HDPE conduit splices and fittings shall be watertight. Where electrofusion couplings are used to join HDPE to rigid steel conduit, the rigid steel conduit shall be threaded. Where gasketed fittings are used to connect to rigid steel conduit, the rigid steel conduit shall not be threaded to ensure a proper seal at the gasket.

HDPE conduit shall be removed from the reel using a conduit straightening mechanism to remove the reel memory from the conduit.

110-3.6 DUCT MARKERS. When called for in the Plans, the location of the ends of all ducts shall be marked by a concrete slab marker 2-feet square and 4-inches thick extending approximately 1-inch above the surface. The markers shall be located above the ends of all ducts or duct banks, except where ducts terminate in a handhole, manhole, or building.

The Contractor shall impress the word “DUCT” on each marker slab, and shall also impress on the slab the number and size of ducts beneath the marker. The letters shall be 4-inches high and 3-inches wide with width of stroke 1/2-inch and 1/4-inch deep or as large as the available space permits.

110-3.7 BACKFILLING. Backfill only after the duct has been placed, inspected and accepted by the Engineer.

After concrete-encased ducts have been properly installed and the concrete has had time to set, the trench shall be backfilled in at least two layers with excavated material not larger than 2-inches in diameter and thoroughly tamped and compacted to at least the density of the surrounding undisturbed soil. If necessary to obtain the desired compaction, the backfill material shall be moistened or aerated as required. If duct is placed in the structural section (P-154, P-299, P-209) of a pavement such as for a runway or taxiway, the Contractor shall construct the backfill according to the specifications for the material in which the duct is placed.

Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations.

The trench shall be completely backfilled and tamped level with the adjacent surface: except that, when sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

Any excess excavated material shall be removed and disposed of according to instructions issued by the Engineer.

For ducts without concrete envelope, bedding material shall be placed around the ducts and carefully tamped around and over them with hand tampers. Use bedding material that conforms to the requirements specified in subsection 110-3.3 for the type of conduit that is used. Bedding material shall be placed to provide a minimum of 4 inches of cover when compacted over and to the sides of the duct. The remaining trench may be filled with regular run of excavated material and thoroughly tamped as specified above. If duct is placed in the structural section (P-154, P-299, P-209) of a pavement such as for a runway or taxiway, the Contractor shall construct the backfill according to the specifications for the material in which the duct is placed.

110-3.8 RESTORATION. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the trenching, storing of dirt, cable laying, pad construction and other work shall be restored to its original condition. The restoration shall include any necessary topsoil, fertilizing, liming, seeding, sprigging, or mulching. All such work shall be performed according to the FAA Standard Turfing Specifications (T-901, T-903, T-904, T-905, T-908, T-920). The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

110-3.9 DRYWELLS. Drywells shall be excavated to a minimum depth of 24-inches below the drain conduit. The excavated hole shall be lined with filter fabric and filled with drain rock. The drain rock shall be hand tamped, the fabric wrapped over the top of the drain rock, and the hole backfilled. In areas within the project limits, backfill shall be in accordance with the material sections shown in the Plans. In other areas, backfill shall consist of the removed material, unless deemed unsuitable by the Engineer.

METHOD OF MEASUREMENT

110-4.1 Underground duct shall be measured by the linear foot of duct installed, measured in place, completed, and accepted. Separate measurement shall be made for the various types and sizes.

110-4.2 Items shown as lump sum will not be measured for payment.

110-4.3 The quantity of new manholes, adjusted manholes, and drywells to be paid for will be the number of units in place, completed, ready for operation, and accepted as satisfactory.

BASIS OF PAYMENT

110-5.1 Payment will be made at the contract unit price for each type and size of single-way or multi-way duct completed and accepted. This price shall be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, including trenching, bedding, backfill, concrete encasement (where required), marking, and restoration, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Refer to Item P-610 for requirements regarding all work and materials to place Portland cement concrete. Portland cement concrete is subsidiary to L-110 items requiring its use.

Removal of underground duct shall be subsidiary to the removal of the associated equipment served by the duct as shown and described in the Plans, unless otherwise indicated.
Payment will be made under:

Item L110.030.1002	Rigid Steel Conduit, 2-inch - per linear foot
Item L110.080.1002	HDPE Conduit, 2-inch - per linear foot

MATERIAL REQUIREMENTS

Fed. Spec. W-C-1094	Conduit and Fittings; Nonmetallic, Rigid, (Plastic)
UL Standard 6	Rigid Metal Conduit
UL Standard 514B	Conduit, Tubing, and Cable Fittings
UL Standard 514C	Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers
UL Standard 651	PVC Conduit and Fittings
UL Standard 651A	HDPE Conduit
UL Standard 1242	Intermediate Metal Conduit

ITEM L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS

DESCRIPTION

125-1.1 This item consists of furnishing and installing runway and taxiway lighting systems and removal and disposal of existing lighting equipment as indicated on the Plans and as specified herein. This item shall include the furnishing of all equipment, materials, services, and incidentals necessary to place the systems in operation as completed units to the satisfaction of the Engineer. This item shall also include furnishing, installing, maintaining, and removing temporary runway lighting as specified and shown in the Plans.

MATERIALS

125-2.1 GENERAL. Obtain approval of all materials and equipment to be used or incorporated in the work, prior to their shipment to the project site. Submit to the Engineer five (5) complete listings or one (1) electronic PDF of materials and equipment specified herein and on the Plans. Clearly identify the material or equipment by item, name, or designation used on the Plans or specifications and indicate where specified. Include applicable catalog numbers, cuts, wiring diagrams, performance data, and operation and maintenance manuals. Neatly bind and clearly index the submittals. In addition, when specified, include in the submittals certificates of compliance, manufacturer's instructions and/or shop drawings, or proposed construction or installation procedures.

a. **Certified Airport Lighting Equipment.** The following items shall conform to the applicable FAA specifications, except as shown on the Plans and/or modified herein. The equipment shall be certified and listed under AC 150/5345-53, Airport Lighting Equipment Certification Program. FAA certified airfield lighting shall be compatible with each other to perform in compliance with FAA criteria and the intended operation. If the Contractor provides equipment that does not performs as intended because of incompatibility with the system, the Contractor assumes all costs to correct the system to the satisfaction of the Engineer. This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA Airport Engineering, Design, & Construction internet page: http://www.faa.gov/airports_airtraffic/airports/construction/.

ITEM	FAA AC 150/
(1) **Constant Current Regulator, L-828,** class, style, and size as indicated on Plans, 60 Hz input, with brightness control for remote operation. Regulator shall be ferroresonant, dry-type with 6.6A output current and front-mounted digital meter.	5345-10
(2) **Runway Edge Light, Bi-directional High-Intensity, L-862,** and Threshold Light, L-862E, with 6.6A halogen lamp, support column, metal frangible coupling with stainless steel hex head set screws, upper plug and cord assembly with separable connector, and stainless steel lens encircling clamp band. Complete with lens coloration, lamp wattage, and specified support column height. Fixtures shall be left and right toe-in as required.	5345-46
(3) **Runway Edge Light, Medium Intensity, L-861,** and Threshold Light, L-861E, with 6.6 A ~~[~~halogen lamp~~][LED]~~ and glass lens, support column, metal frangible coupling with stainless steel hex head set screws, upper plug and cord assembly with separable connector, and stainless steel lens encircling clamp band. Complete with lens coloration, lamp wattage, and specified support column height.	5345-46

(4) **Taxiway Edge Light, Medium Intensity, L-861T**, with 6.6 A ~~[~~halogen lamp~~][LED]~~ and glass lens, support column, metal frangible coupling with stainless steel hex head set screws, upper plug and cord assembly with separable connector, and stainless steel lens encircling clamp band. 5345-46

(5) **Airport Signs, L-858,** internally lighted, Class 2, size, style, and mode as indicated on the Plans, with acrylic panels, LED lamps, and on/off switch with protective cover. Panels shall be smooth and free from aberration with the exception of the panel joints in modular signs. Panel joints shall not interfere with the legibility of the sign. 5345-44

(6) **Airport Signs, L-858,** unlighted. 5345-44

(7) **Airport Light Base, L-867,** transformer housing, Class I, Size B or D, 12 or 16 inches diameter x 24 inches deep, steel one piece light base with internal grounding lug, gasket, steel cover, base extension (where required), drain opening and conduit hubs or openings as indicated. 5345-42

(8) **Airport Light Base, L-867,** watertight, transformer housing, Class II, Size B, 12 inches diameter x 24 inches deep, non-metallic one piece light base made from Type III, ultra-high molecular weight, heavy-wall, high-density polyethylene pipe having a cell classification of 345434C or better according to ASTM D3350. Conduit stubs made of the same material as the light bases shall be sidewall fused to the bases using saddle fittings, or other approved method for a watertight connection. 5345-42

(9) **Airport Light Base, L-868,** transformer housing, Class I, Size B, 12 inches diameter x depth as indicated on the Plans, steel two section light base assembly with grooved and "O" ringed flange ring with concrete ring. Step the top flange of the light base bottom section to fit outside a standard top section. Complete with any necessary spacer rings, internal grounding lug, mud plate, anti-rotational fins and conduit hubs. Light base and cover shall be suitable for vehicle and aircraft wheel loading. 5345-42

(10) **Isolating Transformer, L-830,** individual lamp type, series-to-series, 5000 V, 6.6 A to 6.6 A. 5345-47

(11) **Isolating Transformer, L-830,** individual lamp type, series-to-series, 5000 V, 20 A to 6.6 A, 100 W, 200 W or 300 W. 5345-47

(12) **Radio Control Equipment, L-854,** Type I, Style A, with enclosure for surface mounting, antenna and feedline and field-adjustable frequency set to the Common Traffic Advisory Frequency (CTAF) for the project airport as found in the Alaska Supplement of the U.S. Government Flight Publication. 5345-49

(13) **Flush Taxiway Centerline Light Fixture,** Uni or Bi-Directional, Type L-852C, L-852D, or L-852K, Class 2, Mode 1, Style 3, a flat fixture with 1/4 inch or less clearance above finish surface, with LED lamps, plug and cord assembly, 1/2 inch watertight connector, stainless steel bolts, 2-piece cam-lock washers, "Dry" system with replaceable lens in the optical assembly sealed above and below with "O" rings and without optional arctic heater. 5345-46

(14) **Flush Runway Light Fixture,** Uni or Bi-Directional, Type L-850A or L-850B, Class 2, Mode 1, Style 3, as indicated, with 1/4 inch or less clearance above finish surface, with LED lamps, plug and cord assembly, 1/2-inch watertight

connector, stainless steel bolts, 2-piece cam-lock washers, "Dry" system with replaceable lens in the optical assembly sealed above and below with "O" rings. 5345-46

(15) Primary Handhole, L-868, Class I, Size B, 12 inches diameter x 24 inches deep, steel, one piece with conduit hubs or openings and drain hole as indicated, steel cover and gasket, internal ground lug with connector, and other items as indicated. Handhole and cover shall be suitable for vehicle and aircraft wheel loading. 5345-42

(16) Wind Cone Primary Handhole, L-867, Class I, Size D, 16 inches diameter x 24 inches deep, steel, one piece with conduit hubs or openings and drain hole as indicated, steel cover and gasket, internal ground lug with connector, and other items as indicated. 5345-42

(17) Handhole, L-867, watertight, transformer housing, Class II, Size B, 12 inches diameter x 24 inches deep, non-metallic one piece light base made from Type III, ultra-high molecular weight, heavy wall, high density polyethylene pipe having a cell classification of 345434C or better according to ASTM D3350. A conduit stub made of the same material as the light bases shall be sidewall to ASTM D3350. Conduit stubs made of the same material as the light bases shall be sidewall fused to the bases using saddle fittings, or other approved method for a watertight connection. Complete with ½ inch galvanized steel cover and gasket. 5345-42

(18) Elevated Runway Guard Light, L-804, with LED lamps, support column with adjustable fitting for fixture aiming, metal frangible coupling with stainless steel hex head set screws, heavy baseplate, internal flasher circuitry, and upper plug and cord assembly with separable connector. 5345-46

(19) Flush Guard Light Fixture, Uni Directional, Type L-852G, Class 2, Mode 1, Style 3, a flat fixture with 1/4 or less clearance above finished surface, with LED lamps, internal flasher circuitry, plug and cord assembly, 1/2 inch watertight connector, stainless steel bolts, 2-piece cam-lock washers, “Dry” system with replaceable lens in the optical assembly sealed above and below with “O” rings, and without optional arctic heater. 5345-46

(20) Flush Runway Edge Light Fixture, Bi-Directional, Type L-850C, Class 2, Mode 1, Style 3, as indicated, with 1/4 inch or less clearance above finish surface with 105 W lamps, color filters, plug and cord assembly, 1/2-inch watertight connector, stainless steel bolts, 2-piece cam-lock washers, “Dry” system with replaceable lens in the optical assembly sealed above and below the “O” rings. Fixtures shall be left or right toe-in as required. 5345-46

(21) Spacer Ring, L-867, galvanized steel spacer ring with bolt hole pattern to match light base. 5345-42

(22) Light Base Extension, L-867, Class I, Size B or D, depth as required or indicated, galvanized steel light base extension with bolt hole pattern to match light base. 5345-42

b. Sealer.

(1) Adhesive sealant shall be a self-leveling silicone sealer.

(2) Conduit sealant shall be a two-part, high expansion polyurethane foam duct sealant that is fast setting, easily installed, easily removed and re-enterable. Sealant shall be dispensed with a multi-use, single plunger caulking tube package that automatically mixes the sealant in a correct ratio. Sealant shall create a strong, resilient, chemically resistant seal that is compatible with cable and wire jackets, and will expand, cure, and seal even with water

present. Sealant shall be American Polywater Corporation AFT or FST Foam Sealant, Chemque Q-Pak 2000, or approved equal product.

c. **Transformer Support Platform.** When called for on the Plans, light bases equipped with L-830 type isolating transformers shall, in addition to the other specified items, be provided with 12 inch high non-metallic, fixed height or folding type, transformer support platforms as shown on the Plans.

d. **Power Adapter.** Power adapter, when called for in the plans shall be a series primary to 120 V regulated-voltage power supply suitable for use with a 3-step constant current regulator source. The power adapter shall be oil filled and include two replaceable internal fuses. Power adapter ratings shall be 670 VA at 120 V ac with ± 3% regulation @ 2.8 to 6.6 A primary current.

e. **Regularly Used Commercial Items.** All regularly used commercial items of electrical equipment not covered by FAA equipment specifications shall conform to the applicable NEMA rulings and standards for equipment of its type, be listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Department, and be marked for the intended use.

f. **Lock Washers.** Lock washers shall be two piece cam-type lock washer.

g. **Free Flowing Insulating Material.** Insulating material for filling of light bases shall be an inorganic, non-flammable, free-flowing granular material. The material shall be chemically treated to be hydrophobic. It shall be free of asbestos. The material shall have a density of 40 to 42 lb/ft3, and a load bearing strength of 83 psi.

h. **Lubricant and Sealant.** Lubricant and sealant shall be a general purpose "O"-ring and valve lubricant. Temperature range shall be -40 °F to +400 °F. Anti-seize for use on fixture bolts shall be a marine-grade, metal-free anti-seize compound for wet, corrosive environments and shall be compatible with steel, stainless steel, and aluminum.

i. ~~**Soft** **Gasket.**~~ Soft closed cell foam neoprene gasket to be used with the HDPE L-867 light base. Solid neoprene gasket with a nominal durometer of 55 for the galvanized steel L-867 light base. Gaskets to be installed between the base plate and base ~~shall be soft neoprene~~.

j. **Pedestals.** The power and communications pedestals shall be fiberglass enclosures constructed to meet the requirements of ANCI C 57.12.28 Standard for Pad-mounted Equipment Enclosure Integrity, an attachment to ANSI C 37.72. Construction details and overall dimensions shall be according to the Plans.

k. **Junction Box, Type II.** Junction boxes shall be pre-cast reinforced concrete boxes of the size and details shown on the Plans. Junction boxes shall have metal covers. The covers shall be effectively grounded with a 3-foot copper braid.

l. **Concrete.** Conform to Item P-610 Structural Portland Cement Concrete, 1-inch maximum size coarse aggregate.

m. **Fixture Bolts.** Bolts for securing flush-mounted light fixtures shall be stainless steel, marked grade F593C, fully threaded, and shall be a maximum of 3-1/2 inches long.

n. **Temporary Runway Lighting System.** Temporary lighting shall be portable lighting units meeting the requirements of AC 150/5345-50 or equipment meeting the requirements of this specifications installed in a manner to facilitate temporary use. When cabling is required, use L-824 cabling and L-823 connectors in minimum 1” schedule 40 HDPE conduit.

o. **Drain Rock.** Drain rock shall meet gradation requirements in Table 1, or as otherwise approved by the Engineer.

TABLE 125-1. GRADATION OF DRAIN ROCK

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
2”	100
1-1/2”	95-100
3/4"	0-20
3/8”	0-5

INSTALLATION

125-3.1 GENERAL. All work in connection with the airport lighting system shall be according to the applicable provisions of the current edition of NFPA 70 (National Electrical Code) and all State and local codes. Location of all new fixtures, conduit, cables, etc., shall be as shown on the Plans.

Level and align light fixtures according to manufacturer’s instructions. Level to within 1 degree. Align to within 1/2 inch at right angles to centerline and to within 1 inch parallel to centerline. Light fixtures shall be oriented with the light beams parallel to the runway or taxiway centerline and facing in the required direction.

Where electrical cable or duct is required, such work will be covered under Item L-108 or L-110, as applicable.

Where remote relay assembly and/or remote control panel is required, such work will be covered under item L-109.

Provide all labor, materials, systems, equipment, facilities, and other incidental items as may be required to provide temporary electrical power for construction and testing of all contract work.

Refer to P-610 for requirements regarding all work and materials to place concrete.

Special requirements for providing and maintaining temporary lighting include the following:

- **a.** Install runway, threshold, and taxiway lighting as required with spacing in accordance with AC 150/5340-30.
- **b.** Test temporary lights and system connections prior to their use being required to ensure no delays or service interruptions.
- **c.** Install temporary light units using black sand bags and/or stakes to hold fixtures and conduit in place.
- **d.** On completion of work, remove temporary equipment, repair any damaged light units and turn over all units to the Department.
- **e.** Where hardwired lighting equipment is utilized:
  - **(1)** Connect temporary lighting to existing lighting circuits served from the existing regulator and lighting controls.
  - **(2)** Use HDPE conduit to provide appropriate physical cable protection.
  - **(3)** Remove HDPE conduit from around cable and dispose of upon completion of use.
  - **(4)** Reinstall used cabling on metallic cable drums and turn over to the Department for future use.
  - **(5)** At the Contractor’s option, cabling may be assembled in the field or by the manufacturer. Each section along the runway edges shall be 200 feet minimum in length.
- **f.** Maintain temporary lighting system and existing lights used as part of the temporary lighting system in good repair to keep the system in working condition. Relocate temporary lights and circuits and adjust circuit connections and configuration as required as construction progresses.

125-3.2 INSTALLATION OF NON-WATERTIGHT EDGE LIGHTS. The light base shall be placed on a layer of bedding material of minus 1/4 inch material that is not less than 6 inches in depth. Bedding material shall be, sand, gravel, crushed aggregate, or other suitable material containing no organic, frozen, or other deleterious material. Where called for on the Plans, install drain rock below light base in lieu of bedding material. Compact drain rock to the satisfaction of the Engineer. If the light base is placed in the structural section (P-154, P-207, P-209) of a pavement such as for a runway or taxiway, the Contractor shall construct the backfill according to the specifications for the material in which the light base is placed. The material shall be compacted to the requirements of the material into which it is placed. The light base shall be placed at an elevation that will place the frangible break point below finished grade as indicated on the Plans. The base shall be level to within ±1/4 inch.

Connect the isolating transformer with L-823 connector kits and heat shrink tubing. Ensure that all field installed primary cable connectors have the plug pin connectors and receptacle socket connectors properly positioned within their respective connector bodies, as detailed by the connector manufacturer, prior to the shrinking of heat shrink tubing at the cable-connector interface.

Install isolating transformers in the light bases as shown on the Plans. Where called for on the Plans, install isolating transformers in all light bases by placing on top of an approved transformer supporting platform as specified. Train all connections to the isolating transformer to lay in the upper section of the light base, above the transformer platform and below the cover flange, as shown on the Plans. Provide adequate primary and secondary cable slack in each light base to assure that all connectors can be grouped and trained in the upper section of the light base without subjecting the connector to tension.

Install the light fixtures with stainless steel hardware and coat the bolts and frangible couplings with a suitable corrosion inhibitor prior to being installed. Install the light fixtures with lamp, clean the lenses, align and adjust each optical system according to the manufacturer's instructions.

125-3.3 INSTALLATION OF FLUSH LIGHTS. Install flush light fixtures according to the Plans and specifications.

A jig or holding device shall be used when installing each light fixture to ensure positioning to the proper elevation, alignment, level control, and azimuth control. Surplus PCC shall be removed. The holding device shall remain in place until PCC has reached its initial set.

Install flush runway and taxiway light fixtures in existing pavement after the old pavement has been cold planed, and before the new asphalt is placed. Install flush taxiway and runway light fixtures on new runways or taxiways before the first asphalt lift.

Core remaining asphalt or base course at the light base locations a minimum diameter of 36 inches and remove the base course material to the depth shown. Compact the bottom of the cored hole before pouring concrete.

Use a setting jig to install the bottom section of the light base assembly, as shown in the Plans. The bottom of the light base shall be at least 12 inches above the bottom of the excavation. Provide no more than 4 threaded hubs for the bottom section of the light base, as shown on the Plans. Connect the bottom section of the light bases to the conduit system, using rubber grommets or waterproof nipples and couplings.

Call for inspection of the light base assembly prior to the backfilling of the excavations. Backfill with poured PCC meeting the requirements of Item P-610. Fill the excavation only to the level shown.

After the PCC has cured at least 72 hours or as approved by the Engineer, apply tack coat and overlay with Asphalt Concrete Pavement.

Plug the conduit ends during the course of construction to prevent accumulation of water or debris in the conduit.

When ready to install the inset lights, determine the location of the light base and drill a small diameter core hole to locate the center of the mud plate. Next, drill a 16 inch diameter core hole over the center of the mud plate (± 1/4 inch). Use a coring machine of adequate stability to prevent "wobble". After removing the core, mud plate, plywood cover, and any water or debris that has accumulated, apply a thin layer of self-leveling silicone sealer between the bottom flange of the top section and the top flange of the bottom section and bolt the top section using 18-8, 410, or 416 stainless steel all-thread bolts. Coat the bolts with a suitable corrosion inhibitor prior to installing. Use two-piece cam-type lock washers and torque the bolts to 180 inch-pounds or as recommended by the manufacturer.

Make a "dry system" light fixture installation, using a grooved flange ring, "O" ring, and concrete ring. If the actual elevation of the pavement overlay does not equal the estimated elevation, provide spacer rings or flange rings of different thickness. Bolt the fixture to the top section using 410 stainless steel bolts. Coat the bolts with a suitable corrosion inhibitor prior to installing. Use two piece cam-type lock washers, and torque the bolts to 350 inch-pounds, or as recommended by the manufacturer. Bolts that are removed after having been torqued to the full recommended torque are no longer acceptable for use and shall be discarded and replaced, including the associated lock washers. Set the outboard edge of the fixture 1/8 inch (+/- 1/16 inch) below the adjacent finished pavement measured at the downslope side.

Install the light fixtures per the Plans and the specifications and the manufacturers recommended procedure. Do not deviate from these procedures, or the materials shown or specified, without the prior approval of the Engineer.

125-3.4 INSTALLATION OF WATERTIGHT EDGE LIGHTS. Place the light base on a layer of bedding material that is not less than 6 inches in depth and backfill around the lighting base with bedding material,. Use bedding material that meets requirements for the applicable lift of material (P-152, P-154, P-299, P-209) except that 100% of the bedding material will pass a 1-inch sieve.

Test the base assemblies, saddle fittings, and plastic duct as a complete system or in sections to insure that it is watertight. If a pneumatic test is performed to meet this requirement, the minimum pressure shall be 5 psi for a minimum of 10 minutes.

Base assemblies shall be sealed watertight and conduit openings and any holes shall be caulked with approved sealant to prevent any water from entering the base assemblies. When called for on the Plans, after the connection of the isolating transformer with L-823 connector kits the light bases shall be completely filled with free flowing insulating material.

The light base assemblies shall be sealed watertight using the following method and materials or approved equal:

a. Spot weld the weep hole in the bottom of the base plate hub, if present.

b. Apply conduit sealant to all conduit openings, with the sealant applied on all sides and between cables to fully seal annular and interstitial spaces.

c. To insure that no water leaks into the can, use a soft neoprene gasket under the base plate. The gasket shall be covered on both sides with a generous coating of lubricant and sealant to prevent water seepage during freeze-thaw cycles.

d. Install seal washers with stainless steel cups under the bolt heads. The torque on the six bolts should be approximately 25 plus or minus 5 inch-pounds. A torque wrench must be used.

e. After installation of the base plate, plug in the edge light. Using clear adhesive sealant, coat the threads of the frangible coupling and screw into place. Plug the weep hole with adhesive sealant.

Put adhesive sealant around the bottom of the frangible coupling at the junction with the base plate.

f. Install the edge light stem securely. Then, using more adhesive sealant, fill the space between the edge light stem and the inside diameter of the frangible coupling. Install the light fixtures with lamp, clean the lenses, align and adjust each optical system according to the manufacturer's instructions.

125-3.5 TESTING. All lights shall be fully tested by continuous operation for not less than 24 hours as a completed system prior to acceptance. The test shall include operating the constant current regulator in each step not less than 10 times at the beginning and end of the 24-hour test. The fixtures shall illuminate properly during each portion of the test.

125-3.6 SHIPPING AND STORAGE. Equipment shall be shipped in suitable packing material to prevent damage during shipping. Store and maintain equipment and materials in areas protected from weather and physical damage. Any equipment and materials, in the opinion of the Engineer, damaged during construction or storage shall be replaced by the Contractor at no additional cost to the owner. Painted or galvanized surfaces that are damaged shall be repaired in accordance with the manufacturer's recommendations.

125-3.7 INSPECTION. Notify the Engineer in writing and request inspection at least 48 hours prior to installing lighting fixtures, making any splices, or covering any buried or concealed work. Immediately correct any deficiencies found during the inspection.

125-3.8 RECORD DOCUMENTS. Maintain at the project site a complete set of contract Plans, specifications and approved changes thereto. In addition to the above, 2 complete sets of electrical plans shall be maintained for as-built purposes upon which all changes, connections, part numbers and conductor routings shall be legibly shown and noted. Where changes to Plans are involved, make notations to show the dates and authorities approving the changes. Permanently store one set of annotated electrical plans in a dry, secure location at the project site. Deliver the second set to the Engineer.

As-built plans shall show locations of all buried items such as conduit, including any existing active lines encountered. All dimensions shall be from runway and taxiway centerlines or other permanent objects. As-built plans shall include complete wiring diagrams, (both power and control), identifying terminals, cables, and connections. As-built plans shall be kept current as the work progresses.

125-3.9 GUARANTEE. Furnish a written guarantee that any materials or workmanship found defective within one year of final acceptance shall be replaced at no additional cost to the Department, promptly upon notification and to the satisfaction of the Engineer Lighted Airport Signs shall be guaranteed for a period of at least two years, LED light fixtures shall be guaranteed for a period of at least four years.

125-3.10 SPARE PARTS. Provide a quantity of spare light fixtures, transformers, and other components equal to 10 percent (rounded down) of the installed quantity of each type and size of fixture and transformer (runway and taxiway lighting) and LED light bar, power supply, and transformer (signs), but not less than one of each size or type. Spare parts for other categories are specified in sections L-101 and L-107. Deliver spare parts to airport maintenance as directed by the Engineer. Spare parts shall be divided into airport visual aid categories as follows:

a. Runway and taxiway elevated edge lighting system
~~**b.** Runway and taxiway in-pavement lighting system~~
~~**c.** Runway elevated and in-pavement guard lighting system~~
~~**d.**~~**b.** Illuminated runway and taxiway signs.
~~**e.**~~**c.** Rotating beacons.
~~**f.**~~**d.** Wind cones.

METHOD OF MEASUREMENT

125-4.1 LUMP SUM. No measurement of quantities will be made.

125-4.2 UNIT PRICES. The quantity to be paid for will be the number of units installed, complete, in place, accepted, and ready for operation, or the number of units acceptably removed.

125-4.3 CONTINGENT SUM. For spare parts, the total cost of spare parts for each airport visual aid category listed above shall not exceed $10,000 or 10% of the cost of the visual aid, per FAA regulations. If necessary, reduce the quantity of each spare part within a category equally until the costs are at or below the $10,000 or 10% limit. Maintain a minimum of one of each size and type of spare part.

BASIS OF PAYMENT

125-5.1 ITEMS OF WORK PAID IN OTHER SECTIONS. All work and materials required to install cable, conduit, and ground rods is paid for under Items L-108, and L-110.

All work and materials required to install remote relay assembly and remote control panel are paid for under item L-109.

All bedding, backfill, and drain rock around and below light bases and handholes is subsidiary to the light fixture or handhole installation and no separate measurement or payment will be made.

125-5.2 ITEMS OF WORK PAID IN THIS SECTION. At the contract lump sum, contingent sum, or unit prices for the completed and accepted job. This payment will be full compensation for furnishing all materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools and incidentals necessary to complete this item.

Refer to Item P-610 for requirements regarding all work and materials to place Portland cement concrete. Portland cement concrete is subsidiary to L-125 items requiring its use.

Item L125.010.0000, Airport Lighting: Includes all work required under this item to provide the complete airport lighting system, except work listed above which is paid for under other items.

Item L125.020.0000, Regulator, L-828: Includes mounting and electrical connection (with all input control and output circuits). Size as indicated on Plans.

Item L125.025.0000, High Intensity Runway Edge and Threshold Light, L-862 and L-862E: Includes L-867 base assembly, grounding lug and connector, baseplate with ground lug, gasket, support column, frangible coupling, L-830 isolating transformer, transformer mounting platform (when shown on Plans), and L-823 cable connectors.

Item L125.030.0000, Medium Intensity Runway Edge and Threshold Light, L-861 and L-861SE: Includes L-867 base assembly, drain rock, filter fabric, spacer rings, grounding lug and connector, baseplate with ground lug, gasket, support column, frangible coupling, L-830 isolating transformer, transformer mounting platform (when shown on Plans), ~~and~~ L-823 cable connectors, and marker cone.

Item L125.040.0000, Taxiway Edge Light, L-861T: Includes L-867 base assembly, drain rock, filter fabric, spacer rings, grounding lug and connector, baseplate with ground lug, gasket, support column, frangible coupling, L-830 isolating transformer, transformer mounting platform (when shown on Plans), ~~and~~ L-823 cable connectors, and marker cone.

Item L125.050.0000, Wind Cone Handhole, L-867, Size D: Includes steel cover and gasket, grounding lug and connector, L-823 primary and secondary cable connectors, and PA-4 power adapter (when specified on the Plans).

Item L125.060.0000, Primary Handhole, L-868, Size B: Includes traffic rated steel cover and gasket, grounding lug and connector.

Item L125.070.0000, Remove Runway and Taxiway Light: Includes removal of fixtures, transformers, bases, and other associated materials as shown or directed in the Plans.

Item L125.080.0000, Flush Runway Centerline Light, L-850A or L-850B: Includes L-868 base assembly, spacer rings, flange ring, L-830 isolating transformer, L-823 cable connectors, concrete work, asphalt patching and sealing.

Item L125.090.0000, Flush Taxiway Light, L-852C, L-852D, L-852G, or L-852K: Includes L-868 base assembly, spacer rings, flange ring, L-830 isolating transformer, L-823 cable connectors, concrete work, asphalt patching and sealing.

Item L125.100.0000, Flush Runway Edge Light, L-850C: Includes L-868 base assembly, spacer rings, flange ring, L-830 isolating transformer, L-823 cable connectors, concrete work, asphalt patching and sealing.

Item L125.110.0000, Relocate Airport Sign, Type L-858: Includes L-867 base, frangible couplings, transformer, concrete base, and sign faces as shown.

Item L125.120.0000, Runway Guard Light, L-804: Includes L-867 base assembly, spacer rings, grounding lug, gasket, support column, frangible coupling, heavy baseplate with ground lug, L-830 isolating transformer, and L-823 cable connectors.
Item L125.130.0000, Airport Sign, Type L-858: Includes sign, L-867 base, frangible couplings, transformer, concrete base, sign faces as shown, and subsidiary removal of existing sign and foundation (where required).

Item L125.140.0000, Power or Communications Pedestal: Includes anchor stake and conduits as shown.

Item L125.150.0000, Handhole, L-867, Size B: Includes grounding lug, steel cover, and gasket.

Item L125.160.0000, Junction Box, Type II.

Item L125.170.0000. Spare Parts: Includes spare light fixtures, transformers, and sign power supplies and light bars to be paid by actual invoiced material and deliver cost, plus 15 percent markup. Include rotating beacon and wind cone spare parts specified in sections L-101 and L-107.

Item L125.180.0000, Temporary Runway Lighting System: Includes temporary lights, all HDPE conduit, assemblies, adapters, couplings, transformers, L-823 cable connectors, cables, and all necessary incidentals to provide and maintain a complete, operable, and acceptable temporary lighting system installation. Includes installation, ongoing maintenance and relocations as required, and removal of temporary equipment.

Payment will be made under:

Item L125.020.0000 Regulator, L-828 – per each
Item L125.025.0000 High Intensity Runway Edge and Threshold Light, L-862 and L-862E – per each
Item L125.030.0000 Medium Intensity Runway Edge and Threshold Light, L-861 and L-861E – per each
Item L125.040.0000 Taxiway Edge Light, L-861T – per each
Item L125.070.0000 Remove Runway and Taxiway Light – per each
Item L125.150.0000 Handhole, L-867, Size B – per each
Item L125.170.0000 Spare Parts – per contingent sum
Item L125.180.0000 Temporary Runway Lighting System – per lump sum

MATERIAL REQUIREMENTS

AC 150/5345-10	*Constant Current Regulators and Regulator Monitors*
AC 150/5345-42	*Airport Light Bases, Transformer Houses, Junction Boxes and Accessories*
AC 150/5345-44	*Taxiway and Runway Signs*
AC 150/5345-46	*Runway and Taxiway Light Fixtures*
AC 150/5345-47	*Isolation Transformers for Airport Lighting Systems*
AC 150/5345-49	*L-854, Radio Control Equipment*
AC 150/5345-53	*Airport Lighting Equipment Certification Program*
ATM 207	Moisture-Density Relationship of Soils

ITEM P-151 CLEARING AND GRUBBING

DESCRIPTION

151-1.1 This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the Plans or as required by the Engineer.

Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

Selective tree removal requires the hand cutting (topping) of all types of trees either by chain saw or by other approved conventional hand clearing methods. Dispose of the tree in the same manner as clearing and grubbing spoil materials.

CONSTRUCTION METHODS

151-2.1 GENERAL. The areas to be cleared or cleared and grubbed shall be staked or otherwise marked on the ground at the direction of the Engineer. The Engineer will flag or mark each tree designated for selective tree removal. The clearing and grubbing shall be done far enough ahead of the earthwork operation to permit cross-sectioning prior to excavation or embankment. Mechanical brush cutting equipment may be used for clearing. Dozers or other mechanical equipment not specifically designed for brush cutting may not be used.

Vegetation clearing will follow the USFWS Recommended Time Periods for Avoiding Vegetation Clearing in Alaska in order to protect Migratory Birds unless the USFWS has been consulted to determine the most appropriate method to avoid impacts to nesting birds.

Debris from mechanical brush cutting equipment less than 4 feet long by 4 inches in diameter may remain in place outside of Runway and Taxiway Safety Area surfaces except as specified in areas to be embanked. All other spoil materials generated by clearing or by clearing and grubbing shall be disposed of by burning, when permitted by local laws, or by removal to approved disposal areas. When burning of material is permitted, it shall be burned under the constant care of competent watchmen so that the surrounding vegetation and other adjacent property will not be jeopardized. Burning shall be done according to all applicable laws, ordinances, and regulations. Before starting any burning operations, the Contractor shall notify the agency having jurisdiction.

As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed according to requirements for formation of embankments. Any broken concrete or masonry which cannot be used in construction, and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits, the Contractor shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

If the Plans or the Specifications require the saving of merchantable timber, the Contractor shall trim the limbs and tops from designated trees, saw them into suitable lengths, and make the material available for removal by others.

Perform blasting in accordance with all Federal, state, and local safety regulations. Submit notice 15 days prior to starting work. Submit a Blasting Plan, prepared and sealed by a registered professional Engineer that includes calculations for overpressure and debris hazard. Obtain written approval prior to performing any blasting and notify the Engineer 24 hours prior to blasting. Include provisions for storing, handling and transporting explosives as well as for the blasting operations in the plan. The Contractor is responsible for damage caused by blasting operations.

The Contractor shall remove existing structure and utilities that are identified to be removed or demolished, except when another entity is identified in the Contract to accomplish the work.

151-2.2 CLEARING. The Contractor shall clear the staked or indicated area of all objectionable materials. Trees unavoidably falling outside the specified limits must be cut up, removed, and disposed of in a satisfactory manner. In order to minimize damage to trees that are to be left standing, trees shall be felled toward the center of area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut flush with the original ground surface. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of when directed by the Engineer. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a designated location if the fence is to remain the property of a local owner.

151-2.3 CLEARING AND GRUBBING. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 4 feet in depth are to be made in areas that are not subject to aircraft or vehicle traffic loadings and are unpaved. For embankments that are greater than 4 feet in depth, which are not subject to aircraft or vehicle traffic loadings and are unpaved, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1.5 inches in diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the Plans to be removed shall be demolished or removed, and all materials therefrom shall be disposed of either by burning or otherwise removed from the site. The cost is incidental to this item. The remaining or existing foundations, wells, cesspools, and all like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material which cannot be used in backfill shall be removed and disposed of at the Contractor's expense. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with suitable material, moistened and properly compacted in layers to the density required in Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

METHOD OF MEASUREMENT

151-4.1 Measure according to GCP Section 90 and the following:

a. Acre. The area acceptably cleared, or cleared and grubbed, measured on the ground surface. Only areas shown on the Plans, or areas cleared at the Engineer's direction will be measured. Islands

of existing cleared areas, such as lakes, ponds, existing stream beds, and roads and trails within the clearing limits of more than 60 square yards will not be included as pay areas.

b. Each. The number of designated trees acceptably removed, regardless of size.

c. Lump Sum. Lump sum items will not be measured for payment.

BASIS OF PAYMENT

151-5.1 At the contract lump sum or unit price, for each of the pay items listed below that are shown in the bid schedule.

Payment will be made under:

Item P151.030.0000 Clearing & Grubbing – per acre

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

152-1.1 This item consists of excavation, hauling, embankment (or waste disposal), placement, grading and compaction of all materials required to construct runway safety areas, taxiway safety areas, runways, taxiways, aprons, drainage, buildings, roadways, parking, and other work. Construct according to the specifications, and conform to the dimensions and typical sections shown on the Plans.

Ditch linear grading shall consist of the final shaping of designated ditches and slopes for drainage by grading with a small dozer, motor grader, or other suitable means approved by the Engineer.

MATERIALS

152-2.1 MATERIAL DEFINITIONS. The Contract will designate material to be removed from within the project lines and grades as classified excavation (common, rock or muck) or as unclassified excavation. Material obtained from outside the project lines and grades is borrow.

All material shall be described as defined below, but no quantity of material shall be defined or paid in more than one category:

a. **Unclassified Excavation.** All material, regardless of its nature, which is not paid for under another contract item. May include common, rock or muck.

b. **Common Excavation.** Suitable material such as silt, sand, gravel, and granular material that does not require blasting or ripping. Not rock or muck.

c. **Rock Excavation.** Rock that cannot be excavated without blasting or ripping, and boulders containing a volume of more than 0.5 cubic yard.

d. **Muck Excavation.** Soil, organic matter, and other material not suitable for embankment or foundation material, including material that will decay or produce subsidence in the embankment such as stumps, roots, logs, humus, or peat.

e. **Drainage Excavation.** Excavation made for the primary purpose of controlling drainage including: intercepting, inlet or outlet ditches; temporary levee construction; or any other type as shown on the Plans.

f. **Borrow.** Suitable material that is required for the construction of embankment or for other portions of the work. Borrow material shall be obtained from sources within the limits of the airport property but outside the project lines and grades, or from sources outside the airport property.

g. **Foundation Soil.** In-situ soil or undisturbed ground.

h. **Ditch Lining.** Use crushed or naturally occurring stones that are sound and durable, are not larger than 8 inches in greatest dimension, and containing not more than 50% by weight passing a 3-inch sieve and not more than 5% by weight passing the 1-inch sieve as determined by ATM 304, or as accepted by the Engineer.

152-2.2 UNSUITABLE MATERIAL. Material that does not meet the testing requirement for suitable material. Material containing vegetable or organic matter, such as muck, peat, organic silt, or sod is considered unsuitable for use in embankment construction. Material that is contaminated by hazardous substances, including fuel or oil, in greater quantity than state and federal standards allow is considered unsuitable for use.

152-2.3 SUITABLE MATERIAL. Suitable material may be obtained from classified excavation, unclassified excavation, or borrow. The Engineer will approve material as "suitable" for use in embankment when the material meets the following criteria:

a. Sand, rock, gravel, silt, concrete, asphalt pavement, and other inorganic material;

b. Gradation of 100% by weight passing 6 inch screen; and

c. Meets definition of Non-Frost Susceptible in GCP Subsection 10-03, except delete "6%" and replace with "10%" (passing No. 200 screen).

The Engineer may, in their discretion, approve oversize material as "suitable" for use in embankment when the material meets the following criteria:

a. Sand, rock, gravel, silt, concrete, asphalt pavement, and other inorganic material;

b. Gradation of 100% by weight passing 24-inch screen;

c. Meets definition of Non-Frost Susceptible in GCP Subsection 10-03, except delete "6%" and replace with "10%" (passing No. 200 screen); and

d. Rock is well graded with an even distribution of rock sizes, and can be compacted with a minimal amount of voids.

152-2.4 POROUS BACKFILL MATERIAL. Gravel consisting of crushed or naturally occurring granular material containing not more than 1% clay lumps or other readily decomposed material (AASHTO T 112). Meet the grading requirements of Table 152-1 (ATM 304).

TABLE 152-1 (ATM 304)
AGGREGATE GRADATION FOR POROUS BACKFILL MATERIAL

Sieve designation (Square opening)	Percentage by weight passing sieves
3 inch	100
1 inch	0-10
No. 200	0-5

CONSTRUCTION METHODS

152-3.1 GENERAL. Perform all necessary clearing and grubbing in accordance with Item P-151, and construction surveying in accordance with Item G-135, including staking of lines and grades, prior to beginning excavation, grading, and embankment operations in any area.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. Material with organics, when approved by the Engineer as suitable to support vegetation, may be used on top of the embankment slope.

Unsuitable material shall be disposed of in waste areas shown on the Plans or in locations acceptable to the Engineer. Material contaminated by hazardous substances shall require special handling and disposal, performed according to GCP Subsection 70-11.f. and using methods acceptable to the Engineer.

a. Waste Areas. All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the Plans or approved by the Engineer. Unsuitable material shall not be left in windrows or piles, and shall not extend into the Obstacle-Free Zone as shown on the ~~plans~~Plans.

All waste areas shall be protected from erosion according to the SWPPP. Areas where seeding is called for, in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of 4 inches, in order to loosen and pulverize the soil.

The Contractor shall obtain all permits required for placing waste in areas they choose, and which are not covered by Department obtained permits. When the Contractor is required to locate a disposal area outside the airport property limits at his/her own expense, he shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

b. Utility Work. Utility work shall be performed, and compensation claims for utility work made, according to GCP Subsection 50-06. If it is necessary to work through or around existing utilities or associated structures, the Contractor shall be responsible for and shall take all necessary precautions to preserve the utilities or provide temporary services. When utilities not shown on the Plans are encountered, the Contractor shall immediately notify the Engineer, and the Engineer will determine the disposition of the utility. The Contractor shall, at no additional cost to the Department, satisfactorily repair or pay the cost of all damage to utilities or associated structures which may result from any of the Contractor's operations.

152-3.2 EXCAVATION. No excavation shall be started until the Contractor has construction surveyed the work, including staking the lines and grades, and the Engineer has reviewed stakes, elevations and measurements of the ground surface. As required in GCP Subsection 40-04, all Useable Excavation of suitable material shall be used in the formation of embankment or for other purposes shown on the Plans. All unsuitable material shall be disposed of in waste areas as shown on the Plans or as directed by the Engineer.

When the volume of the Useable Excavation exceeds that required to construct the embankments to the grades indicated, the excess material shall be used to grade the areas of ultimate development or disposed of as directed. When the volume of Useable Excavation is not sufficient for constructing the fill to the grades indicated, borrow shall be used to make up the deficiency.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work. All temporary drains and drainage ditches shall be constructed and maintained according to the SWPPP.

In cuts, all loose or protruding rocks on the back slopes shall be scaled or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the Plans or as directed by the Engineer.

a. Selective Grading. When selective grading is required, the more suitable material as designated by the Engineer shall be used in constructing the upper layers of the embankment or pavement structure. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas.

b. Undercutting. Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for runways, taxiways, safety areas, subgrades, roads, shoulders, or any areas intended for turfing shall be excavated to a minimum depth of 12 inches below the subgrade, or to the depth directed by the Engineer. Muck, peat, matted roots, or other yielding material that is unsatisfactory for foundation soil compaction, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the Plans. The excavated area shall be backfilled with suitable material, obtained from the grading operations or borrow areas and thoroughly compacted as specified. Where rock cuts are made and backfilled with suitable material. Any pockets created in the rock surface shall be drained according to the details shown on the Plans. The material removed will be paid as P152.010.0000 Unclassified Excavation.

c. **Overbreak.** Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work, as planned or authorized by the Engineer. All overbreak shall be graded or removed by the Contractor and disposed of as directed by the Engineer. Payment will not be made for the removal and disposal of overbreak which the Engineer determines as avoidable. Unavoidable overbreak will be paid as P152.010.0000 Unclassified Excavation.

d. **Removal of Structures and Utilities.** The Contractor shall accomplish the removal of existing structures and utilities that are specified to be removed or demolished, except when another entity is identified in the Contract to accomplish the work. All existing structural foundations shall be excavated and removed to a depth at least 2 feet below the top of subgrade or as indicated on the Plans, and the material disposed of as directed. Holes left after removing foundations shall be backfilled with suitable material and compacted as specified. The material will be paid as P152.010.0000 Unclassified Excavation.

e. **Foundation Soil Compaction Requirements.** In areas of excavation, the top 6 inches of foundation soil under areas serving aircraft or vehicle traffic loadings shall be compacted to a density of not less than 95% of the maximum density as determined by ATM 207, ATM 212, or ATM 309. The in-place field density and moisture content shall be determined according to ATM 213. As an alternative, the Engineer may direct the use of a control strip in accordance with ATM 309 to determine a density standard. Material shall be compacted to a density of not less than 95% of the density standard.

Compaction of the foundation soil is a subsidiary cost to excavation.

The Engineer may direct the Contractor to over excavate foundation soil that is soft or compresses excessively, and to backfill excavation with compacted suitable material. The material will be paid as P152.010.0000 Unclassified Excavation.

f. **Blasting.** Blasting will be permitted only when proper precautions are taken for the safety of all persons, the work, and the property. The Contractor is responsible for blasting operations including the requirements of GCP Subsection 70-10. All damage done to the work or property shall be repaired at the Contractor's expense. All operations of the Contractor in connection with the transportation, storage, and use of explosives shall conform to all federal, state, local regulations, explosive manufacturers' instructions, and approved permits.

The Contractor shall submit a Safety Plan that includes descriptions of road and runway closures, warning signals; and ~~plans~~ Plans for notification of affected local, state, and federal agencies, the airport manager, and other interested parties. Discuss in the Safety Plan methods for protection of life and health, public and private property, new work or existing work on the project, nearby structures, wetlands, waters and wildlife. When working within airport property include an emergency response contingency to clear runways of debris, to repair damaged navigational or visual aids; and get a NOTAM before blasting. Hold a safety meeting prior to commencement of blasting operations to address safety issues.

In each distinct blasting area the Contractor shall submit a blasting plan, prepared by a qualified blaster, to the Engineer. This plan must consist of hole size, depth, spacing, burden, type of explosives, type of delay sequence, maximum amount of explosive on any one delay period, depth of rock, and depth of overburden if any. The maximum explosive charge weights per delay included in the plan shall not be increased without submitting a revised blasting plan to the Engineer.

When blasting, the Safety Plan and the Blasting Plan shall conform to FAA Order 7400.2 *Procedures for Handling Airspace Matters*, Chapter 27, and AC 150/5370-2 *Operational Safety on Airports During Construction*.

The Contractor shall keep a record of each blast fired, its date, time, and location; the amount of explosives used, maximum explosive charge weight per delay period, and, where necessary,

seismograph records identified by instrument number and location. These records shall be made available daily to the Engineer.

The Engineer will keep the submitted ~~plans~~ Plans and records, and has authority to review and reject ~~plans~~Plans.

152-3.3 BORROW SOURCES. Borrow sources within the airport property if available will be identified on the Plans. Excavation of borrow on airport property shall be made only at these identified locations and within the lines and grades staked.

Borrow sources outside of airport property may be identified in the Contract according to GCP Subsection 60-02. The Contractor shall furnish additional borrow sources if necessary.

Removal of overburden and waste material, permit costs, mineral royalties, and other costs of material source development are subsidiary and shall be included in the unit price for borrow.

152-3.4 DRAINAGE EXCAVATION. Drainage excavation for intercepting, inlet or outlet drains; for temporary levee construction; or for any other type as designed or as shown on the Plans. The work shall be performed in the proper sequence with the other construction and according to the SWPPP. All suitable material shall be placed in embankment fills; unsuitable material shall be placed in waste areas or as directed by the Engineer. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All necessary work shall be performed to secure a finish true to line, elevation, and cross section.

The Contractor shall maintain ditches constructed on the project to the required cross section and shall keep them free of debris or obstructions until the project is accepted.

Place and spread ditch lining materials so that the finished face is uniform and conforms to the lines and slope shown on the Plans or as directed.

152-3.5 PREPARATION OF EMBANKMENT AREA. In areas of Clearing and Grubbing, completely break up the subgrade by plowing or scarifying to a minimum depth of 6 inches. Where an embankment is to be constructed to a height of 4 feet or less, or where the embankment supports asphalt or concrete paving, compact the subgrade as indicated in Subsection 152-3.2e. Where the height of fill is greater than 4 feet and the embankment does not support asphalt or concrete paving, compact the subgrade to the density of the surrounding ground before construction of embankment.

When new embankment is placed on slopes steeper than 4:1, the existing ground shall be continuously benched over the areas as the work is brought up in layers. Benching shall be of sufficient width to permit placing of material and compacting operations. Each horizontal cut shall begin at the intersection of the original ground and the vertical side of the previous bench. Material thus cut out and deemed suitable shall be blended and incorporated into the new embankment.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-3.6 FORMATION OF EMBANKMENTS. Embankments shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross section, unless otherwise approved by the Engineer.

The grading and compaction operations shall be conducted, and the various soil strata shall be placed, to produce an embankment as shown on the typical cross section or as directed by the Engineer. Materials such as brush, hedge, roots, stumps, grass and other unsuitable material, shall not be incorporated or buried in the embankment.

a. **Suspension of Operations.** Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, moisture content or other unsatisfactory conditions of the field. Frozen material shall not be placed in the embankment nor

shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.

b. Soft Foundations. When embankments are to be constructed across wet or swampy ground, which will not support the weight of heavy hauling and spreading equipment, the Contractor shall use methods of embankment construction, and use hauling and spreading equipment, that will least disturb the soft foundation (defined as having a California Bearing Ratio less than 3). When soft foundations are encountered, and when approved by the Engineer, the lower part of the fill may be constructed by dumping and spreading successive vehicle loads in a uniformly distributed layer of a thickness not greater than that necessary to support the vehicle while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified. The Contractor shall not be required to compact the soft foundation, and at the Engineer's option, may not be required to clear and grub.

c. Moisture. The material in the layer being placed shall be within ±2% of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve a uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be performed when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Watering of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times.

d. Compaction. Rolling operations shall be continued until the embankment is compacted to not less than 95% of maximum density as determined by ATM 207 or ATM 212. Under all areas serving aircraft or vehicle traffic loadings, the embankment shall be compacted to a density of not less than 98% of the maximum density as determined by ATM 207 or ATM 212. The in-place field density and moisture content shall be determined according ATM 213~~202~~. As an alternative, the Engineer may direct the use of a control strip in accordance with ATM 309 to determine a density standard. Material shall be compacted to a density of not less than 95% of the density standard.

Keep dumping and rolling areas separate. Do not cover any layer by another until the proper density is obtained.

During construction of the embankment, the Contractor shall route their equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill and progress in layers approximately parallel to the finished pavement grade line. Stones or fragmentary rock larger than 3 inches in their greatest dimensions will not be allowed in the top 6 inches of the embankment.

e. Oversize Material. At the Engineer's discretion and direction, the Contractor may use oversize material or rockfill, as defined in Subsection 152-2.3, in the embankment. Place material in layers up to 2 feet thick. Fill voids with finer material. Level and smooth each layer with suitable leveling equipment. Use compaction equipment and construction methods that can form a dense, well-compacted embankment. Do not use oversize material within 4 feet of the top of finished subgrade.

Rock or boulders larger than 2 feet in thickness shall both be disposed of outside the excavation or embankment areas, in places and in the manner designated by the Engineer; or they may be crushed to less than 2 feet thickness and used in the embankment.

f. **Subsidiary Costs.** Excavation and embankment is a single pay item; there will be no separate measurement or payment. The costs for material source development, blasting, excavation, hauling, placing in layers, compacting, disking, watering, mixing, sloping, grading, and other necessary operations for construction of embankments, are subsidiary and shall be included in the contract unit prices for excavation, borrow, or other pay items.

g. **Frozen Material.** Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material, unless this construction method is identified in the special provisions, or is part of a Contractor's Progress Schedule that the Engineer has approved.

152-3.7 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed, the full width shall be conditioned by removing any soft or other unstable material that will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to finish subgrade elevation with suitable material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade, whose top is shaped to the lines and grades shown on the Plans.

Grading of the top of subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. The Contractor shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts, ponds or rough places that develop in a completed subgrade shall be repaired, smoothed and recompacted before another layer is placed on top of the subgrade.

No subbase, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer. Erosion and sediment control shall be done according to the SWPPP. Work described in this subsection is subsidiary and shall be included in the contract unit prices.

152-3.8 AREA GRADING. Grading with a smaller dozer, motor grader or other suitable means approved by the Engineer to roughly even existing grades prior to placement of permanent work and to re-establish drainage in areas identified in the Plans whose grading is not required by other work. Final Area Grading limits to be determined by the Engineer.

152-~~3.8~~ 3.9 TOLERANCES. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 12-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2-inch, or shall not be more than 0.05-foot from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by watering and rolling.

On Runway Safety Areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10-foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-~~3.9~~ 3.10 TOPSOIL. When topsoil is specified or required as shown on the ~~plans~~ Plans or under Item T-905, it may be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. The material may be stockpiled at approved locations in conformance with the CSPP.

Upon completion of grading operations, topsoil shall be handled and placed as directed, or as required in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-4.1 The quantity of unclassified excavation, common excavation, rock excavation, and muck excavation, will be measured in cubic yards of excavated material, measured in its original position. Porous backfill will be weighed by the ton in final position according to GCP 90-02. Pay quantities will be computed to the neat lines staked, by the method of average end areas of materials acceptably excavated. Measurement will not include the quantity of materials excavated without authorization beyond project lines and grades, or the quantity of material used for purposes other than those directed or approved by the Engineer.

With the Engineer's written approval, excavation may be measured by any method described in Subsection 152-4.2.

152-4.2 The quantity of Borrow material to be paid will be by calculated by one of the following methods of measurement, as described in the Bid Schedule.

If Borrow is paid by source volume, the quantity will be measured in cubic yards of material, measured in its original position at the borrow source, after stripping of overburden and waste. Pay quantities will be computed by the method of average end areas from cross sections taken before and after borrow excavation. No shrink or swell factor will be used.

If Borrow is paid by design volume, the quantity will be measured in cubic yards of material, measured in its final compacted position. Pay quantities will be computed by the method of average end areas, as determined from original ground cross sections before placement (after clearing and grubbing) and to the neat lines staked and verified by the Engineer after placement. No allowance will be made for subsidence of the subgrade or for material placed outside the staked neat line limits. The quantity to be paid for will be the cubic yards of material placed and accepted in the completed embankment. No shrink or swell factor will be used.

If Borrow is paid by weight, the quantity will be measured in tons, by weighing system or by barge displacement method.

Ditch Lining will be paid by the ton in accordance with ~~subsection~~ GCP Subsection 90-02. Excavation required below normal ditch grade is subsidiary.

Ditch Linear Grading will be measured by the linear foot.

Area Grading will be measured by square yard.

BASIS OF PAYMENT

152-5.1 Excavation and embankment (or waste disposal) is a single pay item. The costs for material source development, blasting, excavation, hauling, placing in layers, compacting, disking, watering, mixing, sloping, grading, and other necessary operations for construction of embankments, or waste disposal, are subsidiary and shall be included in the contract unit prices.

a. Pay Item P152.010.0000 Unclassified Excavation. For "Unclassified Excavation", payment will be made at the contract unit price per cubic yard, or by lump sum.

b. Pay Item P152.275.0000 Porous Backfill. For "Porous Backfill", payment will be made at the contract unit price per ton.

~~**b.**~~**c. Pay Item P152.030.0000 Common Excavation.** For "Common Excavation", payment will be made at the contract unit price per cubic yard.

~~**c.**~~**d. Pay Item P152.040.0000 Rock Excavation.** For "Rock Excavation", payment will be made at the contract unit price per cubic yard.

~~d.~~e. **Pay Item P152.050.0000 Muck Excavation.** For "Muck Excavation", payment will be made at the contract unit price per cubic yard, or by lump sum.

~~e.~~f. **Pay Item P152.070.0000 Drainage Excavation.** For "Drainage Excavation", payment will be made at the contract unit price per cubic yard.

g. **Pay Item P152.190.0000 Borrow.** For "Borrow", payment will be made at the contract unit price per cubic yard. If by weight, payment will be made at the contract unit price per ton.

h. **Pay Item P152.390.0000 Ditch Lining.** For "Ditch Lining", payment will be made at the contract unit price per ton.

h. **Pay Item P152.430.0000 Ditch Linear Grading.** For "Ditch Linear Grading", payment will be made at the contract unit price per linear foot.

i. **Pay Item P152.440.0000 Area Grading.** For "Area Grading", payment will be made at the contract unit price per square yard.

Payment will be made under:

Item P152.010.0000	Unclassified Excavation – per cubic yard
Item P152.275.0000	Porous Backfill – per ton
Item P152.390.0000	Ditch Lining – per ton
Item P152.430.0000	Ditch Linear Grading – per linear foot
Item P152.440.0000	Area Grading – per square yard

TESTING REQUIREMENTS

ATM 212	Determining the Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 207	WAQTC FOP for AASHTO T 99/ T 180 Moisture-Density Relations of Soils*
ATM 202	WAQTC FOP for AASHTO T 255/T 265 Moisture Content of Aggregate and Soils
ATM 213	WAQTC FOP for AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*.
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *

ITEM P-154 SUBBASE COURSE

DESCRIPTION

154-1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course according to these Specifications, and in conformity with the dimensions and typical cross section shown on the Plans.

MATERIALS

154-2.1 MATERIALS. The subbase material shall consist of hard durable particles or fragments of granular aggregates. This material will be mixed or blended with fine sand, clay, stone dust, or other similar binding or filler materials produced from approved sources. This mixture must be uniform and shall comply with the requirements of these Specifications as to gradation, soil constants, and shall be capable of being compacted into a dense and stable subbase. The material shall be free from vegetable matter, lumps or excessive amounts of clay, and other objectionable or foreign substances. Pit-run material may be used, provided the material meets the requirements specified.

Aggregate gradation shall meet the requirements of Table 154-1, determined according to ATM 304.

TABLE 154-1. AGGREGATE GRADATION REQUIREMENTS

Sieve designation (Square opening)	Percentage by weight passing sieves
3 inch	90-100
No. 4	20-55
No. 200	0-6

The percent passing the No. 200 sieve will be determined on minus 3-inch material.

The portion of the material passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 6 when tested according to ATM 204 and ATM 205.

The gradations shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieves, or vice versa.

CONSTRUCTION METHODS

154-3.1 GENERAL. The subbase course shall be placed where designated on the Plans or as directed by the Engineer. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the movement of construction equipment, shall be mechanically stabilized to the depth necessary to provide such stability as directed by the Engineer. The mechanical stabilization shall principally include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so that the course will not deform under the traffic of the construction equipment. The addition of the binding medium to the subbase material shall not increase the soil constants of that material above the limits specified.

154-3.2 PREPARING UNDERLYING COURSE. Before any subbase material is placed, the underlying course shall be prepared and conditioned as specified. The course shall be checked and accepted by the Engineer before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, the spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

154-3.3 MATERIALS ACCEPTANCE IN EXISTING CONDITION. When the entire subbase material is secured in a uniform and satisfactory condition, such approved material may be moved directly to the spreading equipment for placing. The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The moisture content of the material shall be approximately that required to obtain maximum density. The final operation shall be blading or dragging, if necessary, to obtain a smooth uniform surface true to line and grade.

154-3.4 GENERAL METHODS FOR PLACING. When materials from several sources are to be blended and mixed, the subbase material, together with any blended material, shall be thoroughly mixed prior to placing on grade.

The subbase course shall be constructed in layers. Any layer shall be not less than 3 inches nor more than 8 inches of compacted thickness. The material, as spread, shall be of uniform gradation with no pockets of fine or coarse materials. No material shall be placed in snow or on a soft, muddy, or frozen course.

When more than one layer is required, the construction procedure described herein shall apply similarly to each layer.

During the placing and spreading, sufficient caution shall be exercised to prevent the incorporation of subgrade, shoulder, or foreign material in the subbase course mixture.

154-3.5 FINISHING AND COMPACTING. After spreading or mixing, the subbase material shall be thoroughly compacted. Sufficient compactors shall be furnished to adequately handle the rate of placing and spreading of the subbase course. The moisture content of the material shall be approximately that required to obtain maximum density.

The field density of the compacted material shall be not less than 95~~8~~% of the maximum density, as determined according to ATM 207 or ATM 212. The in-place field density and moisture content shall be determined according to ATM 213. As an alternative, the Engineer may direct the use of a control strip in accordance with ATM 309 to determine a density standard. Material shall be compacted to a density of not less than 100% of the density standard.

The course shall not be rolled when the underlying course is soft or yielding or when the rolling causes undulation in the subbase. When the rolling develops irregularities that exceed 1/2 inch when tested with a 12-foot straightedge, the irregular surface shall be loosened and then refilled with the same kind of material as that used in constructing the course and again rolled as required above.

Along places inaccessible to rollers, the subbase material shall be tamped thoroughly with mechanical or hand tampers.

Watering during rolling, if necessary, shall be in the amount and by equipment approved by the Engineer. Water shall not be added in such a manner or quantity that free water will reach the underlying layer and cause it to become soft.

154-3.6 SURFACE TEST. After the course is completely compacted, the surface shall be tested for smoothness and accuracy of grade and crown; any portion found to lack the required smoothness or to fail in accuracy of grade or crown shall be scarified, reshaped, recompacted, and otherwise manipulated as the Engineer may direct until the required smoothness and accuracy is obtained. The finished surface shall not vary more than 1/2-inch when tested with a 12-foot straightedge applied parallel with, and at right angles to, the centerline.

154-3.7 PROTECTION. Work on subbase course shall not be conducted during freezing temperature nor when the subgrade is wet. When the subbase material contains frozen material or when the underlying course is frozen, the construction shall be stopped.

154-3.8 MAINTENANCE. Following the final shaping of the material, the subbase shall be maintained throughout its entire length by the use of standard motor graders and rollers until, in the judgment of the Engineer, the subbase meets all requirements and is acceptable for the construction of the next course.

METHOD OF MEASUREMENT

154-4.1 Pay Item P154.010.0000 Subbase Course. Subbase Course will be weighed by the ton or measured by the cubic yard in final position according to GCP Subsection 90-02.

Subbase materials will not be included in any other excavation quantities.

BASIS OF PAYMENT

154-5.1 Subbase Course will be paid for at the contract price, per unit of measurement, accepted in place.

Hauling and placing of these materials is subsidiary.

Payment will be made under:

Item P154.020.0000	Subbase Course – per ton

TESTING REQUIREMENTS

ATM 212	Determining the Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *
ATM 204	WAQTC FOP for AASHTO T 89 Determining the Liquid Limit of Soils
ATM 205	WAQTC FOP for AASHTO T 90 Determining the Plastic Limit and Plasticity Index of Soils
ATM 207	WAQTC FOP for AASHTO T 99/ T 180 Moisture-Density Relations of Soils*
ATM 213	WAQTC FOP for AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*

ITEM P-165 REMOVAL OF STRUCTURES

DESCRIPTION

165-1.1 Remove and dispose of or salvage existing structures as specified. Backfill the resulting holes and pits.

CONSTRUCTION REQUIREMENTS

165-2.1 GENERAL. Obtain utility locates in the vicinity of the designated items. Work around and preserve any facilities within the work limits. Backfill all excavations with approved embankment or excavated materials and compact in accordance with Item P-152.

a. Removed Structures Designated for Disposal. Removed structures designated for disposal become your property. Excavate, load, and haul structures to an approved disposal site off of airport property in accordance with applicable Federal and State regulations.

1. Bollards. Remove twenty one (21) bollards per F-170 and the plans.
2. Airport Rotating Beacon. Remove existing rotating beacon from Snow Removal Equipment Building. Antenna and man platform to remain.

b. Removed Structures Designated for Salvage and/or Re-Installation. Removed structures designated for salvage remain the property of the State.

1. Diesel vehicle fuel tank and building heating oil tank, Two (2) existing tanks at the SRE building shall be relocated per the plans. Fuel lines, fittings and hardware damaged by tank settlement or moving shall be repaired or replaced to provide full operation.

The fuel tanks have a capacity of 1,000 gals each and may contain residual fuel but the fuel levels are unknown. The fuel and oil will remain the property of the State. If defueling and refueling are necessary it shall be the responsibility of the Contractor. The two different types of fuel products shall be measured, stored separately and protected from contamination in certified and approved containers. Fuel handling shall be addressed as required in P-641, Erosion, Sediment, and Pollution Control

2. SREB. Remove, and relocate one (1) existing Snow Removal Equipment Building per the plans. Refer to S-142 for installation details at new location.

3. Electrical Equipment Building. Remove, and relocate one (1) existing Electrical Equipment Building per the plans. Refer to L-109 for installation details at new location.

METHOD OF MEASUREMENT

165-3.1 This item will not be measured for payment. The Engineer's acceptance constitutes measurement of removal for disposal or salvage.

BASIS OF PAYMENT

165-4.1 Payment will be made at the contract price for work acceptably completed. No separate payment will be made for hauling or transportation. All work associated with removal of specified items, including but not limited to labor, equipment, tools, hauling, transportation, and incidentals will be included in the contract price for removal of structures.

Payment will be made under:

Item P165.060.0000 Equipment Storage Building Relocation – per lump sum

ITEM P-167 DUST PALLIATIVE

DESCRIPTION

167-1.1 Furnish all materials, equipment, and labor necessary to apply the specified dust control agent in accordance with the manufacturer's recommendations at the locations shown on the Plans.

MATERIALS

167-2.1 DUST PALLIATIVE. Dust palliative shall be approved by the Engineer. The furnished product shall meet all requirements of this specification. Documentation substantiating conformance with all of the material requirements in this specification must be provided 5 days prior to the preconstruction conference. Failure to meet any requirements of this specification or failure to provide the substantiating documentation may result in the rejection or disqualification of the use of the proposed project.

The product must be confirmed by an independent certified laboratory to have passed all the requirements of Boeing's D6-17487, Rev. P "Testing of Airplane Maintenance Materials" within the last 5 years. Specifically:

a. Sandwich Corrosion Test, ASTM F1110-90

b. Acrylic Crazing Test, ASTM F484-83 using Type C acrylic

c. Paint Softening Test, ASTM F502

d. Hydrogen Embrittlement Test, ASTM F519

The product must be capable of being topically applied over a prepared gravel surface without the use of water for diluting.

The manufacturer/supplier must certify that the following properties/characteristics are present:

a. Performance not affected by freeze thaw cycles: at temperatures down to -70 °F

b. Non-Flammable & Non-Volatile.

c. Final product shall not stick to and be tracked by tire traffic after 1 week of dwell time (Non-Tacky).

d. Product is environmentally safe for aquatic species and requires no specialized response or cleanup if a spill occurs.

The Contractor shall submit proof to the Engineer in the form of test reports and certificates to verify that the dust palliative product is in environmental compliance. The Contractor is responsible for any costs associated with the testing of soil and dust control product prior to its application. Products shall not contain or emit chlorinated fluorocarbons (CFCs or Freon) and shall not contain or emit volatile organic compounds (VOCs) that exceed Federal or State air quality limitations. Products and their degradation products shall not be composed of elements, compounds, mixtures or produce runoffs with the characteristics identified under Code of Federal Regulations Title [40 § 261.3], emit or off gas during placement, use or degradation of hazardous air pollutant listed under

Section 112 of the Federal Clean Air Act [42 U.S.C. § 7412], be a hazardous chemical substance or mixture pursuant to Section 7 of the Federal Toxic Substances Control Act [15 U.S.C.§ 2606], be prohibited for use by the Alaska Department of Environmental Conservation, the Environmental Protection Agency, or any applicable law, rule or regulation.

The Contractor shall submit documentation from a reputable laboratory containing aquatic toxicity test results for lethal concentration at 50% (LC50) showing that the product has a rating of "slightly toxic" (LC50>10mg/L) or better as described in EPA guidelines. Acute and chronic toxicity testing must be performed per U.S. EPA guidelines for all of the following species: Rainbow trout (*Oncorhynchus mykiss*), Fathead minnow (*Pimephales Promelas*), and Mysid Shrimp (*Americamysis bahia*).

Products or their components and degradation products shall be tested and certified by the manufacturer not to be substances or composed of substances known to be, or reasonably anticipated to be carcinogenic or toxic by the U.S. Department of Health and Human Services. Products must have hazardous Materials Identification System (HMIS) ratings equal to or less than the following for each category: H=1; F=1; R=1; PPE=X.

CONSTRUCTION METHODS

167-3.1 GENERAL. Surface dust control shall be applied to the areas as shown on the plans before September 1 of the contract completion year. An evenly applied spray application method shall be used. The product shall not be applied in the rain or when the in-situ moisture levels are more than 3% above the optimum moisture content (OMC) of the material being treated. The Contractor shall prepare the surface by scarifying, grading, contouring and compacting to meet finished grade and surface requirements.

167-3.2 RATE OF APPLICATION. The product manufacturer shall be consulted and provided with airport specific material for gradation and proctor tests in order to define an appropriate application rate to target a reduction in dust emissions of no less than 85%.

Submit the manufacturer's recommended application rate with supporting documentation showing how the application rate was determined. The manufacturer's recommended application rate shall result in a design life of not less than 24 months without reapplication.

167-3.3 WEATHER LIMITATIONS. Apply:

a. After a 48 hour period with no rain prior to application.

b. During dry weather conditions

c. Allow sufficient time for application penetration prior to any rainfall

Do not apply dust control agent when rain is imminent or in any condition where agent may wash away prior to its full penetration. Do not apply dust control agent to a saturated surface, or when the air temperature is below 50°F unless approved by the Engineer. Do not apply dust control agent during windy conditions which prevent a uniform distribution of the product.

167-3.4 EQUIPMENT. Provide equipment for applying the dust control agent that is approved by the product supplier and conforms to the following requirements:

Use a distributor that is designed, equipped, maintained and operated to apply the agent uniformly through a calibrated spray bar system in accordance with the manufacturer's recommended application rate determined in accordance with subsection 167-3.2. Nozzle height for application shall not exceed 20 inches.

167-3.5 APPLICATION SET-UP. The product supplier shall supply detailed guidelines or procedure for applying their product to the runway surface. Their guidelines or procedure will be considered by the Engineer for use if there is a conflict with this section. Ensure that the application system provides a uniform delivery of the dust control product at the manufacturer's recommended application rate determined in accordance with subsection 167-3.2, with a 50% overlap of the spray pattern. Application setup shall be approved by the Engineer.

METHOD OF MEASUREMENT

167-4.1 Item P167.010.0000 Dust Palliative. The quantity of Dust Palliative as applied to all areas of crushed aggregate surface course or as ordered by the Engineer will be measured according to Subsection GCP-90-02.

BASIS OF PAYMENT

167-5.1 Payment for the accepted quantity of Dust Palliative will be made at the contract unit price, which shall include full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to acceptably complete the work. Costs associated with consulting the product manufacturer are subsidiary and shall be included in the contract unit price.

Payment will be made under:

Item P167.020.0000	Dust Palliative – per lump sum

ITEM P-180 RIPRAP

DESCRIPTION

180-1.1 Construct riprap bank and slope protection.

MATERIALS

180-2.1 Use evenly graded stones that are hard, angular, and have no more than 50% wear at 500 revolutions as determined by AASHTO T 96. Use stones with breadth and thickness at least 1/4 of its length. Do not use rounded boulders or cobbles on slopes steeper than 2:1.

Meet the following gradation for the class specified. Percents are by total weight, weights are for each stone:

Class I	0-50% weighing up to 25 pounds 0-10% weighing more than 50 pounds
Class II	50-100% weighing 200 pounds or more 0-15% weighing up to 25 pounds 0-10% weighing more than 400 pounds
Class III	50-100% weighing 700 pounds or more 0-15% weighing up to 25 pounds 0-10% weighing more than 1400 pounds
Class IV	50-100% weighing 2000 pounds or more 0-15% weighing up to 400 pounds 0-10% weighing more than 5400 pounds

CONSTRUCTION REQUIREMENTS

180-3.1 Provide a level, compact area large enough to dump and sort typical loads of riprap at approved location(s). Dump the loads specified in this area and assist the Engineer as needed to sort and measure the stones in the load to determine if the riprap is within specifications. Provide the equipment needed to assist in this sorting.

Excavate a footing trench along the toe of the slope as shown on the Plans.

Place stones to the thickness, height, and length shown on the Plans, or as staked, in a well-graded mass with a minimum of voids. Fill in unacceptable voids with smaller stones. Place riprap to its full course thickness in one operation. Avoid displacing the underlying material. Do not place riprap in layers or use methods likely to cause segregation.

Manipulate the rock sufficiently using a backhoe, rock tongs, or other suitable equipment to secure a reasonably regular surface and stability.

METHOD OF MEASUREMENT

180-4.1 Section 90. By neat line volume or by weight. Excavation and backfill will not be measured for payment and is considered subsidiary.

BASIS OF PAYMENT

180-5.1 Payment will be made at the contract unit price for each item below that appears on the bid schedule.

Payment will be made under:

Item P180.020.0000 Riprap, Class I – per ton

ITEM P-190 INSULATION BOARD

DESCRIPTION

190-1.1 Furnish and install polystyrene insulation board where shown on the Plans.

MATERIALS

190-2.1 Use materials that conform to the following:

a. Insulation Board. AASHTO M 230, Type VI, except that extrusion is not required, and the maximum water absorption is 0.3% by volume, as determined by ASTM C272. Insulation board must meet or exceed the minimum thickness called out in the Plans, and have a 20-year warranted thermal resistance (R-Value) @ 75°F of 4.5 per inch of thickness as determined by ASTM C177 or ASTM C518.

b. Sand Blanket. Sand containing no muck, frozen material, roots, sod or other deleterious matter and with a plasticity index not greater than 6 as determined by ATM 204 and ATM 205. Meet the grading requirements of Table 190-1 as determined by ATM 304:

TABLE 190-1. SAND BLANKET MATERIAL GRADATION

SIEVE	PERCENT PASSING BY WEIGHT
3/8 in.	100
No. 4	15-65
No. 200	0-6

CONSTRUCTION REQUIREMENTS

190-3.1 Prior to placing the insulation board, blade, shape, and compact the area per specification P-152. Place a sand blanket leveling course at least four inches thick. Finish the leveling course surface so it does not vary more than 0.10-foot when tested using a 12-foot straightedge.

Set each board accurately to the line and grade established and anchor firmly in place by driving a minimum of two wood dowels per panel. Place insulation to the required thickness, using a minimum of two layers. The required thickness is shown on the Plans and is actual thickness, not nominal thickness. Stagger all joints between layers.

Cover the insulation board with twelve inches of sand blanket material prior to placing subsequent lifts. Use approved spreading and compacting equipment.

METHOD OF MEASUREMENT

190-4.1 By the square foot of insulation board with the required “R” value in final position, including transitions, regardless of thickness, complete and accepted.

Sand blanket material will be paid under P152.200.0000, Borrow, per ton.

BASIS OF PAYMENT

190-5.1 At the contract unit price.

Payment will be made under:

Item P190.010.0000 Insulation Board – per square foot

TESTING REQUIREMENTS

ATM 204	WAQTC FOP for AASHTO T 89 Determining the Liquid Limit of Soils
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *

MATERIAL REQUIREMENTS

ASTM C272	Water Absorption of Core Materials for Sandwich Constructions
ASTM 177	Steady-State Heat Flux Measurement and Thermal Transmission Properties by Means of the Guarded-Hot Plate Apparatus

ITEM P-299 AGGREGATE SURFACE COURSE

DESCRIPTION

299-1.1 This item consists of an aggregate surface course composed of crushed or uncrushed coarse aggregate bonded with either soil or fine aggregate or both. It shall be constructed on a prepared course according to these Specifications and to the dimensions and typical cross section shown on the Plans.

MATERIALS

299-2.1 GENERAL. Aggregates shall consist of hard, durable particles or fragments of stone or gravel mixed or blended with sand, stone dust, or other similar binding or filler materials produced from approved sources. The aggregate shall be free from vegetation, lumps, or excessive amounts of clay and other objectionable substances. The coarse aggregate shall have a minimum degradation value of 45 when tested according to ATM 313. The aggregate shall have a percent of wear not more than 50 at 500 revolutions as determined by AASHTO T 96 and shall not show evidence of disintegration nor show loss greater than 12% when subjected to 5 cycles of sodium sulfate accelerated soundness test using AASHTO T 104.

a. **Crushed Aggregate Surface Course.** The aggregates shall consist of both fine and coarse fragments of crushed stone or crushed gravel mixed or blended with sand, screenings, or other similar approved materials. The material shall consist of hard, durable particles or fragments of stone and shall be free from excess soft or disintegrated pieces, dirt, or other objectionable matter.

   The fractured particles in the finished product shall be as uniform as practicable. At least 75% by weight of material retained on the No. 4 sieve shall have one or more fractured faces, when tested according to ATM 305.

   If necessary to meet this requirement, or to eliminate an excess of fine, uncrushed particles, the gravel shall be screened before crushing.

   The fine, aggregate portion, defined as the portion passing the No. 4 sieve, produced in crushing operations, shall be incorporated in the base material to the extent permitted by the gradation requirements.

b. **Uncrushed Aggregate Surface Course.** This material may consist of natural pit-run aggregate. However, screening, blending, ripping, washing, and/or necessary mixing of the material or other processing may be necessary to meet the gradation and performance requirements of this specification.

299-2.2 GRADATION. The gradation of the uncrushed or crushed material shall meet the requirements of the gradations indicated in Table 299-1, when tested according to ATM 304.

TABLE 299-1. AGGREGATE GRADATION REQUIREMENTS

Sieve Designation(Square Openings)	Percentage by weight passing sieves For E-1
1.0 in.	100
3/4 in.	70-100
3/8 in.	50-85
No. 4	35-65
No. 8	20-50
No. 50	15-30
No. 200	8-15

The specified gradations represent the limits of suitability of aggregate for use from the sources of supply. The final gradations decided on, within the specified limits, shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieves, or vice versa.

The portion of the material passing the No. 40 sieve shall have a liquid limit not more than 35 and a plasticity index not more than 10, when tested according to ATM 204 and ATM 205.

299-2.3 FINES FOR BLENDING. If additional fine material is necessary, it shall be obtained from approved sources and uniformly blended with the aggregate at the crushing plant, the mixing plant, or as approved by the Engineer. Silt, stone dust, or other similar fine material may be used as binder.

CONSTRUCTION METHODS

299-3.1 PREPARING UNDERLYING COURSE. The underlying course will be checked and accepted by the Engineer before placing and spreading operations are started. Any ruts or soft areas shall be corrected and compacted to the required density before placing aggregate surface course.

To protect the underlying course and to ensure proper drainage, the spreading of the aggregate surface course shall begin along the centerline on a crowned section or on the high side of sections with a one-way slope.

299-3.2 METHODS OF PRODUCTION. The aggregate shall be uniformly blended and when at the satisfactory moisture content per paragraph 299-3.5, the approved material may be transported directly to the spreading equipment.

299-3.3 PLACING. The surface course shall be constructed without segregation of the aggregate. The material shall be placed in uniform, equal-depth layers, each not exceeding 6 inches of compacted depth. No material shall be placed in snow or on a soft uncompacted, muddy, or frozen course.

During the mixing and spreading process, sufficient caution shall be exercised to prevent the incorporation of subgrade, subbase, or shoulder material in the surface course mixture.

299-3.4 COMPACTION. Immediately upon completion of the spreading operations, the aggregate shall be thoroughly compacted to the required density. The moisture content of the material shall be ± 2 percentage points of the optimum moisture content.

299-3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY. The surface course will be accepted for density when the field density is not less than 95% of the maximum density, as determined according to ATM 207, ATM 212, or ATM 309. The control strip for ATM 309 shall be compacted by a vibratory compactor with a minimum operating weight of 22,000 pounds. The in-place field density and moisture content will be determined according to ATM 213. If the specified density is not attained, the material shall be reworked and/or recompacted until the specified density is reached.

299-3.6 FINISHING. The surface of the aggregate surface course shall be finished by blading or with automated equipment specifically designed for this purpose.

In no case shall thin layers of material be added to the top of surface course to meet grade. If the compacted elevation of the top layer is 0.05 foot or more below grade, it shall be scarified to a depth of at least 3 inches, new material added, and the layer shall be blended and compacted to bring it to grade. If the finished surface is above plan grade, it shall be cut back to grade and recompacted.

299-3.7 SURFACE TEST. After the course has been completely compacted, the surface will be tested by the Engineer for smoothness and accuracy of grade and crown. The finished grade elevation shall not vary more than 0.05 foot from the design elevation. The finished surface shall not vary more than 3/8 inch from a 12-foot straightedge when applied to the surface parallel with, and at right angles to, the centerline. Any portion lacking the required smoothness or failing in accuracy of grade or crown shall be corrected to within the specified tolerances and approved by the Engineer.

299-3.8 PROTECTION. Work on the surface course shall not be accomplished during freezing temperatures or when the subgrade is wet. When the aggregates contain frozen materials or when the underlying course is frozen, the construction shall be stopped.

Hauling equipment may be routed over completed portions of the surface course, provided no damage results and provided that such equipment is routed over the full width of the surface course to avoid rutting or uneven compaction. However, the Engineer in charge will have full and specific authority to stop all hauling over completed or partially completed surface course when, in their opinion, such hauling is causing damage. Any damage resulting to the surface course from routing equipment over the surface course shall be repaired by the Contractor at their own expense.

299-3.9 MAINTENANCE. Following the completion of the aggregate surface course, the Contractor shall satisfactorily remove all blue tops, fill and compact the voids, and perform all maintenance work on this surface until final acceptance unless otherwise stated in the Specifications. The surface course shall be properly drained at all times.

METHOD OF MEASUREMENT

299-4.1 Aggregate Surface Course will be weighed by the ton or measured by the cubic yard in final position according to GCP Subsection 90-02.

BASIS OF PAYMENT

299-5.1 Aggregate Surface Course will be paid for at the contract price, per unit of measurement, accepted in place.

Payment will be made under:

Item P299.020.0000	Crushed Aggregate Surface Course – per ton

TESTING REQUIREMENTS

AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
ATM 212	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *
ATM 313	Degradation Value of Aggregates
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *
ATM 204	WAQTC FOP for AASHTO T 89 Determining the Liquid Limit of Soils
ATM 205	WAQTC FOP for AASHTO T 90 Determining the Plastic Limit and Plasticity Index of Soils
ATM 207	WAQTC FOP for AASHTO T 99/ T 180 Moisture-Density Relations of Soils*
ATM 213	WAQTC FOP for AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*
ATM 305	WAQTC FOP for AASHTO T 335 Determining the Percentage of Fracture in Coarse Aggregate*

ITEM P-610 CONCRETE FOR MISCELLANEOUS STRUCTURES

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these Specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 GENERAL. Only approved materials, conforming to the requirements of these Specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Engineer before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. **Reactivity.** Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the Engineer. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days (16 days from casting). If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

   If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet P-501 reactivity test requirements may be utilized.

610-2.2 COARSE AGGREGATE. The coarse aggregate for concrete shall meet the requirements of AASHTO M 80, Class A.

Coarse aggregate shall be well graded from coarse to fine, and shall meet AASHTO M 43, Number 57 or 67, when tested according to ATM 304.

610-2.2.1 COARSE AGGREGATE SUSCEPTIBILITY TO DURABILITY (D) CRACKING. Not Used.

610-2.3 FINE AGGREGATE. The fine aggregate for concrete shall meet all fine aggregate requirements of AASHTO M 6, Class A.

610-2.4 CEMENT. Cement shall conform to the requirements of AASHTO M 85.

610-2.5 CEMENTITIOUS MATERIALS.

a. **Fly ash.** Fly ash shall meet the requirements of AASHTO M 295, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than 15% and a total available alkali content less than 3% per AASHTO M 295. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent,

consecutive AASHTO M 295 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the Engineer.

b. **Slag cement (ground granulated blast furnace (GGBF)).** Slag cement shall conform to AASHTO M 302, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 WATER. Water used in mixing or curing shall be from potable water sources. Water from 'Community' or 'Non-Transient Non-Community' sources regulated by the Alaska Department of Environmental Conservation Division of Environmental Health Drinking Water Program, or equivalent in other states, do not require testing under ASTM C1602. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 ADMIXTURES. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. **Air-entraining admixtures**. Air-entraining admixtures shall meet the requirements of AASHTO M 154 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. **Water-reducing admixtures**. Water-reducing admixture shall meet the requirements of AASHTO M 194, Type A, B, or D. AASHTO M 194, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures according to the manufacturer's printed instructions.

c. **Other chemical admixtures**. The use of set retarding, and set-accelerating admixtures shall be approved by the Engineer. Retarding shall meet the requirements of AASHTO M 194, Type A, B, or D and set-accelerating shall meet the requirements of AASHTO M 194, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of AASHTO M 213.

610-2.9 JOINT FILLER. The filler for joints shall meet the requirements of Item P-605.

610-2.10 STEEL REINFORCEMENT. Reinforcing shall consist of Deformed and Plain Carbon-Steel Bars conforming to the requirements of ASTM A615, Welded Steel Wire Fabric conforming to the requirements of ASTM A1064, Welded Deformed Steel Fabric conforming to the requirements of ASTM A1064, or Bar Mats conforming to the requirements of ASTM A184, as shown on the Plans.

610-2.11 MATERIALS FOR CURING CONCRETE. Curing materials shall conform to Table 610-1:

TABLE 610-1. MATERIALS FOR CURING CONCRETE

CURING MATERIAL	SPECIFICATION
Burlap Cloth made from Jute or Kenaf and Cotton Mats	AASHTO M 182, Class 4
Sheet Materials for Curing Concrete	ASTM C171
Liquid Membrane – Forming Compounds for Curing Concrete	ASTM C309, Type 1-D Class B, except do not use compounds containing linseed oil.

CONSTRUCTION METHODS

610-3.1 GENERAL. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE MIXTURE. The concrete shall develop a minimum compressive strength of 4,000 psi in 28 days as determined by test cylinders made according to ATM 506 and tested according to AASHTO T 22. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard. The concrete shall contain 5.0% of entrained air, plus or minus 1.2%, as determined by ATM 505. Slump, as determined by ATM 503, shall match the mix design target value plus or minus 1 inch.

610-3.3 MIXING. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of AASHTO M 157.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F without the Engineer's approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F nor more than 100°F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 FORMS. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the Engineer. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the Plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so that no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the Plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

Reinforcing bars shall be bent cold and shall conform accurately to the shape and dimensions shown on the diagram. In no case shall the radius of any bend be less than 4 times the diameter of the bar.

Place reinforcement as indicated on the Plans or as hereinafter specified. Rigidly block and wire in place, using metal or plastic supports or concrete blocks and securely tie at each intersection with annealed iron wire of at least 1/8 inch.

Do not splice bars at points not indicated on the Plans except with the consent of the Engineer. Such splices shall be at the points of minimum tensile stress and the lap shall be not less than 36 bar diameters.

Verify the quantity, size, and shape of the reinforcement against the structure drawings and make necessary corrections to the bar lists and bending schedules before ordering. Errors in the bar lists and/or bending schedules shall not be cause for adjustment of the contract prices.

If reinforcing bars are to be welded, follow AWS D12.1.

610-3.6 EMBEDDED ITEMS. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 CONCRETE CONSISTENCY. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ATM 503.

610-3.8 PLACING CONCRETE. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the Engineer. Concrete shall be placed as soon as practical after mixing, but in no case later than one (1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 VIBRATION. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 JOINTS. Joints shall be constructed as indicated on the plans.

610-3.11 FINISHING. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 CURING AND PROTECTION. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 COLD WEATHER PLACING. When concrete is placed at temperatures below 40°F, follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 HOT WEATHER PLACING. When concrete is placed at temperatures greater than 85ºF, follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

ACCEPTANCE TESTING

610-4.1 ACCEPTANCE SAMPLING AND TESTING. Concrete for each day's placement will be accepted on the basis of the compressive strength specified in Subsection 610-3.2. The Engineer will sample the concrete in accordance with ATM 501; test the slump in accordance with ATM 503; test air content in accordance with ATM 505; make and cure compressive strength specimens in accordance with ATM 506; and test in accordance with AASHTO T 22. The Acceptance Testing laboratory will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

610-4.2 DEFECTIVE WORK. Any defective work that cannot be satisfactorily repaired as determined by the Engineer, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 Concrete will be measured by the number of cubic yards based on the dimensions shown on the plans of concrete complete in place and accepted, and according to GCP Section 90. When the pay items shown below are absent from the bid schedule, no measurement for payment will be made.

610-5.2 Reinforcing steel will be measured by the calculated theoretical number of pounds placed, as shown on the Plans, complete in place and accepted. The unit weight used for deformed bars will be the weight of plain square or round bars of equal nominal size. If so indicated on the Plans, the weight to be paid for will include the weight of metal pipes and drains, metal conduits and ducts, or similar materials indicated and included. When the pay items shown below are absent from the bid schedule, no measurement for payment will be made.

BASIS OF PAYMENT

610-6.1 Payment will be made at the contract unit price per cubic yard for structural portland cement concrete and per pound for reinforcing steel. If the following pay items are absent from the bid schedule, no payment will be made.

Payment will be made under:

Item P610.010.0000	Structural Portland Cement Concrete - per cubic yard
Item P610.020.0000	Steel Reinforcement - per pound
Item P610.030.0000	Standard Curb & Gutter – per linear foot
Item P610.040.0000	Depressed Curb and Gutter – per linear foot

REFERENCES

ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates
ATM 501	FOP for WAQTC TM 2 Sampling Freshly Mixed Concrete
ATM 503	WAQTC FOP for AASHTO T 119 Slump of Hydraulic-Cement Concrete
ATM 505	WAQTC FOP for AASHTO T 152 Air Content of Freshly Mixed Concrete by the Pressure Method
ATM 506	WAQTC FOP for AASHTO T 23 Making and Curing Concrete Test Specimens in the Field

AASHTO M 6	Fine Aggregate for Portland Cement Concrete
AASHTO M 43	Sizes of Aggregate for Road and Bridge Construction
AASHTO M 80	Coarse Aggregate for Portland Cement Concrete
AASHTO M 85	Portland Cement
AASHTO M 154	Air-Entraining Admixtures for Concrete
AASHTO M 157	Ready-Mixed Concrete
AASHTO M 182	Burlap Cloth made from Jute or Kenaf and Cotton Mats
AASHTO M 194	Chemical Admixture for Concrete
AASHTO M 213	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
AASHTO M 295	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
AASHTO M 302	Slag Cement for Use in Concrete and Mortars
AASHTO T 22	Compressive Strength of Cylindrical Concrete Specimens
ASTM A184	Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A1064	Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C171	Sheet Materials for Curing Concrete
ASTM C309	Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C1017	Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1260	Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1602	Mixing Water Used in the Production of Hydraulic Cement Concrete
AWS D12.1	Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction
ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

ITEM P-620 RUNWAY AND TAXIWAY MARKING

DESCRIPTION

620-1.1 This item consists of temporary marking of temporary runways, in accordance with these specifications and at the locations shown on the Plans, or as directed by Engineer. ~~the preparation and painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, in accordance with these specifications and at the locations shown on the plans, or as directed by the Engineer. The terms "paint" and "marking material" as well as "painting" and "application of markings" are interchangeable throughout this specification. This item includes removal of existing painted markings from pavement surfaces as shown on the plans or as designated by the Engineer.~~ Complete this work within the limitations of the project Construction Safety and Phasing Plan.

MATERIALS

620-2.1 MATERIALS ACCEPTANCE. The Contractor shall furnish manufacturer's certified test reports, for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. This certification along with a copy of the paint manufacturer's surface preparation; marking materials, including adhesion, flow promoting and/or floatation additive, and application requirements must be submitted and approved by the Engineer prior to the initial application of markings. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site. All material shall arrive in sealed containers that are easily quantifiable for inspection by the Engineer. Provide manufacturer certification (Material Safety Data Sheet) showing that each product does not contain mercury, lead, hexavalent chromium, halogenated solvents, nor any carcinogen as defined in 29 CFR 1910.1200 in amounts exceeding permissible limits as specified in relevant Federal Regulations.

620-2.2 MARKING MATERIALS. Paint shall be waterborne or solvent-base. Paint colors shall comply with Federal Standard No. 595, and Table 620-1. Use black paint to outline a border at least 6 inch wide around markings on all light colored pavements.

TABLE 620-1. MARKING MATERIALS

Paint[1]				Glass Beads[2]	
Type	**Color**	**Fed Std. 595 Number**	**Application Rate Maximum**	**Type**	**Application Rate Minimum**
II	White	37925	115 ft²/gal	Type I, Gradation A	7 lb/gal)
II	Red	31136	115 ft²/gal	Type I, Gradation A	5 lb/gal
II	Yellow	33538 or 33655	115 ft²/gal	Type I, Gradation A	7 lb/gal
II	Black	37038	115 ft²/gal	Not used	Not Used
II	Pink	1 part 31136 to 2 parts 37925	115 ft²/gal	Type I, Gradation A	5 lb/gal
II	Green	34108	115 ft²/gal	Not Used	Not Used

[1] See subsection 620-2.2a
[2] See subsection 620-2.2b

a. **Paint.**

(1) **Waterborne**. Paint shall meet the requirements of Federal Specification TT-P-1952F, Type II. The non-volatile portion of the vehicle for all paint types shall be composed of a 100% acrylic polymer as determined by infrared spectral analysis. Use waterborne paint only for temporary markings.

(2) **Solvent-Base.** Paint shall meet the requirements of Commercial Item Description A-A-2886B Type II. Use solvent-based paint only for permanent markings.

b. **Reflective Media.** Glass beads shall meet the requirements for Federal Specification TT-B-1325D Type I, Gradation A.

Glass beads shall be treated with all compatible coupling agents recommended by the manufacturers of the paint and reflective media to ensure adhesion and embedment.

Glass beads shall not be used in black and green paint.

Glass beads shall comply with Table 620-1.

CONSTRUCTION METHODS

620-3.1 WEATHER LIMITATIONS. Painting shall only be performed when the surface is dry, and the ambient temperature and the pavement surface temperature meet the manufacturer's recommendations in accordance with subsection 620-2.1. Discontinue painting when the wind speed exceeds 10 mph unless windscreens are used to shroud the material guns. Do not apply markings when weather conditions are forecasted to not be within the manufacturers' recommendations for application and dry time.

620-3.2 EQUIPMENT. Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type or airless type marking machine with automatic glass bead dispensers suitable for application of traffic paint. It shall produce an even and uniform film thickness and appearance of both paint and glass beads at the required coverage and shall apply markings of uniform cross sections and clear-cut edges without running or spattering and without over spray. Marking equipment for both paint and glass beads shall be calibrated daily.

620-3.3 PREPARATION OF SURFACES. Immediately before application of the paint, the surface shall be sufficiently dry to accept paint and compacted to the satisfaction of the Engineer.~~dry and free from dirt, grease, oil, laitance, or other contaminates that would reduce the bond between the paint and the pavement.~~

a. **Preparation of New Pavement Surfaces.** The area to be painted shall be cleaned by broom, blower, water blasting, or by other methods approved by the Engineer to remove all contaminants, including PCC curing compounds, minimizing damage to the pavement surface. Areas which cannot be satisfactorily cleaned by brooming and blowing shall be scrubbed as directed with a 10% solution of tri-sodium phosphate or an equally suitable solution. After scrubbing, the solution shall be rinsed off and the surface dried prior to painting.

b. **Preparation of Pavement to Remove Existing Markings.** Where indicated on the plans, use high pressure water to remove all visible indications of existing painted markings from pavement surfaces. Do not paint over existing markings. Remove pavement markings to the fullest extent

possible without materially damaging the pavement surface, color, or texture. Group adjacent markings together into a larger rectangular removal area in conformance with FAA AC 150/5340-1, paragraph 1.3.f. and Figure 1-1, Figure 1-2, Figure 1-3 and Figure 1-4. Collect and dispose of all loose or waste material as needed to prevent interference with drainage or to prevent dusty conditions under traffic, wind, or propellers. After removal of markings on asphalt pavements, apply a fog seal or seal coat to 'block out' the removal area to eliminate 'ghost' markings.

c. **Preparation of Pavement Markings Prior to Remarking.** Prior to remarking existing markings, loose existing markings must be removed minimizing damage to the pavement surface, with a method approved by the Engineer. After removal, the surface shall be cleaned of all residue or debris according to 620-3.3.a.

Prior to the application of markings, the Contractor shall certify in writing that the surface is dry and free from dirt, grease, oil, laitance, or other foreign material that would prevent the bond of the paint to the pavement or existing markings. This certification along with a copy of the paint manufacturer's application and surface preparation requirements must be submitted to the Engineer prior to the initial application of markings.

620-3.4 LAYOUT OF MARKINGS. The proposed markings shall be laid out in advance of the paint application. Layout markings and glass beads in advance of paint application at the locations shown on the Plans according to the tolerances in section 620-3.5 and according to the requirements of G-135. Space control points at such intervals to ensure accurate location of all markings. Provide an experienced technician to supervise the location, alignment, layout dimensions, and application of the paint.

620-3.5 APPLICATION. A period of 7 days minimum shall elapse between placement of surface course or seal coat and application of the permanent paint markings. Paint shall be applied at the locations and to the dimensions and spacing shown on the Plans. Paint shall not be applied until the layout and condition of the surface has been approved by the Engineer.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and marking dimensions and spacing shall be within the tolerances shown in Table 620-2:

TABLE 620-2. MARKING DIMENSIONS AND SPACING TOLERANCE

Dimension and Spacing	Tolerance
36 inch or less	±1/2 inch
greater than 36 inch to 6 feet	±1 inch
greater than 6 feet to 60 feet	±2 inch
greater than 60 feet	±3 inch

The paint shall be mixed in accordance with the manufacturer's instructions and applied to the pavement with a marking machine at the rate shown in Table 620-1. The addition of thinner will not be permitted.

Pressure apply glass beads upon the marked areas at the locations shown on the Plans to receive glass beads immediately after application of the paint. A dispenser shall be furnished that is properly designed for attachment to the marking machine and suitable for dispensing glass beads. Glass beads shall be applied at the rate shown in Table 620-1. Glass beads shall not be applied to black paint or green paint. Glass beads shall adhere to the cured paint or all marking operations shall cease until corrections are made. Different bead types shall not be mixed. Regular monitoring of glass bead embedment and distribution should be performed.

Apply temporary markings, if required, as directed by the Engineer. If pavement is opened to traffic before the pavement curing period is complete, apply paint in two coats. Apply the first coat at least 12 hours after paving is completed at 30 to 50 percent of the total application rate. Apply an additional coat at 100 percent

of the total application rate following pavement curing time and after pavement grooving operations in affected areas. The direction of the second application shall be 180 degrees from the first to ensure complete coverage. Apply glass beads, if required, in the second coat only.

Return all emptied containers to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

620-3.6 NOT USED.

620-3.7 CONTROL STRIP. Prior to the full application of airfield markings, the Contractor shall prepare a control strip in the presence of the Engineer. The Contractor shall demonstrate the surface preparation method and all striping equipment to be used on the project. The marking equipment must achieve the prescribed application rate of paint and population of glass beads, according to Table 620-1, that are properly embedded and evenly distributed across the full width of the marking. Prior to acceptance of the control strip, markings must be evaluated during darkness to ensure a uniform appearance.

620-3.8 RETRO-REFLECTANCE TESTING (PART 139 CERTIFICATED AIRPORTS ONLY). Reflectance shall be measured with a portable retro-reflectometer meeting ASTM E1710 (or equivalent). A total of 6 reading shall be taken over a 6 square foot area with 3 readings taken from each direction. The average of all readings which are within 30% of each other shall be equal to or above the minimum levels shown in Table 620-3.

TABLE 620-3. MINIMUM RETRO-REFLECTANCE VALUES

Material	Retro-reflectance mcd/m^2/lux		
	White	**Yellow**	**Red**
Initial Type I	300	175	35
All materials, remark when less than[1]	100	75	10

[1] 'Prior to remarking determine if removal of contaminants on markings will restore retro-reflectance

620-3.9 PROTECTION AND CLEANUP. After application of the markings, all markings shall be protected from damage until dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings. The Contractor shall remove from the work area all debris, waste, loose reflective media, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

620-4.1 RUNWAY AND TAXIWAY PAINTING BY UNIT AREA. If runway and taxiway painting by unit area appears in the bid schedule, then new painted markings will be so measured.

620-4.2 REFLECTIVE MEDIA. If reflective media by unit weight appears in the bid schedule, then this material will be so measured. If reflective media appears by lump sum in the bid schedule, or does not appear at all, it will not be measured.

620-4.3 RUNWAY AND TAXIWAY PAINTING BY LUMP SUM. If Runway and Taxiway painting by a lump-sum item appears in the bid schedule, new painted markings will not be measured for payment. Reflective media is subsidiary to the work.

620-4.4 PAINTED MARKING REMOVAL. If painted marking removal by unit area, it will be measured by area. If painted marking removal by lump sum appears in the bid schedule or is absent from the bid schedule, no measurement will be made and this item will be subsidiary to painting.

620-4.5 TEMPORARY RUNWAY AMD TAXIWAY PAINTING BY SQUARE FOOT. If temporary runway and taxiway painting by square foot appears in the bid schedule, then temporary painted markings will be measured by the square foot.

BASIS OF PAYMENT

620-5.1 Payment will be made at the respective contract unit or lump sum price for the pay items listed below that appear in the bid schedule.

Payment will be made under:

Item P620.075.0000	Temporary Runway and Taxiway Painting – per square foot

TESTING REQUIREMENTS

ASTM C371	Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D92	Flash and Fire Points by Cleveland Open Cup
ASTM D711	No-Pick-Up Time of Traffic Paint
ASTM D968	Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1652	Epoxy Content of Epoxy Resins
ASTM D2074	Total Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D2240	Rubber Products-Durometer Hardness
ASTM D7585	Standard Practice for Evaluating Retroreflective Pavement Markings Using Portable Hand-Operated Instruments
ASTM E1710	Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM G53	Operating Light and Water-Exposure Apparatus (Florescent UV-Condensation Type) for Exposure of Nonmetallic Materials.
Federal Test Method Standard No. 141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

MATERIAL REQUIREMENTS

ASTM D476	Titanium Dioxide Pigments
Code of Federal Regulations	40 CFR Part 60, Appendix A-7, Method 24. Determination volatile matter content, water content, density, volume solids, and weight solids of surface coatings
Code of Federal Regulations	29 CFR Part 1910.1200 – Hazard Communications

Fed. Spec. TT-B-1325D	Beads (Glass Spheres) Retroreflective
Fed. Spec. TT-P1952F	Paint, traffic and Airfield Marking, Waterborne
Federal Standard 595	Colors used in Government Procurement
Commercial Item Description	A-A-2886B Paint, Traffic, Solvent Based
Advisory Circular 150/5340-1	Standard for Airport Markings
Advisory Circular 150/5320-12	Measurement, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces

ITEM P-641 EROSION, SEDIMENT, AND POLLUTION CONTROL

641-1.1 DESCRIPTION. Provide project administration and Work relating to control of erosion, sedimentation, and discharge of pollutants, according to this section and applicable local, state, and federal requirements, including the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (CGP). The state APDES program is administered by the Alaska Department of Environmental Conservation (ADEC). Section 301(a) of the Clean Water Act (CWA) and 18 AAC 83.015 provide that the discharge of pollutants to the waters of the United States (U.S.) is unlawful except as allowed by the CGP.

Temporary erosion control measures shall be in accordance with the Erosion and Sediment Control Plan (ESCP); the approved Construction Safety and Phasing Plan (CSPP), and AC 150/5370-2, *Operational Safety on Airports During Construction*. The temporary erosion control measures contained herein shall be coordinated with the permanent erosion control measures specified as part of this contract to the extent practical to assure economical, effective, and continuous erosion control throughout the construction period.

Temporary erosion and sediment control measures may include work outside the construction limits such as borrow pit operations, equipment and material storage sites, waste areas, and temporary plant sites, when such areas are included in the Project Zone.

Temporary control measures shall be designed, installed and maintained:

a. outside of safety areas of active runways and taxiways, and

b. to minimize the creation of wildlife attractants that have the potential to attract hazardous wildlife on or near airports.

DEFINITIONS AND TERMS

641-1.2 These definitions apply only to Item P-641.

ACTIVE TREATMENT SYSTEM (ATS) OPERATOR. The Contractor's qualified representative who is responsible for maintaining and operating an active treatment system (as defined in the CGP) for storm water runoff.

ALASKA CERTIFIED EROSION AND SEDIMENT CONTROL LEAD (AK-CESCL). A person who has completed training, testing, and other requirements of, and is currently certified as, an AK-CESCL from an AK-CESCL Training Program (a program developed under a Memorandum of Understanding between the Department and others). The Department recognizes AK-CESCLs as "qualified personnel" required by the CGP. An AK-CESCL must be recertified every three years. See subsection 641-1.2. QUALIFIED PERSON for the definition.

ALASKA DEPARTMENT OF ENVIRONMENTAL CONSERVATION (ADEC). The state agency authorized by the Environmental Protection Agency (EPA) to administer the APDES.

ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM (APDES). A system administered by ADEC that issues and tracks permits for storm water discharges.

BEST MANAGEMENT PRACTICES (BMPs). Temporary or permanent structural and non-structural devices, schedules of activities, prohibition of practices, maintenance procedures, and other management practices to prevent or minimize the discharge of pollutants to waters of the United States. BMPs also include, but are not limited to, treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from material storage.

CLEAN WATER ACT (CWA). Federal Water Pollution Control Amendments of 1972, as amended (33 U.S.C. 1251 et seq.).

CONSTRUCTION ACTIVITY. Physical activity by the Contractor, Subcontractor or utility company; that may result in erosion, sedimentation, or a discharge of pollutants into storm water. Construction Activity includes soil disturbing activities (e.g. clearing, grubbing, grading, excavating); and establishment of construction materials or equipment storage or maintenance areas (e.g. material piles, borrow area, concrete truck chute washdown, fueling); and industrial activities that may discharge storm water and are directly related to the construction process (e.g. concrete or asphalt batch plants).

CONSTRUCTION GENERAL PERMIT (CGP). The permit authorizing storm water discharges from Construction Activities, issued and enforced by ADEC. It authorizes storm water discharges provided permit conditions and water quality standards are met.

ELECTRONIC NOTICE OF INTENT (ENOI). The electronic Notice of Intent submitted to ADEC, to obtain coverage under the CGP.

ELECTRONIC NOTICE OF TERMINATION (ENOT). The electronic Notice of Termination submitted to ADEC, to end coverage under the CGP.

ENVIRONMENTAL PROTECTION AGENCY (EPA). A federal agency charged to protect human health and the environment.

ERODIBLE STOCKPILE. Any material storage area or stockpile consisting of mineral aggregate, organic material, or a combination thereof, with greater than 5% passing the No. 200 sieve, and any material storage where wind or water transports sediments or other pollutants from the stockpile. Erodible Stockpile also includes any material storage area or stockpile, where the Engineer determines there is potential for wind or water transport, of sediments or other pollutants away from the stockpile.

EROSION AND SEDIMENT CONTROL PLAN (ESCP). The Department's project specific document that illustrates measures to control erosion and sediment on the project. The ESCP provides bidders with the basis for cost estimating and guidance for developing an acceptable Storm Water Pollutant Prevention Plan (SWPPP).

FINAL STABILIZATION. Is defined in this item as it is defined in Appendix C of the CGP.

HAZARDOUS MATERIAL CONTROL PLAN (HMCP). The Contractor's detailed project specific plan for prevention of pollution from storage, use, transfer, containment, cleanup, and disposal of hazardous material (including, but are not limited to, petroleum products related to construction activities and equipment). The HMCP is included as an appendix to the SWPPP.

INSPECTION. An inspection required by the CGP or the SWPPP, usually performed together by the Contractor's SWPPP Manager and Department's Storm Water Inspector.

MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) PERMIT. An ADEC storm water discharge permit issued to certain local governments and other public bodies, for operation of storm water conveyances and drainage systems. See CGP for further definition.

MULTI-SECTOR GENERAL PERMIT (MSGP). The APDES General Permit for storm water discharges associated with industrial activity.

OPERATOR(S). The party or co-parties associated with a regulated activity that has responsibility to obtain permit coverage under the CGP. "Operator" for the purpose of the CGP and in the context of storm water associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:

a. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

b. The party has day to day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g. they are authorized

to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

POLLUTANT. Any substance or item meeting the definition of pollutant contained in 40 CFR § 122.2. A partial listing from this definition includes: dredged spoil, solid waste, sediment, sewage, garbage, sewage sludge, chemical wastes, biological materials, wrecked or discarded equipment, rock, sand, cellar dirt and industrial or municipal waste.

PROJECT ZONE. The physical area provided by the Department for construction. The Project Zone includes the area of highway or facility under construction, project staging and equipment areas, and material and disposal sites; when those areas, routes and sites, are provided by the Contract.

Material sites, material processing sites, disposal sites, haul routes, staging and equipment storage areas; that are furnished by the Contractor or a commercial operator, are not included in the Project Zone.

QUALIFIED PERSON. A person knowledgeable in the principles and practice of erosion and sediment controls. A Qualified Person must be certified either under the AK-CESCL training program. One of the following training and certification programs may substitute for AK-CESCL certification: ENVIROCERT's Certified Professional in Erosion & Sediment Control (CPESC), Certified Erosion, Sediment, and Stormwater Inspector (CESSWI), The Certified Professional in Stormwater Quality (CPSWQ), or CISEC's Certified Inspector of Sediment and Erosion Control (CISEC). For additional information, see Appendix C of the CGP.

RECORDS. Any record, report, information, document or photograph required to be created or maintained pursuant to the requirements of the CGP, the CGP storm water requirements of the Clean Water Act; and applicable local, state, and federal laws and regulations regarding document preservation.

SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN (SPCC PLAN). The Contractor's detailed plan for petroleum spill prevention and control measures that meet the requirements of 40 CFR 112.

SPILL RESPONSE FIELD REPRESENTATIVE. The Contractor's representative with authority and responsibility for managing, implementing, and executing the HMCP and SPCC Plan.

STORM EVENT. A rainfall event that produces more than 0.5-inch of precipitation in 24 hours and that is separated from the previous storm event by at least 3 days of less than 0.1-inch of rain per day.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP). The Contractor's detailed project specific plan to minimize erosion and contain sediment within the Project Zone, and to prevent discharge of pollutants that exceed applicable water quality standards. The SWPPP includes, but is not limited to, amendments, records of activities, inspection schedules and reports, qualifications of key personnel, and all other documentation, required by the CGP and this specification, and other applicable local, state, and federal laws and regulations.

STORM WATER POLLUTION PREVENTION PLAN TWO (SWPPP2). The Contractor's detailed project specific plan to comply with CGP or MSGP requirements, for Contractor construction-related activities outside the Project Zone.

SUBCONTRACTOR SPILL RESPONSE COORDINATOR. The subcontractor's representative with authority and responsibility for coordinating the subcontractor's activities in compliance with the HMCP and SPCC Plan.

SUBCONTRACTOR SWPPP COORDINATOR. The subcontractor's representative with authority to direct the subcontractor's work, and who is responsible for coordination with the Superintendent and SWPPP Manager, and for the subcontractor's compliance with the SWPPP.

SUPERINTENDENT. The Contractor's duly authorized representative in responsible charge of the work. The Superintendent has responsibility and authority for the overall operation of the Project and for Contractor furnished sites and facilities directly related to the Project.

SWPPP AMENDMENT. A revision or document that adds to, deletes from, or modifies the SWPPP.

SWPPP MANAGER. The Contractor's qualified representative who conducts Inspections, updates SWPPP records, and has authority to suspend work and to implement corrective actions required for CGP compliance.

SWPPP PREPARER. The Contractor's qualified representative who is responsible for developing the initial SWPPP.

TEMPORARY STABILIZATION. Protecting soils from erosion and sediment loss by rainfall, snow melt, runoff, or wind with a temporary vegetative and/or non-vegetative protection cover. Temporary stabilization may include a combination of seeding, geotextiles, mulches, surface tackifiers, rolled erosion control products, low erodible gravel or paving, or the mentioned BMP's combined together with trackwalking.

U.S. ARMY CORPS OF ENGINEERS PERMIT (USACE PERMIT). A USACE Permit for construction in the waters of the U.S. Such permit may be issued under Section 10 of the Rivers and Harbors Act of 1899, or Section 404 of the Clean Water Act.

UTILITY SPILL RESPONSE COORDINATOR. The Utility's representative with authority and responsibility for coordinating the Utility's activities in compliance with the HMCP and SPCC Plan.

UTILITY SWPPP COORDINATOR. The Utility's representative with authority to direct the Utility's work, and who is responsible for coordination with the Superintendent and SWPPP Manager, and for the Utility's compliance with the SWPPP.

641-1.3 PLAN AND PERMIT SUBMITTALS.

For plans listed in GCP subsection 80-03d (SWPPP, HMCP, and SPCC), use the Contractor submission and Department review deadlines identified in Subsection 641-1.3.

Partial and incomplete submittals will not be accepted for review. Any submittal that is re-submitted or revised after submission, but before the review is completed, will restart the submittal review timeline. No additional Contract time or additional compensation will be allowed due to delays caused by partial or incomplete submittals, or required re-submittals.

a. **Storm Water Pollution Prevention Plan**. Submit an electronic copy and three hard copies of the SWPPP to the Engineer for approval. Deliver these documents to the Engineer at least 21 days before beginning Construction Activity. Organize and bind the SWPPP and related documents for submittal according to the requirements of Subsection 641-2.1b

   The Department will review the SWPPP submittals within 14 days after they are received. Submittals will be returned to the Contractor, and marked as either "rejected" with reasons listed or as "approved" by the Department. When the submittal is rejected, the Contractor must revise and resubmit the SWPPP. The 14 day review period will restart when the contractor submits an electronic copy and three hard copies of the revised SWPPP to the Engineer for approval.

   After the SWPPP is approved by the Department, the Contractor must sign and certify the approved SWPPP using Form 25D-111. See Subsection 641-1.3d for further SWPPP submittal requirements.

b. **Hazardous Material Control Plan**. The HMCP Template can be found at the following webpage: http://www.dot.state.ak.us/stwddes/dcsconst/pop_constforms.shtml. Submit an electronic copy and three hard copies of the HMCP, as an appendix to the SWPPP, to the Engineer for approval. The HMCP submittal and review timeline, and signature requirements are the same as the SWPPP.

c. **Spill Prevention, Control and Countermeasure Plan**. When a SPCC Plan is required under Subsection 641-2.3, submit an electronic copy and three signed hard copies of the SPCC Plan to the Engineer. Deliver these documents to the Engineer at least 21 days before beginning Construction Activity. The Department reserves the right to review the SPCC Plan and require modifications.

d. **CGP Coverage**. The Contractor is responsible for permitting of Contractor and subcontractor Construction Activities related to the Project. Do not use the SWPPP for Construction Activities outside the Project Zone where the Department is not an operator. Use a SWPPP2 for Construction Activities outside the Project Zone.

After Department approval of the SWPPP and prior to beginning Construction Activity, submit an eNOI with the required fee to ADEC for coverage under the Construction General Permit (CGP). Submit a copy of the signed eNOI and ADEC's written acknowledgement (by letter or other document), to the Engineer as soon as practicable and no later than three days after filing eNOI or receiving a written response.

Do not begin Construction Activity until the conditions listed in Subsection 641-3.1a are completed.

The Department will submit an eNOI to ADEC for Construction Activities inside the Project Zone. The Engineer will provide the Contractor with a copy of the Department's eNOI and ADEC's written acknowledgment (by letter or other document), for inclusion in the SWPPP.

Before Construction Activities occur, transmit to the Engineer an electronic copy of the approved and certified SWPPP, with signed Delegations of Signature Authorities on Forms 25D-107 and 25D-108, SWPPP Certifications on Forms 25D-111 and 25D-109, both permittee's signed eNOIs and ADEC's written acknowledgement.

e. **Ending CGP Coverage**. Submit an eNOT to ADEC within 30 days after the Engineer has determined the conditions listed in Subsection 641-3.1f have been met. Submit a copy of the signed eNOT and ADEC's acknowledgement letter to the Department within three days of filing the eNOT or receiving a written response.

f. **ADEC SWPPP Review**. When CGP Part 2.1.3, requires ADEC SWPPP review:

(1) Transmit a copy of the Department-approved SWPPP to ADEC using delivery receipt confirmation;

(2) Transmit a copy of the delivery receipt confirmation to the Engineer within seven (7) days of receiving the confirmation; and

(3) Retain a copy of delivery receipt confirmation in the SWPPP.

g. **Local Government SWPPP Review**. When local government or the CGP Part 2.1.4, requires local government review:

(1) Transmit a copy of the Department-approved SWPPP and other information as required to local government, with the required fee. Use delivery receipt confirmation;

(2) Transmit a copy of the delivery receipt confirmation to the Engineer within seven days of receiving the confirmation;

(3) Transmit a copy of any comments by the local government to the Engineer within seven days of receipt;

(4) Amend the SWPPP as necessary to address local government comments and transmit SWPPP Amendments to the Engineer within seven days of receipt of the comments;

(5) Include a copy of local government SWPPP review letter in the SWPPP; and

(6) File a notification with local government that the project is ending.

h. Modifying Contractor's eNOI. When required by the CGP Part 2.7, modify your eNOI to update or correct information within 30 calendar days of the change. Reasons for modification include a change in start or end dates, change in Owner/Operator address and contact information, change in site information, any changes in number of acres to be disturbed, change in decision to use or not use treatment chemicals, or change in location of SWPPP records.

The Contractor must submit an eNOT and then submit a new eNOI instead of an eNOI modification when the operator has changed.

641-1.4 PERSONNEL QUALIFICATIONS. Provide documentation in the SWPPP that the individuals serving in these positions meet the personnel qualifications.

a. The SWPPP Preparer:

(1) Total disturbed acreage 20 acres or less, must meet at least one of the following qualifications:

(a) Current certification as a Certified Professional in Erosion and Sediment Control (CPESC);

(b) Current certification as AK-CESCL, and at least two years' experience in erosion and sediment control, as a SWPPP Manager or SWPPP writer, or equivalent. Provide documentation including project names, project timelines, and work responsibilities demonstrating the experience requirement; or

(c) Professional Engineer registered in the State of Alaska with current certification as AK-CESCL.

(2) Total disturbed acreage greater than 20 acres, meet 641-1.4a(1) above, and complete a SWPPP Preparation course.

b. The Superintendent must meet the following qualifications:

(1) Current certification as AK-CESCL; and

(2) Duly authorized representative, as defined in Appendix A, Part 1.12.3 of the CGP.

c. The SWPPP Manager must have current certification as AK-CESCL. The SWPPP Manager must meet the experience, and authority requirements identified in the CGP for the Storm Water Lead and Storm Water Inspector positions.

d. The Active Treatment System (ATS) operator must have current certification as AK-CESCL, and be knowledgeable in the principles and practices of treatment systems in general, and the operation of the project-specific ATS. The ATS operator must have at least three months field experience with ATS, or completion of an ATS manufacturer's training course, or completion of system operator certification course.

e. The Department accepts people having any of the following certificates as equivalent to AK-CESCL, if the certificates are current according to the sponsoring organization's policies:

(1) CPESC

(2) CISEC

(3) CESSWI

(4) CPSWQ

641-1.5 SIGNATURE/CERTIFICATION REQUIREMENTS AND DELEGATIONS.

a. eNOI and eNOT. The eNOI and eNOT must be signed and certified by a responsible corporate officer according to CGP Appendix A, Part 1.12. Signature and certification authority for the eNOI and eNOT cannot be delegated.

b. Delegation of Signature Authority for Other SWPPP Documents and Reports. Use Form 25D-108 to delegate signature authority and certification authority to the Superintendent position, according to CGP Appendix A, Part 1.12.3, for the SWPPP, Inspection Reports and other reports required by the CGP. The Superintendent position is responsible for signing and certifying the SWPPP, Inspection Reports, and other reports required by the CGP, except the eNOI and eNOT.

The Engineer will provide the Department's delegation on Form 25D-107, which the Contractor must include in the SWPPP.

c. Subcontractor Certification. Subcontractors must certify on Form 25D-105, that they have read and will abide by the CGP and the conditions of the project SWPPP.

d. Signatures and Initials. Handwrite signatures or initials on CGP documents and SWPPP forms, wherever a signature or initial is required.

641-1.6 RESPONSIBILITY FOR STORM WATER PERMIT COVERAGE.

a. The Department and the Contractor are jointly responsible for permitting and permit compliance within the Project Zone.

b. The Contractor is responsible for permitting and permit compliance outside the Project Zone. The Contractor has sole responsibility for compliance with ADEC, USACE, and other applicable federal, state, and local requirements, and for securing all necessary clearances, rights, and permits. GCP subsection 70-02 describes the requirement to obtain permits, and to provide permit documents to the Engineer.

c. An entity that owns or operates, a commercial plant (as defined in GCP subsection 80-01d. or material source or disposal site outside the Project Zone, is responsible for permitting and permit compliance. The Contractor has sole responsibility to verify that the entity has appropriate permit coverage. GCP subsection 70-02 describes the requirement to obtain permits, and to provide permit documents to the Engineer.

d. The Department is not responsible for permitting or permit compliance, and is not liable for fines resulting from noncompliance with permit conditions:

(1) For areas outside the Project Zone;

(2) For Construction Activity and Support Activities outside the Project Zone; and

(3) For commercial plants, commercial material sources, and commercial disposal sites.

641-1.7 UTILITY. (RESERVED FOR REGIONS)

641-2.1 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS.

a. SWPPP Preparer and Pre-Construction Site Visit.

Use a SWPPP Preparer to develop the SWPPP and associated documents, according to the requirements of the CGP and COE permit. The SWPPP Preparer must put their name,

qualifications (including the expiration date of any certifications), title and company name in the SWPPP.

The SWPPP Preparer must conduct a pre-construction inspection at the Project site before construction activity begins. If the SWPPP Preparer is not a Contractor employee, the SWPPP Preparer must visit the site accompanied by the Contractor. Give the Department at least seven days advance notice of the site visit, so that the Department may participate.

During the pre-construction inspection, the SWPPP Preparer must identify, or if a draft of the SWPPP has already been prepared verify that the SWPPP fully addresses and describes:

(1) Opportunities to phase construction activities;

(2) Appropriate BMPs and their sequencing; and

(3) Sediment controls that must be installed prior to beginning Construction Activities.

Document the SWPPP Preparer's pre-construction inspection in the SWPPP on Form 25D-106, SWPPP Pre-Construction Site Visit, including the names of attendees and the date.

b. Developing the SWPPP.

Use the Department's ESCP, Environmental commitments, and other Contract documents as a starting point for developing the SWPPP. The approved SWPPP replaces the ESCP.

Develop the SWPPP with sections and appendices, according to the current Alaska State Department of Transportation (DOT&PF) SWPPP template. Include information required by the Contract and described in the CGP Part 5.0.

(1) Obtain the following forms after they have been completed by the Department and include them in the SWPPP:

(a) SWPPP Delegation of Signature Authority – DOT&PF (25D-107)

(b) SWPPP Certification for DOT&PF (25D-109)

(c) SWPPP Delayed Action Item Report (25D-113), if needed

(2) Use the following Department forms for recording information in the SWPPP:

(a) SWPPP Amendment Log (25D-114)

(b) SWPPP Certification for Contractor (25D-111)

(c) SWPPP Construction Site Inspection Report (25D-100)

(d) SWPPP Corrective Action Log (25D-112)

(e) SWPPP Daily Record of Rainfall (25D-115)

(f) SWPPP Delegation of Signature Authority – Contractor (25D-108)

(g) SWPPP Grading and Stabilization Activities Log (25D-110)

(h) SWPPP Pre-Construction Site Visit (25D-106)

(i) SWPPP Project Staff Tracking (25D-127)

(j) SWPPP Subcontractor Certification (25D-105)

(k) SWPPP Training Log (25D-125)

(l) SWPPP Noncompliance (25D-143)

SWPPP Template, forms, and instructions are available online at:

http://www.dot.state.ak.us/stwddes/dcsconst/pop_constforms.shtml

Compile the SWPPP in three ring binders with tabbed and labeled dividers for each section and appendix.

c. SWPPP Considerations and Contents.

(1) The SWPPP must provide erosion and sediment control measures for all Construction Activity within the Project Zone. Construction activity outside the Project Zone must have permit coverage, using a separate SWPPP2, and separate Contractor Inspections.

(2) The SWPPP must consider the activities of the Contractor and all subcontractors and utility companies performing work in the Project Zone. The SWPPP must describe the roles and responsibilities of the Contractor, subcontractors, utility companies, and the Department with regard to implementation of the SWPPP. The SWPPP must identify all operators for the Project, including utility companies performing Construction Activity, and identify the areas:

(a) Over which each operator has operational control; and

(b) Where the Department and Contractor are co-operators.

(3) For work outside the Project Zone the SWPPP must identify the entity that has storm water permit coverage, the operator, and the areas that are:

(a) Dedicated to the Project and where the Department is not an operator; and

(b) Not dedicated to the project, but used for the project.

(4) Account for the Contractor's construction methods and phasing. Identify the amount of mean annual precipitation.

(5) Comply with the CGP Part 1.4.3 Authorized Non-Storm Water Discharges. List locations where authorized non-storm water will be used, including the types of water that will be used on-site.

(6) Include the Department's Anti-degradation Analysis in the SWPPP if storm water from the Project Zone discharges into receiving water that is considered a high quality water and that constitutes an outstanding national resource, according to CGP Part 2.1.6.

(7) Where the project intersects a Public Water System (PWS), the Engineer will notify the PWS contact for the Department and Contractor according to the CGP Part 4.10. Contractor Amend a copy of the communications in Appendix Q.

(8) There are special requirements in the CGP Part 3.2, for storm water discharges into an impaired water body, and they may include monitoring of storm water discharges. For Projects meeting the permit criteria, the Contractor shall implement a monitoring plan approved by the Department for the storm water within the Project Zone, and shall provide the required information and reports for inclusion in the SWPPP. The Contractor is responsible for monitoring and reporting outside the Project Zone.

(9) Preserve natural topsoil unless infeasible. Delineate the site according to CGP Part 4.2.1. Use stakes, flags, or silt fence, etc. to identify areas where land disturbing activities will occur and

areas that will be left undisturbed. Minimize the amount of soil exposed during Construction activity according to CGP Part 4.2.2.

(10) Comply with CGP Part 4.4, and the ADEC General Permit for Excavation Dewatering (AKG002000), requirements for dewatering for trenches and excavations.

(11) The SWPPP must identify specific areas where potential erosion, sedimentation, or pollution may occur. The potential for wind erosion must be addressed. The potential for erosion at drainage structures must be addressed.

(12) Describe methods and time limits, to initiate temporary or final soil stabilization, CGP Part 4.5.1.1. Begin stabilization no later than the end of the next work day, following the day when the earth-disturbing activities have permanently ceased on any portion of the site or temporarily ceased on any portion of the site and will not resume for a period exceeding:

(a) Seven days for areas with mean annual precipitation 40 inches or greater; or

(b) Fourteen days for areas with mean annual precipitation less than 40 inches.

(c) Time allotted to complete temporary and final stabilization, Subsection 641-2.1(c)(13)

(13) Within seven days of initiating final stabilization, CGP Part 4.5.1.4, either complete final stabilization or continue maintenance of work until final stabilization is complete. Complete temporary stabilization within fourteen days of initiating stabilization, CGP Part 4.5.1.2.

(14) Include in the "Stabilize Soils" section of the SWPPP, a description of how you will minimize the amount of disturbed and unstabilized ground in the fall season. Identify anticipated dates of fall freeze-up and spring thaw. Describe how you will stabilize areas when it is close to or past the seasonal time of snow cover or frozen conditions, and before the first seasonal thaw. Include a plan for final stabilization.

(15) Plans for Active Treatment Systems must be submitted to ADEC for review at least 14 days prior to use of the system and the Operator of the ATS identified in the SWPPP. Any use of treatment chemicals must be identified on the NOI, documented in the SWPPP, and meet with the requirements in the CGP Part 4.6.

(16) The SWPPP must provide designated areas for equipment and wheel washing, equipment fueling and maintenance, chemical storage, staging or material storage, waste or disposal sites, concrete washouts, paint and stucco washouts, and sanitary toilets. These activities must be done in designated areas that are located, to the extent practicable, away from drain inlets, conveyance channels, and waters of the US. No discharges are allowed from concrete washout, paint and stucco washout; or from release oils, curing compounds, fuels, oils, soaps, and solvents. Equipment and wheel washing water that doesn't contain detergent may be discharged on-site if it is treated before discharge.

(17) Design temporary BMPs for a 2 year 24 hour precipitation amount. Describe BMPs in the SWPPP and in SWPPP Amendments, including source controls, sediment controls, discharge points, and temporary and final stabilization measures. Describe the design, placement, installation, and maintenance of each BMP, using words and drawings as appropriate. Describe the design capacity of sediment basins (including sediment ponds and traps). Provide a citation to the BMP Manual or publication used as a source for the BMP, including the manufacturer's or BMP manual specifications for installation (CGP Part 5.3.6.2). If no published source was used to select or design a BMP, then the SWPPP or SWPPP amendment must state that "No BMP manual or publication was used for this design."

(18) Describe the sequence and timing of activities that disturb soils and of BMP implementation and removal. Phase earth disturbing activities to minimize unstabilized areas, and to achieve

temporary or final stabilization quickly. Whenever practicable incorporate final stabilization work into excavation, embankment and grading activities. Include drawings showing each phase of the project with the BMPs implemented in the phase.

(19) Provide a legible site map or set of maps in the SWPPP, showing the entire site and identifying boundaries of the property where construction and earth-disturbing activities will occur, as described in the CGP Part 5.3.5. Include all BMPs on the site map.

(20) Identify the inspection frequency in the SWPPP.

(a) For areas of the state where the mean annual precipitation is less than 40 inches:

(1) Inspect at least once every seven calendar days; or

(2) Inspect at least once every 14 calendar days and within 24 hours of the end of a storm event that resulted in a discharge from the site.

(b) For areas of the state where the mean annual precipitation is 40 inches or greater:

(1) Inspect at least once every seven calendar days.

(21) Linear Project Inspections, described in CGP Part 6.5, are not applicable to this contract.

(22) The SWPPP must cite and incorporate applicable requirements of the Project permits, environmental commitments, COE permit, and commitments related to historic preservation. Make additional consultations or obtain permits as necessary for Contractor specific activities that were not included in the Department's permitting and consultation.

(23) The SWPPP is a dynamic document. Keep the SWPPP current by noting installation, modification, and removal of BMPs, and by using amendments, SWPPP amendment logs, Inspection Reports, corrective action logs, records of land disturbance and stabilization, and any other records necessary to document storm water pollution prevention activities and to satisfy the requirements of the CGP and this specification. See Subsection 641-3.3 for more information.

d. Recording Personnel and Contact Information in the SWPPP.

Identify the SWPPP Manager as the Storm Water Lead and Storm Water Inspector positions in the SWPPP. Document the SWPPP Manager's responsibilities in Section 2.0 Storm Water Contacts, of the SWPPP template and:

(1) Identify that the SWPPP Manager does not have authority to sign inspection reports (unless the SWPPP Manager is also the designated project Superintendent).

(2) Identify that the SWPPP Manager cannot prepare the SWPPP unless the SWPPP Manager meets the Contract requirements for the SWPPP Preparer.

Include in the SWPPP proof of AK-CESCL or equivalent certifications for the Superintendent and SWPPP Manager, and for any acting Superintendent and acting SWPPP Managers. If the Superintendent or SWPPP Manager is replaced permanently or temporarily, by an acting Superintendent or acting SWPPP Manager; record in the SWPPP (use Form 25D-127) the names of the replacement personnel, the date of the replacement. For temporary personnel record their beginning and ending dates.

Provide 24 hour contact information for the Superintendent and SWPPP Manager. The Superintendent and SWPPP Manager must have 24 hour contact information for all Subcontractor SWPPP Coordinators and Utility SWPPP Coordinators.

Include in the SWPPP proof of AK-CESCL or equivalent certifications of ATS operators. Record names of ATS operators and their beginning and ending dates, on Form 25D-127.

The Department will provide proof of AK-CESCL, or equivalent certifications for the Department's Project Engineer, Storm Water Inspectors, and Monitoring Person (if applicable), and names and dates they are acting in that position. Include the Department's staff certifications in Appendix D. Include Department's staff names, dates acting, and assignments, in Section 2.0 of the SWPPP.

641-2.2 HAZARDOUS MATERIAL CONTROL PLAN (HMCP) REQUIREMENTS.

a. Prepare the HMCP using the DOT&PF template located at the following DOT&PF link; http://www.dot.state.ak.us/stwddes/dcspubs/forms.shtml for prevention of pollution from storage, use, containment, cleanup, and disposal of all hazardous material, including petroleum products related to construction activities and equipment. Include the HMCP as an appendix to the SWPPP. Compile Material Safety Data Sheets in one location and reference that location in the HMCP.

b. Designate a Contractor's Spill Response Field Representative with 24-hour contact information. Designate a Subcontractor Spill Response Coordinator for each subcontractor. The Superintendent and Contractor's Spill Response Field Representative must have 24-hour contact information for each Subcontractor Spill Response Coordinator and the Utility Spill Response Coordinator.

c. List and give the location and estimated quantities of hazardous materials (Including materials or substances listed in 40 CFR 117 and 302, and petroleum products) to be used or stored on the Project. Hazardous materials must be stored in covered storage areas. Include secondary containment for all hazardous material storage areas.

d. Identify the locations where fueling and maintenance activities will take place, describe the activities, and list controls to prevent the accidental spillage of petroleum products and other hazardous materials. Controls include placing absorbent pads or other suitable containment under fill ports while fueling, under equipment during maintenance or repairs, and under leaky equipment.

e. List the types and approximate quantities of response equipment and cleanup materials available on the Project. Include a list and location map of cleanup materials, at each different work site and readily available off site (materials sources, material processing sites, disposal sites, staging areas, etc.). Spill response materials must be stored in sufficient quantity at each work location, appropriate to the hazards associated with that site.

f. Describe procedures for containment and cleanup of hazardous materials. Describe a plan for the prevention, containment, cleanup, and disposal of soil and water contaminated by spills. Describe a plan for dealing with contaminated soil and water encountered during construction. Clean up spills or contaminated surfaces immediately.

g. Describe methods of disposing of waste petroleum products and other hazardous materials generated by the Project, including routine maintenance. Identify haul methods and final disposal areas. Assure final disposal areas are permitted for hazardous material disposal.

h. Describe methods of complying with the requirements of AS 46.04.010-900, Oil and Hazardous Substances Pollution Control, and 18 AAC 75. Include contact information for reporting hazardous materials and petroleum product spills to the Project Engineer and reporting to federal, state, and local agencies.

641-2.3 SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN (SPCC PLAN) REQUIREMENTS.

Prepare and implement an SPCC Plan when required by 40 CFR 112 when both of the following conditions are present on the Project:

a. Oil or petroleum products from a spill may reach navigable waters (as defined in 40 CFR 112); and

b. Total above ground storage capacity for oil and any petroleum products is greater than 1,320 gallons (not including onboard tanks for fuel or hydraulic fluid used primarily to power the movement of a motor vehicle or ancillary onboard oil-filled operational equipment, and not including containers with a storage capacity of less than 55 gallons)

Reference the SPCC Plan in the HMCP and SWPPP.

641-2.4 RESPONSIBILITY AND AUTHORITY OF THE SUPERINTENDENT AND SWPPP MANAGER.

The Superintendent is responsible for the overall operation of the Project and all Contractor furnished sites and facilities directly related to the Project. The Superintendent shall sign and certify the SWPPP, Inspection Reports, and other reports required by the CGP, except the NOI and NOT. The Superintendent may not delegate the task or responsibility of signing and certifying the SWPPP submitted under Subsection 641-1.3.a, Inspection Reports, and other reports required by the CGP.

The Superintendent may assign certain duties to the SWPPP Manager.

a. Ensuring Contractor's and subcontractor's compliance with the SWPPP and CGP;

b. Ensuring the control of erosion, sedimentation, or discharge of pollutants;

c. Directing and overseeing installation, maintenance, and removal of BMPs;

d. Performing Inspections; and

e. Updating the SWPPP including adding amendments and forms.

When Bid Item P641.070.0000 is part of the Contract, the SWPPP Manager must be available at all times to administer SWPPP requirements, and be physically present within the Project Zone or the project office, for at least eight hours per day when construction activities are occurring.

The Superintendent and SWPPP Manager shall be knowledgeable in the requirements of this Item P-641, the SWPPP, CGP, BMPs, HMCP, SPCC Plan, environmental permits, environmental commitments, and historic preservation commitments.

The Superintendent and SWPPP Manager shall have the Contractor's complete authority and be responsible for suspending construction activities that do not conform to the SWPPP or CGP.

641-2.5 MATERIALS. Use materials suitable to withstand hydraulic, wind, and soil forces, and to control erosion and trap sediments according to the requirements of the CGP and the Specifications.

a. **Seed Mix.** Use the seed mixture specified in Item T-901, or as directed by the Engineer.

b. **Soil Stabilization.** Use soil stabilization material as specified in Item P-682 and T-908.

c. **Silt Fence.** Use silt fences as specified in Item P-680.

d. **Straw.** Use straw and straw products certified weed free of prohibited and restricted noxious weed seed and quarantined pests, according to Alaska Administrative Code, Title 11, Chapter 34 (11 AAC 34). When straw or straw products certified according to 11 AAC 34 are not available, use non-certified products manufactured within Alaska before products manufactured in another state, country or territory. Grass, legumes, or any other herbaceous plants produced as hay, shall not be substituted for straw or straw products.

e. **Other.** Use Oregon Scientific RGR126 wireless rain gauge with temperature, or Taylor 2751 Digital Wireless Rain Gauge with Thermometer, or approved equivalent.

CONSTRUCTION REQUIREMENTS

641-3.1 GENERAL. Comply with the SWPPP and the requirements of the CGP Part 5.0.

a. Before Construction Activity may Begin. The following actions must be completed before Construction Activity begins:

(1) The SWPPP Preparer must visit the Project, the visit must be documented in the SWPPP Form (25D-106), and the SWPPP must be developed (or amended) with findings from the visit;

(2) The SWPPP must be approved by the Engineer on Form 25D-109;

(3) The Contractor must be authorized to begin by the Engineer;

(4) The Project eNOIs for the Department and for the Contractor, as well as any other eNOIs if there are additional operators, must be listed as Active Status on the ADEC website;

(5) The Department approved SWPPP must be submitted to ADEC and Local Government (when required); and

(6) The Contractor has transmitted to the Engineer an electronic copy and at least one hardcopy of the approved SWPPP.

(7) The Delegation of Authority (Forms 25D-108 and 25D-107) for both the Contractor and DOT&PF Engineer are signed.

(8) Begin winter construction activity according to CGP Part 4.12.2, provided actions (1), (3), and (7) are completed. If winter construction activities may extend beyond spring thaw, the following actions must be completed before spring thaw:

(a) Actions (1) through (7), listed above, and

(b) Appropriate control measures to minimize erosion and sediment runoff during spring thaw and summer rainfall are installed.

(9) Post notices. Include the following information:

(a) Copy of all eNOIs related to this project;

(b) Location of the SWPPP.

Post notices on the outside wall of the Contractor's project office, and near the main entrances of the construction project. Protect postings from the weather. Locate postings so the public can safely read them without obstructing construction activities or the traveling public (for example, at an existing pullout). Do not use retroreflective signs for the SWPPP posting. Do not locate SWPPP signs in locations where the signs may be confused with traffic control signs or devices. Update the notices if the listed information changes.

(10) Install an outdoor rain gauge per manufacturer's guidance in a readily accessible location on the Project. Projects may utilize the nearest National Weather Service (NWS) precipitation gauge station, if within 20 miles of the project, to determine rainfall amounts during storm events.

(11) Delineate the site for both land disturbing activities and areas that will be left undisturbed.

(12) Install sediment controls and other BMPs that must be placed prior to the initiation of Construction Activity.

b. During Construction. Before subcontractors or utility companies begin soil disturbing activities, provide to them copies of applicable portions of the SWPPP, and require them to sign a SWPPP Subcontractor Certification, Form 25D-105. Include SWPPP Subcontractor Certifications as an appendix to the SWPPP. Ensure subcontractors and utility companies understand and comply with the SWPPP and the CGP. Inform subcontractors and utility companies of SWPPP amendments that affect them in a timely manner. Coordinate with subcontractors and utility companies doing work in the Project Zone so BMPs, including temporary and final stabilization are installed, maintained, and protected from damage.

Provide on-going training to employees and subcontractors, on control measures at the site and applicable storm water pollution prevention procedures. Training must be specific to the installation, maintenance, protection, and removal of control measures CGP 4.14. Training must be given at a frequency that will be adequate to ensure proper implementation and protection of control measures, and no less frequently than once a month during construction activity. Document on the SWPPP Training Log, Form 25D-125, the dates and attendees to these trainings. Include the SWPPP Training Log as an appendix to the SWPPP.

Notify the Engineer immediately if the actions of any utility company or subcontractor do not comply with the SWPPP and the CGP.

Comply with GCP subsection 70-11 Protection and Restoration of Property and Landscape. Concrete washout must be fully contained.

Comply with CGP Part 4.8.2 for fueling and maintenance activities. Place absorbent pads or other suitable containment under fill ports while fueling, under equipment during maintenance or repairs, and under leaky equipment.

Comply with requirements of the HMCP and SPCC Plan, and all local, state and federal regulations that pertain to the handling, storage, containment, cleanup, and disposal of petroleum products or other hazardous materials.

Keep the SWPPP and HMCP current (refer to Subsection 641-2.1.c, SWPPP Considerations and Contents.

c. Pollutant Reporting Requirements. If an incident of non-compliance occurs that may endanger health or the environment a report must be made, CGP, Appendix A, Part 3.4:

(1) Verbally, immediately report the incident to the Engineer,

(2) Verbally report to ADEC within 24 hours after the permittee becomes aware of the incident, and

(3) In writing, report to ADEC within five days after the permittee becomes aware of the circumstances. To report in writing, complete the written noncompliance report on Form 25D-143, and file the written report with ADEC. Coordinate the report with the Engineer. Include in the report:

(a) A description of the noncompliance and its causes;

(b) The exact dates and times of noncompliance;

(c) If not yet corrected the anticipated time the project will be brought back into compliance; and

(d) The corrective action taken or planned to reduce, eliminate and prevent reoccurrence.

(e) Notify the Engineer and COE Regulatory Program immediately if there is incident of noncompliance with COE Permits.

d. Hazardous Materials Reporting Requirements. Any release of a hazardous substance must be reported immediately, to the Engineer as soon as the person has knowledge of the discharge.

Report spills of petroleum products or other hazardous materials to the Engineer and other agencies as required by law, and according to CGP Part 9.3.

(1) To water:

(a) Any amount released must be reported immediately to the Engineer, ADEC, and the Coast Guard.

(2) To land:

(a) Any release of a petroleum product in excess of 55 gallons must be reported as soon as the person has knowledge of the discharge CGP Part 9.3.2.

(b) Any release of a petroleum product in excess of 10 gallons but less than 55 gallons must be reported to the Engineer and must be reported to ADEC within 48 hours after the person has knowledge of the discharge CGP Part 9.3.2.

(c) Any release of a petroleum product in excess of 1 gallon to 10 gallons must be recorded and logged and provided to ADEC on a monthly basis.

(3) Use the HMCP and SPCC Plan (if available) for contact information to report spills to regulatory agencies.

(4) Within seven calendar days of knowledge of the release, provide a description of the release, the circumstances leading to the release, and the date of the release to the nearest ADEC Area Response Team Office listed CGP Part 9.3.2.

(5) Implement measures to prevent the reoccurrence of and to respond to such releases.

e. Corrective Action and Maintenance of BMPs. Implement maintenance as required by the CGP, SWPPP, and manufacturer's specifications, whichever is more restrictive.

(1) Implement corrective action:

(a) If an incident of noncompliance with the SWPPP, or CGP is identified;

(b) If an Inspection or the Engineer identifies the SWPPP or any part of the SWPPP is ineffective in preventing erosion, sedimentation or the discharge of pollutants;

(c) If a required BMP was not installed according to the SWPPP schedule or phasing, or was installed incorrectly, or was not installed according to the CGP Part 4.0;

(d) If a BMP is not operating as intended, has not been maintained in an effective operation condition, or is unable to effectively perform the intended function;

(e) If sediment accumulates more than one-third of the distance of the above-ground height of the silt fence;

(f) If sediment accumulates to more than one-half retention height for an inlet BMP, check dam, berm, wattle, or other control measures;

(g) If a prohibited discharge of pollutants, as specified in CGP Part 4.7, is occurring or will occur; or

(h) If there is accumulation of sediment or other pollutants, that is in or near any storm water conveyance channels, or that may enter a discharge point or storm sewer system. If there is accumulation of sediment or other pollutants that is being tracked outside the project zone.

(2) Implement corrective actions so that they comply with the following time requirements:

(a) For conditions that are easily remedied (i.e. removal of tracked sediment, maintenance of control measure, or spill clean-up), initiate corrective action within 24 hours and complete as soon as possible;

(b) If a discharge occurs during a local 2-year, 24-hour storm event, initiate a corrective action the day after the storm event ends;

(c) If installation of a new control measure is needed or an existing control measure requires redesign and reconstruction or replacement to make it operational, the corrective action must be completed within seven calendar days from the time discovered.

(d) For all other conditions initiate corrective actions so both of the following requirements are met:

(1) Corrective action is completed in time to protect water quality; and

(2) Corrective action is completed no later than the Complete-by-Date that was entered in an Inspection Report (see Subsection 641-3.3.b for more information).

If a corrective action is not implemented within the time requirements of this section, document the situation in the SWPPP, notify the Engineer and implement corrective action as soon as possible.

If a corrective action could affect a subcontractor, notify the subcontractor within three days of taking the corrective action. Require in your written subcontract, that subcontractors must notify the Contractor within 24 hours of becoming aware of a condition that requires a corrective action.

f. Stabilization.

(1) Stabilization may be accomplished using temporary or permanent measures. Initiate stabilization of disturbed soils, erodible stockpiles, disposal sites, and of erodible aggregate layers so that all of the following conditions are satisfied:

(a) Not later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased (CGP 4.5.1.1).

(b) As soon as necessary to avoid erosion, sedimentation, or the discharge of pollutants; and

(c) As identified in the SWPPP.

(2) Land may be disturbed and stabilized multiple times during a project. Coordinate work to minimize the amount of disturbed soil at any one time. Do not disturb more soil than you can stabilize with the resources available.

(3) Temporarily stabilize from wind and water erosion portions of disturbed soils, portions of stockpiles, and portions of disposal sites, that are not in active construction. Temporary stabilization measures may require a combination of measures including but not limited to vegetative cover, mulch, stabilizing emulsions, blankets, mats, soil binders, low-erodible cover, dust palliatives, or other approved methods.

(4) When temporary or permanent seeding is required, provide a working hydro seeding equipment located within 100 miles of the project by road; with 1,000 gallons or more tank capacity, paddle agitation of tank, and the capability to reach the seed areas with an uniform mixture of water, seed, mulch and tackifier. If the project is located in an isolated community the hydro-seeder must be located at the project.

(5) Before applying temporary or permanent seeding, prepare the surface to be seeded to reduce erosion potential and to facilitate germination and growth of vegetative cover. Apply seed and maintain seeded areas. Reseed areas where growth of temporary vegetative cover is inadequate to stabilize disturbed ground.

(6) Apply permanent seed according to Item T-901, within the time periods allowed by the CGP and the contract, at locations where seeding is indicated on the plans and after land-disturbing activity is permanently ceased.

(7) When installing a culvert or other drainage structure where stream bypass is not used, install temporary or final stabilization concurrently or immediately after placing the culvert or drainage structure in a manner that complies with the SWPPP, applicable project permits and prevents discharge of pollutants. Install temporary or final stabilization:

(a) At the culvert or drainage structure inlet and outlet; and

(b) In the areas upstream and downstream that may be disturbed by the process of installing the culvert, culvert end walls, culvert end sections, or drainage structure.

(8) Before deactivating a stream bypass or stream diversion used for construction of a bridge, culvert, or drainage structure, install final or temporary stabilization when approved by the Engineer:

(a) At the inlet and outlet of the culvert, drainage structure, or bridge;

(b) In the area upstream and downstream of the culvert, drainage structure, or bridge, that is disturbed during installation or construction of the culvert, drainage structure, or bridge; and

(c) Under the bridge.

Within seven days of initiating final stabilization, either complete final stabilization or continue maintenance of work until final stabilization is complete, CGP Part 4.5.1.5.

Complete temporary stabilization within 14 day of initiating stabilization, CGP Part 4.5.1.2.

g. Ending CGP Coverage and BMP Maintenance in the Project Zone.

(1) The Engineer will determine the date that all the following conditions for ending CGP coverage have been met within the Project Zone:

(a) Land disturbing activities have ceased;

(b) Final Stabilization has been achieved on all portions of the Project Zone, according to the CGP PART 4.5.2 (including at Department furnished material sources, disposal sites, staging areas, equipment areas, etc.); and

(c) Temporary BMPs have been removed.

(2) After the Engineer has determined the conditions for ending CGP coverage have been met, the Department will:

(a) Send written notice to the Contractor with the date that the conditions were met;

(b) Submit an eNOT to ADEC; and

(c) Provide a copy of the eNOT and ADEC's acknowledgement letter to the Contractor.

The Contractor is responsible for ending permit coverage within the Project Zone, by submitting an eNOT to ADEC within 30 days of meeting the conditions for ending CGP coverage. The Contractor is responsible for BMP maintenance and SWPPP updates until permit coverage is ended.

If the Contractor's CGP eNOI acreage includes Support Activities and any other areas where the Department is not an Operator, the Contractor may not be able to file an eNOT at the same time as the Department. In this case, the Contractor must amend the SWPPP and separate SWPPP2(s), to indicate the Department's CGP coverage has ended, and the Department is no longer an Operator within the Project Zone.

The Contractor must indicate in the SWPPP the areas that have reached Final Stabilization, and the dates land disturbing activities ended and Final Stabilization was achieved. The Contractor must submit an eNOT to ADEC, and insert copies of the Department's and the Contractor's eNOTs with ADEC's acknowledgement letters in the appendix of the SWPPP.

The Contractor must submit a copy of each signed eNOT and ADEC's acknowledgement letter to the Department within three days of filing the eNOT or receiving a written response.

The Contractor is responsible for coordinating local government inspections of work and ending permit coverage with local government. See Subsection 641-1.3e for more information.

h. Transmit final SWPPP.

Transmit one copy of the final SWPPP, including all amendments, appendices and maps, to the Engineer; when the project eNOTs are filed, or within 30 days of the Department's eNOT being filed, whichever is sooner. Transmittal must be by both electronic and at least one hard copy.

641-3.2 SWPPP DOCUMENTS, LOCATION ON-SITE, AVAILABILITY, AND RECORD RETENTION.

The SWPPP and related documents maintained by the Contractor are the Record for demonstrating compliance with the CGP. Copies of SWPPP documents transmitted to the Engineer under the requirements of this specification are informational and do not relieve the Contractor's responsibility to maintain complete records as required by the CGP and this specification.

Keep the SWPPP, HMCP and SPCC Plan at the on-site project office. If there is not an on-site project office, keep the documents at a locally available location that meets CGP requirements and is approved by the Engineer. Records may be moved to another office for record retention after the eNOTs are filed. Records may be moved to another office during winter shutdown. Update on-site postings if records are relocated during winter shutdown. Provide the Department with copies of all Records.

Retain Records and a copy of the SWPPP, for at least three years after the date of eNOT. If EPA or ADEC inspects the project, issues a Notice of Violation (NOV), or begins investigation for a potential NOV before the retention period expires, retain the SWPPP and all Records related to the SWPPP and CGP until at least three years after EPA and/or ADEC has determined all issues related to the investigation are settled.

The SWPPP and related documents must be made available for review and copy, to the Department and other regulatory agencies that request them. See CGP Parts 5.10, 6.6 and 9.5.

641-3.3 SWPPP INSPECTIONS, AMENDMENTS, REPORTS, AND LOGS. Perform Inspections, prepare Inspection Reports, and prepare SWPPP Amendments in compliance with the SWPPP and the CGP. Update SWPPP Corrective Action Log Form 25D-112, SWPPP Amendment Log Form 25D-114, SWPPP

Grading and Stabilization Activities Log Form 25D-110, SWPPP Project Staff Tracking Form 25D-127, and SWPPP Daily Record of Rainfall Form 25D-115. For active projects update the Records daily.

a. Inspection during Construction. Conduct Inspections according to the schedule and requirements of the SWPPP and CGP.

Inspections required by the CGP and SWPPP must be performed by the Contractor's SWPPP Manager and the Department's Storm water Inspector jointly, unless approved by the Engineer, when:

(1) One of the inspectors is not on site, access is only by air, and weather delayed or canceled flights;

(2) One of the inspectors is sick;

(3) The project is on a reduced frequency inspection schedule with no staff on site, the only access to the site is by air, and it is economical to send only one inspector; or

(4) When the Engineer determines a safety concern that makes joint inspection impracticable.

When this is the case, the Operator who conducts the inspection must provide a copy of the Inspection Report to the other Operator within three days of the Inspection date and document the date of the report transmittal.

b. Inspection Reports. Use only the DOT&PF SWPPP Construction Site Inspection Report, Form 25D-100 to record Inspections. Changes or revisions to Form 25D-100 are not permitted; except for adding or deleting data fields that list: Location of Discharge Points, and Site Specific BMPs. Complete all fields included on the Inspection Report form; do not leave any field blank.

Insert a Complete-by-Date for each corrective action listed that complies with:

(1) Subsection 641-3.1d, and

(2) The CGP.

Provide a copy of the completed, unsigned Inspection Report to the Engineer by the end of the next business day following the inspection.

The Superintendent must review, correct errors, and sign and certify the Inspection Report, within three days of the date of Inspection. The Engineer may coordinate with the Superintendent to review and correct any errors or omissions before the Superintendent signs the report. Corrections are limited to adding missing information or correcting entries to match field notes and conditions present at the time the Inspection was performed. Deliver the signed and certified Inspection Report to the Engineer on the same day the Superintendent signs it.

The Engineer will sign and certify the Inspection Report and will return the original to the Contractor within three working days.

The Engineer may make corrections after the Superintendent has signed and certified the Inspection Report. The Engineer will initial and date each correction. If the Engineer makes corrections, the Superintendent must recertify the Inspection Report by entering a new signature and date in the white space below the original signature and date lines. Send a copy of the recertified Inspection Report to the Engineer on the day it is recertified.

If subsequent corrections to the certified Inspection Report are needed, document the corrections in an amendment memo that addresses only the omitted or erroneous portions of the original Inspection Report. The Superintendent and the Engineer must both sign and certify the amendment memo. The issuance of an amendment memo does not relieve the Contractor of liquidated

damages that may have been incurred as a result of the error on the original certified inspection report.

c. **Inspection before Seasonal Suspension of Work.** Conduct an Inspection before seasonal suspension of work to confirm BMPs are installed and functioning according to the requirements of the SWPPP and CGP.

d. **Reduced Inspection Frequencies.** Conduct Inspections according to the inspection schedule indicated in the approved SWPPP. Any change in inspection frequency must be approved by the Engineer, and beginning and ending dates documented as an amendment to the SWPPP.

If the Engineer approves and the entire site is stabilized, the frequency of inspections may be reduced to at least one inspection every 30 days. At actively staffed sites, inspect within two business days of the end of a storm event that results in a discharge from the site.

When work is suspended due to fall freeze-up, the Engineer may suspend inspection requirements after fourteen days of freezing conditions if:

(1) Soil disturbing activities are suspended; and

(2) Soil stabilizing activities are suspended.

Inspections must resume according to the normal inspection schedule identified in the SWPPP, at least 21 days before anticipated spring thaw. See CGP Part 6.2.3.

The Engineer may waive requirements for updating the Grading and Stabilization Activities Log and Daily Record of Rainfall during seasonal suspension of work. If so, resume collecting and recording weather data on the Daily Record of Rainfall form one month before thawing conditions are expected to result in runoff. Resume recording land disturbance and stabilization activities on the Grading and Stabilization Activities Log when Construction Activity resumes.

e. **Stabilization before Fall Freeze up and Spring Thaw.** Stabilize Construction Activities within the Project Zone with appropriate BMPs prior to the anticipated date of fall freeze up, in accordance with the CGP, Part 4.12.

Exceptions to stabilization prior to anticipated date of fall freeze up include:

(1) When stabilization activities are precluded by snow cover or frozen ground conditions prior to the anticipated date of fall freeze up, or

(2) When winter construction activity is authorized by the Engineer and conducted according to the contract.

Stabilize Construction Activities within the Project Zone with appropriate BMPs prior to spring thaw, as defined in the CGP.

f. **Inspection before Project Completion.** Conduct Inspection to ensure Final Stabilization is complete throughout the Project, and temporary BMPs that are required to be removed are removed. Temporary BMPs that are biodegradable and are specifically designed and installed with the intent of remaining in place until they degrade, may remain in place after project completion.

g. **Items and Areas to Inspect.** Conduct Inspections of the areas required by the CGP and SWPPP.

h. **SWPPP Amendments and SWPPP Amendment Log.** The Superintendent and the SWPPP Manager are the only persons authorized to amend the SWPPP and update the SWPPP Amendment Log, Form 25D-114. The Superintendent or the SWPPP Manager must sign and date amendments to the SWPPP and updates to the SWPPP Amendment Log.

SWPPP Amendments must be approved by the Engineer.

Amendments must occur:

(1) Whenever there is a change in design, construction operation, or maintenance at the construction site that has or could cause erosion, sedimentation or the discharge of pollutants that has not been previously addressed in the SWPPP;

(2) If an Inspection identifies that any portion of the SWPPP is ineffective in preventing erosion, sedimentation, or the discharge of pollutants;

(3) Whenever an Inspection identifies a problem that requires additional or modified BMPs

(4) Whenever a BMP is modified during construction, or a BMP not shown in the original SWPPP is added;

(5) If the Inspection frequency is modified (note beginning and ending dates); or

(6) When there is a change in personnel who are named in the SWPPP, according to Subsection 641-2.1d.

Amend the SWPPP narrative as soon as practicable after any change or modification, but in no case, later than seven days following identification of the need for an amendment. Every SWPPP Amendment must be signed and dated. Cross-reference the amendment number with the Corrective Action Log or SWPPP page number, as applicable. When a BMP is modified or added, describe the BMP according to Subsection 641-2.1c.

Keep the SWPPP Amendment Log current. Prior to performing each scheduled Inspection, submit to the Engineer a copy of the pages of the Amendment Log that contain new entries since the last submittal. Include copies of any documents amending the SWPPP.

Keep the SWPPP Amendment Log as an appendix to the SWPPP.

i. Site Maps. Document installation, routine maintenance, and removal of BMPs by making notes on the SWPPP Site Maps. Include the date and the recording person's initials by these notes. Identify areas where Construction Activities begin, areas where Construction Activities temporarily or permanently cease, and areas that are temporarily or permanently stabilized.

j. Corrective Action Log. The Superintendent and SWPPP Manager are the only persons authorized to make entries on the SWPPP Corrective Action Log, Form 25D-112. Document the need for corrective action within 24 hours of either:

(1) Identification during an inspection; or

(2) Discovery by the Department's or Contractor's staff, a subcontractor, or a regulatory agency inspector.

Modification or replacement of a BMP, installation of a new BMP not shown in the original SWPPP, overdue BMP maintenance, or other reasons listed as corrective actions in 641-3.1d must be documented on the Corrective Action Log.

Within 24 hours of discovery, update the Corrective Action Log, Form 25D-112, with the date of discovery and proposed corrective action. If discovered during an inspection, update log with inspection date and proposed corrective actions noted on the Inspection Report. If discovered outside of an inspection, update the log with the date of discovery, the proposed corrective action, and the date the corrective action was completed.

After the corrective action has been accomplished, note in the Corrective Action Log the action taken and if a SWPPP amendment was needed. Date and initial the entry.

Keep the Corrective Action Log current and submit a copy to the Engineer prior to performing each scheduled SWPPP Inspection.

Keep the Corrective Action Log as an appendix to the SWPPP.

k. Grading and Stabilization Activities Log. The Superintendent and SWPPP Manager are the only persons authorized to date and initial entries on the SWPPP Grading and Stabilization Activities Log, Form 25D-110. Use the SWPPP Grading and Stabilization Activities Log, to record land disturbance and stabilization activities.

Keep the Grading and Stabilization Activities Log current and submit a copy to the Engineer prior to performing each scheduled SWPPP Inspection. Keep the Grading and Stabilization Activities Log organized and completed to demonstrate compliance with the CGP Part 4.5.

Keep the Grading and Stabilization Activities Log as an appendix to the SWPPP.

l. Daily Record of Rainfall. Use SWPPP Daily Record of Rainfall, Form 25D-115, to record weather conditions at the Project. Update the form daily and include the initials of the person recording each day's entry. Submit a copy to the Engineer prior to performing each scheduled Inspection. Keep the Daily Record of Rainfall as an appendix to the SWPPP.

m. Staff Tracking Log.

Use the SWPPP Project Staff Tracking Form 25D-127, to keep staff records current. Include Records of the AK-CESCL or equivalent qualifications for the Superintendent, SWPPP Manager, ATS operator, any acting Superintendent and acting SWPPP Managers, and beginning and end dates for temporary personnel assignments related to administration of the CGP or Item P-641. Update the SWPPP Staff Tracking Log within 24 hours of any changes in personnel, qualifications, or other staffing items related to administration of the CGP or Item P-641.

641-3.4 FAILURE TO PERFORM WORK.

The Engineer has authority to suspend work and withhold monies according to GCP subsections 50-01 and 80-06 for the reasons listed under GCP subsection 80-06 and for an incident of noncompliance with the CGP or SWPPP, that may endanger health or the environment or for failure to perform work related to Item 641.

An incident of noncompliance includes, but is not limited to, the Contractor's failure to:

a. Obtain appropriate permits before Construction Activities occur;

b. Perform SWPPP Administration;

c. Perform timely Inspections;

d. Update the SWPPP;

e. Transmit updated SWPPP, Inspection Reports, and other updated SWPPP forms to the Engineer;

f. Maintain effective BMPs to control erosion, sedimentation, and pollution in accordance with the SWPPP, the CGP, and applicable local, state, and federal requirements;

g. Perform duties according to the requirements of Item P-641; or

h. Meet requirements of the CGP, SWPPP, or other permits, laws, and regulations related to erosion, sediment, or pollution control.

i. Any other requirements established or included in the contract.

No additional Contract time or additional compensation will be allowed due to delays caused by the Engineer's suspension of work.

641-3.5 ACCESS TO WORK.

The Project, including any related off-site areas or support activities, must be made available for inspection, or sampling and monitoring, by the Department and other regulatory agencies. See CGP, Part 6.6.

METHOD OF MEASUREMENT

641-4.1 Measure work according to GCP Section 90 and as follows:

a. Items P641.010.0000, P641.030.0000, P641.070.0000 and P641.090.0000, are lump sum.

b. Items P641.020.0000, P641.040.0000, P641.050.0000, P641.080.0000 and P641.100.0000 will be measured on a contingent sum basis as specified by the Directive authorizing the work.

c. Item P641.060.0000 will be measured on a contingent sum basis with withholding determined by the Department.

TABLE 641-1 BMP VALUES – RESERVED

Liquidated Damages assessed according to Table 641-2 are not an adjustment to the Contract amount. These damages charges are related to Contract performance but are billed by the Department to the Contractor, independent of the Contract amount. An amount equal to the Liquidated Damages may be withheld for unsatisfactory performance, from payment due under the Contract, until the Contractor remits payment for billed Liquidated Damages.

TABLE 641-2 – (Version C) EROSION, SEDIMENT AND POLLUTION CONTROL – LIQUIDATED DAMAGES

Code	Specification Section Number and Description	Deductible Amount in Dollars	Cumulative Deductible Amounts in Dollars
a	641-1.4 Failure to have a qualified (AK-CESCL or equivalent) SWPPP Manager	Calculated in Code b or f	
b	Failure to meet SWPPP requirements of: (1) 641-2.1a Name of SWPPP Preparer (2) Not Applicable (3) 641-3.3h Sign and Date SWPPP amendments by qualified person (4) 641-3.2 Records maintained at project and made available for review	$750 per omission	
c	Not Applicable		
d	641-3.3e Failure to stabilize a Project prior to fall freeze up.	$5,000 per Project per year	
e	641-2.1a Failure to conduct pre-construction inspections before Construction Activities on all projects greater than 1 acre.	$2,000 per Project	
f*	641-3.3. Failure to conduct and record CGP Inspections	$750 per Inspection	Additional $750 for every additional 7 day

Code	Specification Section Number and Description	Deductible Amount in Dollars	Cumulative Deductible Amounts in Dollars
	641-3.3a Personnel conducting Inspections and Frequency 641-3.3b Inspection Reports, use Form 25D-100, completed with all required information		period without completing the required inspection.
g	641-3.1d Corrective action, failure to timely accomplish BMP maintenance and/or repairs. In effect until BMP maintenance and/or repairs is completed.	$500 per Project per day	
h	641-3.1c Failure to provide to the Engineer and ADEC a timely oral noncompliance report of violations or for a deficient oral noncompliance report	$750 for the first day the report is late or deficient	Additional $750 for every 14 day period with- out the required information
i	641-3.1c Failure to provide to the Engineer and ADEC a timely written noncompliance report, use Form 25D-143, of violations or for a deficient written noncompliance report	$750 for the first day the report is late or deficient	Additional $750 for every 14 day period without the required information
j	641.3.4 Failure to comply with the requirements of the CGP, approved SWPPP, and Item P-641, except as listed above	$750 per occurrence for the first day of noncompliance	Additional $750 for every day the deficiency remains uncorrected

Code f* *Liquidated Damages according to Code f will not be billed for typographic errors and minor data entry errors, except the liquidated damages will be assessed for these errors when:*

(1) the contractor has previously been notified and subsequent inspection reports repeat the same or similar error,

(2) multiple inspection reports are submitted after the submission due date and the same or similar errors are repeated on multiple overdue reports,

(3) an error in recording the inspector's AK-CESCL certification date results in an inspector performing the inspection during a period when their certification was lapsed or was otherwise invalid.

BASIS OF PAYMENT

641-5.1 See Subsection 641-3.4 Failure to Perform Work, for additional work and payment requirements.

a. Item P641.010.0000 Erosion, Sediment and Pollution Control Administration. At the Contract lump sum price for administration of all work under this Section. Includes, but is not limited to, SWPPP and HMCP and SPCC Plan preparation, agency fees for SWPPP reviews, SWPPP amendments, pre-construction Inspections, Inspections, monitoring, reporting, and Record keeping or copying Records related to the SWPPP and required by the CGP, and Record retention.

b. Item P641.020.0000 Temporary Erosion, Sediment and Pollution Control. At the contingent sum prices specified for all labor, supervision, material, equipment, and incidentals to install, maintain, remove and dispose of approved temporary erosion, sedimentation, and pollution control BMPs required to implement the SWPPP and SPCC Plan.

c. Item P641.030.0000 Temporary Erosion, Sediment and Pollution Control. At the Contract lump sum price for all labor, supervision, material, equipment, and incidentals to install, maintain, remove and dispose of temporary erosion, sedimentation, and pollution control BMPs identified in the SWPPP and SPCC Plan.

d. Item P641.040.0000 Temporary Erosion, Sediment and Pollution Control Additives. At the contingent sum prices specified in the Directive to authorize the work, for all labor, supervision, materials, equipment, and incidentals for extra, additional, or unanticipated work, to install, maintain, remove and dispose of temporary erosion, sedimentation, and pollution control BMPs not covered by Item P641.030.0000. All additional Erosion, Sediment, and Pollution Control

Administration necessary due to this item will not be paid for separately but will be subsidiary to other bid items.

e. **Item P641.050.0000 Temporary Erosion, Sediment and Pollution Control by Directive.** At the contingent sum prices specified in the Directive using time and materials to authorize the work, for all labor, supervision, materials, equipment, and incidentals to install, maintain, remove and dispose of temporary erosion, sedimentation, and pollution control BMPs. Prices for this item will by time and materials according to GCP Subsection 90-05, or by mutual agreement between the Engineer and Contractor. All additional Erosion, Sediment, and Pollution Control Administration necessary due to this item will not be paid for separately but will be subsidiary to other bid items.

f. **Item P641.060.0000 Withholding.** The Engineer may withhold an amount equal to Liquidated Damages, assessed according to Item P-641, from payment due the Contractor. Liquidated Damages for violations of the Contract, CWA, CGP, are determined by the Engineer according to Table 641-2. The Engineer may withhold payment due the Contractors until the Contractor pays the Liquidated Damages to the Department.

The Department will not release performance bonds until Liquidated Damages assessed according to Item P-641 are paid to the Department, and all requirements according to GCP subsection 30-05 are satisfied.

g. **Item P641.070.0000 SWPPP Manager.** At the Contract lump sum price for a SWPPP Manager that conforms to this specification. When Item P641.070.0000 appears in the Bid Schedule, the SWPPP Manager must be a different person than the superintendent, and must be physically present during construction activity with duties and authority as described in Subsection 641-2.4. When Item P641.070.0000 does not appear in the Bid Schedule, the SWPPP Manager is subsidiary to Item P641.010.0000.

h. **Subsidiary Items.** Temporary erosion, sediment and pollution control measures that are required outside the Project Zone are subsidiary. Work required by the HMCP and SPCC Plan including hazardous material storage, containment, removal, cleanup and disposal, are subsidiary to Item P641.010.0000 Erosion, Sediment and Pollution Control Administration.

i. **Work under other pay items.** Work that is paid for directly or indirectly under other pay items will not be measured and paid for under Item P-641. This work includes but is not limited to:

(1) Dewatering;

(2) Shoring;

(3) Bailing;

(4) Permanent seeding;

(5) Installation and removal of temporary work pads;

(6) Temporary accesses;

(7) Temporary drainage pipes and structures;

(8) Diversion channels;

(9) Settling impoundment; and

(10) Filtration.

Permanent erosion, sediment and pollution control measures will be measured and paid for under other Contract items when shown on the bid schedule.

a. Work at the Contractor's Expense. Temporary erosion, sediment and pollution control measures that are required due to carelessness, negligence, or failure to install temporary or permanent controls as scheduled or ordered by the Engineer, or for the Contractor's convenience, are at the Contractor's expense.

Payment will be made under:

Item P641.010.0000	Erosion, Sediment, and Pollution Control Administration – per lump sum
Item P641.020.0000	Temporary Erosion, Sediment, and Pollution Control – per contingent sum
Item P641.060.0000	Withholding – per contingent sum
Item P641.070.0000	SWPPP Manager – per lump sum

ITEM P-650 AIRCRAFT TIE-DOWN

DESCRIPTION

650-1.1 This item consists of furnishing and installing aircraft tie-down anchors according to these specifications and the details on the Plans, or as directed by the Engineer.

MATERIALS

650-2.1 GENERAL. Meet the strength and/or capacity requirements of this section for the type of anchor specified.

Substitution of products as approved equals will be determined by comparing ratings for tensile breaking strength and pull-out capacity that exceed the specified minimums when installed under prevailing soil or rock conditions. The practicality of installing proposed anchors at the plan locations and corrosion resistance will also be considered.

Locate existing tiedowns and record their locations. Install new tiedowns at the locations shown and detailed on the Plans. ~~such that new tie-downs may be placed in a similar layout.~~

Cut existing tie-downs off at the lowest point available after excavation in the area is complete.

Install tie-downs such that the new tie-down is offset at least 18 inches or as directed by the Engineer to avoid hitting the existing anchor with the new installation.

650-2.2 SOIL ANCHOR TIE-DOWNS.

~~**a. Driven Toggle.** Provide an anchor assembly with a minimum tensile breaking strength of 9,000 pounds, a minimum working load capacity of 3,500 pounds and a minimum field pull-out capacity of 5,000 pounds. Provide anchors equipped with stainless steel cable, swaged eyes at cable ends, and no intermediate connections.~~

~~**b.**~~**a. Buried Plate.** Provide an anchor assembly meeting the details shown on the Plans.

~~**c. Helical "Screw" Anchor.** Provide an anchor assembly with minimum tensile breaking strength of 9,000 pounds, a minimum working load capacity of 3,500 pounds, and a minimum field pull-out capacity of 5,000 pounds.~~

~~For each anchor assembly, provide a chain extension to the anchor cable so that the cable eye is buried 12 inches minimum below finish grade and the chain extends several links above finish grade after locking the anchor.~~ Use ~~3/8-inch~~ grade 8043 high test hot galvanized steel chain with ~~two 3/8-inch~~ removable coupling links, ~~one at each end of the chain.~~ screw pin shackle, and drop-forged eye bolt. Coupling links, shackles and eye bolts shall have a minimum working load of 4000 lbs.

~~**650-2.3 ROCK ANCHOR TIE-DOWNS.** Rock anchors shall be 1/2-inch diameter Williams Solid Bar "Spin Lock" Rock Bolts, Williams Titan Injection Anchor 30/16, or an approved equal. Provide anchor assembly with a minimum tensile breaking strength of 9,000 pounds and minimum field pull-out capacity of 5,000 pounds. Provide chain and chain coupling links meeting the same requirements as specified for soil anchor tie downs.~~

650-2.4 TEMPORARY TIE-DOWNS. Temporary tie-down anchors shall provide a minimum 500 pounds of resistance to uplift per anchor. Temporary anchors shall be laid out as shown on the Plans or as approved by the Engineer. Each anchor shall be provided with a 2-inch link or eye to which aircraft can be tethered. If above ground weights are used they shall be painted with reflective paint to be visible from any horizontal angle.

CONSTRUCTION METHODS

650-3.1 GENERAL. Soil and Rock Anchor tie-downs shall be installed as shown on the Plans.

Install anchor eye to the end of the anchor shaft by either bolting or as recommended by the manufacturer and approved by the Engineer. Eye must be able to pass a 1-inch rope or pin.

650-3.2 SOIL ANCHOR TIE-DOWNS.

~~a. **Driven Toggle.** Drive to sufficient depth to develop the minimum pull-out strength according to the manufacturer's installation instructions. Predrilling may be required depending on soil class. Anchor placement shall be achieved by methods recommended in the manufacturer's installation instructions. Backfill material, when required, shall be aggregate compacted to the satisfaction of the Engineer. If the anchor is set in pavement, backfill to a level 2-inchs below finish grade. Two-component sealant shall be used to fill the remainder of the hole to a level 1-inch below finish grade.~~

~~b.~~a. **Buried Plate.** Install each plate on a level and compacted surface at 5 feet minimum below finish grade. Place backfill with the chain plumb and under tension. Meet the material and compaction requirements for the applicable lift of material involved.

~~c. **Helical "Screw" Anchor.** Helical anchors shall be handled, stored, and installed in accordance with the manufacturer's recommendations. The helix of the helical anchors shall be installed a minimum of 6 feet below finish grade. Under no circumstances shall the manufacturer's recommended maximum allowable torque be exceeded at any time during installation.~~

~~The helix must be advanced in a continuous manner that allows the helix to "screw" into the soil matrix rather than "auger" through the soil matrix, resulting in disturbed soils around the helices. The rate of advance should provide a rotation of 5 to 15 rotations per minute. Apply uniform down pressure to maintain a penetration rate commensurate with the helix pitch. The rate of rotation and magnitude of down pressure may require adjustments during installation.~~

~~Prior to installing helical anchors in paved areas, core through the asphalt using a circular coring machine approved by the engineer. Install as shown on the Plans and compact to the satisfaction of the Engineer.~~

~~The helical anchors installed shall be field tension tested to the design pull-out load under the supervision of the Engineer to confirm tension load performance.~~

~~**650-3.3 ROCK ANCHOR TIE-DOWNS.** Rock anchors shall be anchored in sound bedrock at sufficient penetration to develop the minimum pull-out strength according to the manufacturer's instructions.~~

650-3.4 TEMPORARY TIE-DOWNS. Temporary tie-downs shall be produced that can be located to provide tie downs for aircraft displaced by the Contractor's operations. Tie-downs shall not require any permanent modifications to existing facilities or pavements and shall be re-locatable using readily available equipment. Initial placement and subsequent relocations of tie-downs shall be accomplished at the direction of the Engineer at no additional cost to the State.

650-3.5 MANUFACTURER'S CERTIFICATION AND ACCEPTANCE TESTING. For anchors where minimum tensile breaking strength or working load capacity is specified, provide manufacturer's certification that requirements are met. For anchors where minimum field pull-out capacities are specified, provide an Engineer approved testing apparatus that can apply and measure the required minimum field pull-out capacity. Field test each anchor and certify each test by recording the date of the test, the force applied, and the person completing the test. Tabulate this data and deliver to the Engineer within 24 hours of completing the tests.

METHOD OF MEASUREMENT

650-4.1 Measure according to GCP Section 90 and by each ~~set, consisting of 3 anchors,~~anchor completed and accepted in final position.

BASIS OF PAYMENT

650-5.1 At the contract price, per each~~set~~, for ~~each of~~ the pay items shown in the bid schedule.

Payment will be made under:

Item P650.010.0000	Aircraft Tie-down – per each

ITEM P-660 RETROREFLECTIVE MARKERS AND CONES

DESCRIPTION

660-1.1 Furnish and install airport retroreflective markers and traffic cones in accordance with the Plans, the safety plan, and the specifications at the locations indicated on the Plans or as directed by the Engineer. Assemble and install markers using all materials and incidentals necessary to place completed markers into operation to the satisfaction of the Engineer. Remove existing reflective marker cones and threshold markers for salvage and offer to the owner for possession.

MATERIALS

660-2.1 MARKERS.

a. **Type I Marker.** Semi-flush centerline marker conforming to FAA *AC 150/5345-39 Specification for L-853, Runway and Taxiway Retroreflective Markers* and certified under *AC 150/5345-53 Airport Lighting Equipment Certification Program.*

b. **Type II Marker.** Elevated marker for edge marking conforming to FAA AC 150/5345-39x, "Specification for L-853. Runway and Taxiway Lighting Retroreflective Markers" and certified under AC 150/5345-53 *Airport Lighting Equipment Certification Program.* Provide flexible or frangible markers in accordance with the height, marker colors, and retro-reflective colors shown on the Plans. If not called on the Plans, provide a finished marker height that is 30 inches above finish grade, marker color orange, and retroreflective colors as required by AC 150/5345-39. If frangible markers are supplied, ensure that the mounting system and tether are certified. When retro-reflective sheeting is used, provide manufacturer applied sheeting.

c. **Cone, 18-Inch.** Reflective traffic cone, 18 inches in height, orange color. Fit each cone with retro-reflective sheeting to the height specified on the Plans. When no height dimension is specified, fit with a 7-inch wide band of retro-reflective sheeting centered on the cone. Use pressure sensitive, flexible, high intensity retroreflective sheeting, conforming to ASTM D4956, Type III. Provide the appropriate sheeting color(s) as indicated on the Plans or if none is indicated supply with white colored band. Provide each cone with an anchoring tether of weather and corrosion resistant material capable of securing the assembly to prevent foreign object debris (FOD) hazard to aircraft similar to the tether required for Type II Markers that are frangible.

CONSTRUCTION REQUIREMENTS

660-3.1 Install markers and/or cones at the locations shown on the Plans, called for in the specifications or as directed by the Engineer. Stabilize Type II Markers by using the manufacturer's recommended methods of driving the supporting posts into the ground or providing a certified mounting system. If frangible Type II Markers or cones are provided, secure the tether to a hard point in accordance with AC 150/5345-39 per the manufacturer's recommendations.

Remove existing reflective markers and threshold marking panels as shown on the Plans or as directed for salvage and offer to the owner for possession. Markers not claimed by the owner become the property of the Contractor to be disposed of in a manner approved by the Engineer.

METHOD OF MEASUREMENT

660-4.1 Measure according to GCP Section 90 and by the number of markers ~~or cones~~ furnished and installed of the specified type, at locations approved by the Engineer. Retroreflective markers for handholes will not be measured for payment.

Removal and salvaging of existing markers and panels will be subsidiary to the installation of reflective markers and/or cones and will not be measured for payment.

BASIS OF PAYMENT

660-5.1 Payment will be made at the contract unit price for each furnished and accepted item. This price will be full compensation for furnishing all materials, for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete this item. Reflective Markers for handholes are subsidiary to Pay Item L125.150.0000.

Payment will be made under:

Item P660.030.0000	Reflective Marker, Type II – per each
Item P660.070.0000	Cone, 18-inch – per each

ITEM P-661 STANDARD SIGNS

DESCRIPTION

661-1.1 Furnish and install standard signs. The location and type of installation will be as shown on the Plans or as designated.

MATERIALS

661-2.1 Use materials that conform to the following:

a. Sheet Aluminum. Use alloy 6061-T6, 5052-H36, 5052-H38, or recycled aluminum meeting alloy 3105, as specified in ASTM B 209. Meet the thickness of aluminum sheet designated on the Plans. Verify alloy and temper designations by mill certification.

Treat the aluminum base metal sheets with coating for aluminum to meet ASTM B921, Class 2. Handle the cleaned and coated base metal only by a mechanical device or by operators wearing clean cotton or rubber gloves. After cleaning and coating operations, protect the panels at all times from contact or exposure to greases, oils, dust or other contaminants.

Make each sign panel a continuous sheet for all lengths 72 inches or less in the horizontal direction. Use no more than one vertical splice for signs up to 144 inches in length and 48 inches or less in height.

Meet the panel dimensions specified with a tolerance of 1/16-inch. Furnish metal panels that are cut to size and shape and free of buckles, warp, dents, cockles, burrs and any other defects resulting from fabrication. Complete all possible fabrication, including shearing, cutting and punching of holes prior to the base metal preparation.

b. Reflective Sheeting. Meet ASTM D4956, for the type specified.

c. Sign Posts. Use the type and size of posts designated on the Plans.

(1) Perforated Steel Posts.

(a) Fabricate posts from 0.105-inch thick cold-rolled carbon steel sheets, commercial quality, to meet ASTM A 653 and ASTM A 924. Zinc coat, both sides, to meet coating designation G90. Form posts into a steel tube, roll to size, and weld in the corner.

(b) Perforate all members for their entire length with 7/16-inch diameter holes on 1-inch centers.

(c) Furnish members that are straight and with a smooth, uniform finish, with no splices.

(d) Ensure that all perforations and cut off ends are free from burrs.

(e) Ensure that consecutive sizes will telescope freely with a minimum of play.

d. Sign Fabrication. Use Type IV reflective sheeting (for lettering, symbols, borders, and background) on sheet aluminum panels.

e. Sign Posts and Bases. Use sign posts and bases of the types specified. The structural aspects of design and materials for sign supports must comply with the AASHTO *Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals*. Do not splice sign posts.

f. Concrete. Use concrete that shall conform to the requirements of Item P-610.

CONSTRUCTION REQUIREMENTS

661-3.1 Attach sign panels to posts using the types and sizes of fastening hardware shown on the Plans.

All materials and finished signs are subject to inspection and acceptance in place.

a. Surfaces exposed to weathering must be free of defects in the coating that impair serviceability or detract from general appearance or color match.

b. Finished signs must be clean and have no chatter marks, burrs, sharp edges, loose rivets, delaminated reflective sheeting, or aluminum marks. Do not make repairs to the face sheet.

Install breakaway assemblies according to the manufacturer's written instructions.

Remove and replace all foundations requiring more than three shims to plumb a post without extra compensation.

Construct the top of any foundation located on a slope so that the finished slope passes through the top center of the foundation. Grade the area 24 inches up and down slope of the foundation edge so that no portion of the foundation projects above the surrounding slope and water will drain away from the foundation.

Attach a label to the back of all standard signs in the lower right corner. Make the label at least 15 square inches and show the year the sign was purchased from the manufacturer. Show the last two digits of the year in clear and bold numbers. Make the label from Type I or brighter reflective sheeting. Use background and legend colors meeting Table 661-1.

Table 661-1. DECAL COLORS

YEAR	BACKGROUND COLOR	LEGEND COLOR
XXX1	Yellow	Black
XXX2	Red	White
XXX3	Blue	White
XXX4	Green	White
XXX5	Brown	White
XXX6	Orange	Black
XXX7	Black	White
XXX8	White	Black
XXX9	Purple	White
XXX0	Strong Yellow-Green	Black

Note: Central values and tolerance limits for each color, as referenced in the Manual on Uniform Traffic Control Devices (MUTCD), are available from the Federal Highway Administration, (HHS-30), 400 7th St. SW, Washington, D.C. 20590

661-3.2 SIGN PLACEMENT AND INSTALLATION. Sign locations are approximate and subject to field adjustment by the Engineer.

Do not allow the top of the embedded steel tube to extend more than 2 inches above the surrounding ground and concrete foundation.

On all signs, install 2-inch diameter wind washers, colored to match the sign face, between the fastener head and the sign. Use rust-resistant washers fabricated from a material equal in strength to the sign blank.

METHOD OF MEASUREMENT

661-4.1 Measure according to GCP Section 90 and by the total area of legend-bearing sign panel erected in place. No deductions in quantity for corner rounding will be made. Nominal dimensions for sign sizes indicated on the Plans will be used to calculate sign pay quantities. Octagons and round signs will be measured as rectangles.

BASIS OF PAYMENT

661-5.1 Payment will be made at the contract price per unit of measurement. Sign posts, bases, mounting hardware, and concrete used for sign bases are subsidiary.

Payment will be made under:

Item P661.010.0000	Standard Sign – per square foot

ITEM P-670 HAZARDOUS AREA BARRIERS

DESCRIPTION

670-1.1 Provide barriers for use on the project required under GCP subsection 70-09. Provide each barrier complete with flasher unit and flag in accordance with the dimensions, design, and details shown on the Plans. Haul and place barriers as shown on the Plans or as directed by the Engineer. Relocate barriers as conditions warrant.

When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated. Barricades shall be spaced not more than 25 feet apart.

Provide additional flasher units and flags, when specified, for use on Department-supplied barriers.

MATERIALS

670-2.1 Use materials that conform to the following:

a. **Hazard Marker Barrier, Timber.** Provide construction-grade Douglas Fir-Larch with nominal dimensions of 12 inches by 12 inches and a length of 8 feet. All timber that is exposed to weather, water, or soil shall be pressure treated to the current edition of the AWPA Standards, or AASHTO M 133, using preservatives registered with the US Environmental Protection Agency. Products shall be treated according AWPA Standard U1, Use Category System. Use either oil base or latex exterior paint in colors international orange and white.

b. **Hazard Marker Barrier, Plastic.** Provide 10-inch by 10-inch by 8-foot nominal dimension portable water-ballast barriers made from high impact, safety orange and white, UV-resistant, high density polyethylene (HDPE) plastic. Provide barriers with pre-molded flag staff and flasher bracket attachment holes. Provide barriers that are designed as a modular system to allow assembly/disassembly and nesting for compact storage, and to permit the option of physically bolting multiple barriers together to provide a continuous barrier wall. Provide 6-inch by 72-inch reflective striping panel for attachment to one side of each barrier.

670-2.2 FLAG. Provide heavy vinyl coated nylon, 18-inch by 18-inch flag with an integral diagonal metal or plastic stay to make the flag self-supporting. Provide flag in color fluorescent orange and mounted on a 3/4-inch by 30-inch staff.

670-2.3 FLASHER UNIT. Provide battery-operated omnidirectional flashing red light. Provide flasher unit with mounting bracket designed for the appropriate barrier type.

a. **Flasher Unit for Timber Barrier.** Meet Manual on Uniform Traffic Control Devices (MUTCD) requirements for Type A Warning Lights. Supply one set of non-standard tools, such as the on/off switch or battery access tool, for each 5 flasher units furnished.

b. **Flasher Unit for Plastic Barrier.**

Composition	High impact, polycarbonate plastic lens and base
Flashing Rate	60 flashes per minute
Brightness	6,000 millicandela (mcd)
LED	Total of 3 red
Photo Cell	Allows for solar light to automatically shut off in higher level light conditions and turn on in lower light conditions

CONSTRUCTION REQUIREMENTS

670-3.1 GENERAL. On the top side and at opposite ends of each barrier, mount one flag and one flasher unit per manufacturer's instructions. Tether flag to the barrier.

a. Hazard Marker Barrier, Timber.

(1) Preparation. Prior to painting, notch the underside of each timber to allow for the use of a forklift. Cut two 4-inch high by 12-inch wide notches spaced 36 inches center to center, centered on the long axis of the timber.

(2) Painting. Apply one coat of primer and one coat of finish white color paint on all sides and the ends followed by two coats of orange finish paint to form the stripes on the sides. Paint orange stripes 24 inches wide and offset by 6 inches from one side to the next giving a "barber pole" effect.

(3) Flag and Flasher Unit. Mount the flag 24 inches from one end of the timber by drilling a hole 1/8-inch larger than the diameter of the staff by 8 inches deep. Mount the flasher unit 24 inches from the opposite end of the timber.

b. Hazard Marker Barrier, Plastic. Fill barriers with water for ballast in accordance with manufacturer's recommendations. When shown on the Plans or directed by the Engineer, interlock barrier units using manufacturer recommended connectors to form a continuous wall separating the hazardous work area from aircraft movement areas. Adhere reflective striping panels to one side of each barrier.

670-3.2 DELIVERY. Deliver hazard marker barriers, flasher units, and flags to the project site prior to commencing work within the Air Operations Area.

670-3.3 STORAGE. Following completion of the project, remove flasher units and flags from the barriers. Barriers, flasher units, and flags are the property of the State. Drain plastic barriers. Deliver to a location on the Airport designated by the Engineer.

METHOD OF MEASUREMENT

670-4.1 Hazard marker barriers, complete with flag and flasher unit will be measured by the number of units furnished and accepted.

Flasher units and flags to be used on Department-supplied barriers will be measured by the number of units furnished and accepted.

BASIS OF PAYMENT

670-5.1 Payment covers all costs associated with furnishing and storing hazard marker barriers, flasher units, and flags, including tools, batteries, and incidentals.

Work required for placing, erecting, moving, and maintaining barriers is subsidiary.

Payment will be made under:

Item P670.010.0000 Hazard Marker Barrier, Plastic – per each

ITEM P-671 RUNWAY AND TAXIWAY CLOSURE MARKERS

DESCRIPTION

671-1.1 Furnish, install, and maintain runway and/or taxiway closure markers at the locations shown on the Plans or as directed by the Engineer. Where a new runway is built to replace an existing runway, install runway closure markers on the old runway immediately after the new runway has been opened for operations. Place markers as shown on the Plans or as directed by the Engineer. Relocate markers as required. Materials supplied under this item may be used as temporary closure markers as required in GCP subsection 80-04.

MATERIALS

671-2.1 Use materials that conform to the following.

a. Vinyl Mesh Panel.

(1) Panel Material. High tenacity vinyl coated polyester mesh fabric, 9 ounces per square yard (oz/yd^2), 70% closed mesh allowing water to flow through. Use 3.0 oz/yd^2 woven polyester fabric, coated after weaving with 6.0 oz/yd^2 coating of poly vinyl chloride, color traffic yellow. Minimum tensile strength 230 by 200 pounds (lbs) grab method and 200 by 140 lbs strip method. Meet ASTM D 471 for water absorption, 7 days @160°F, 5.0% maximum weight gain and ASTM D 750 for weathering, 2,500 hours, no appreciable change in color, no cracking, minimum crazing.

(2) Seams, Perimeter Hem, and Thread. Double flat felled seams, double stitched, and 3-ply perimeter hem sewn with UV resistant #92 bonded polyester thread.

(3) Grommets. No. 2 brass rolled-rim spur grommets installed through hem at 30-inch intervals along marker perimeter.

(4) Anchors. 3/8-inch diameter deformed reinforcing steel at least 18 inches long, including a hook formed as a 4-inch segment bent perpendicular to the anchor stem.

b. Snow Fence Panel.

(1) Panel Material. Wire-supported wood lathe snow fence, pre-treated with a suitable wood stain.

(2) Paint Type: (select one)

(a) AASHTO M248, Type F (Alkyd resin)

(b) FSS TT-P-19D(1) Paint Latex (Acrylic emulsion, Exterior).

(3) Paint Color: Traffic Yellow, #33538

(4) Anchors: 3/8-inch diameter deformed reinforcing steel at least 18 inches long, including a hook formed as a 4-inch segment bent perpendicular to the anchor stem.

c. Temporary Illuminated Panel.

(1) Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5345-53, Airport Lighting Equipment Certification Program (ALECP). The AC 150/5345-53, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the FAA webpage at: https://www.faa.gov/airports/engineering/airport_lighting/.

CONSTRUCTION REQUIREMENTS

671-3.1 Meet the following requirements.

a. Vinyl Mesh Panel. Secure by driving anchors into the embankment through all grommets.

b. Snow Fence Panel. Apply to the upper side of the panels, two coats of paint that result in a dense and consistent color. Construct panels double layered, with upper layer wood lathe oriented to lower lathe at right angles to provide a solid yellow appearance.

Combine standard manufactured widths to provide plan dimensions, if necessary.

Secure panels by driving anchors into the embankment at 30-inch intervals around the perimeter of each panel. If more than one standard manufactured width is combined to obtain plan dimensions, provide anchors on each strip.

c. Temporary Illuminate Panel. Locate the marker where shown on the plans or as directed by the Engineer. The contractor shall maintain an uninterrupted operation of the closure marker. Maintenance records shall be kept by the Contractor for all portable lighted markers and will be turned in to the Engineer when construction is complete.

METHOD OF MEASUREMENT

671-4.1 By the number of markers of the specified type, installed and accepted as completed units in place. No additional measurement will be made for removing and relocating markers for various stages of work.

BASIS OF PAYMENT

671-5.1 Payment will be made at the contract unit price for each furnished and accepted item of the marker type specified.

Payment will be made under:

Item P671.010.0000	Runway Closure Marker, Vinyl Mesh – per each
Item P671.040.0000	Taxiway Closure Marker, Vinyl – per each

TESTING REQUIREMENTS

ASTM D 471	Rubber Property – Effect of Liquids
ASTM D 750	Rubber Deterioration in Carbon-Arc Weathering Apparatus

ITEM P-681 GEOTEXTILE FOR SEPARATION AND STABILIZATION

DESCRIPTION

681-1. 1 Prepare ground surface, and furnish and place geotextiles for separation, stabilization, and/or reinforcement as shown on the Plans.

MATERIALS

681-2.1 MATERIALS. Use materials that conform to the following:

a. Separation. Meet AASHTO M 288 for Separation, except provide a minimum permittivity of 0.50 sec^{-1}, and meet Class 3 Strength Property Requirements.

b. Stabilization. Meet AASHTO M 288 for Stabilization, except provides a minimum permittivity of 0.50 sec^{-1}, and meet Class 1 Strength Property Requirements.

c. Reinforcement. Meet the requirements in Table 681-1 for Type 1 or Type 2.

Package, label, handle and store geotextile materials according to ASTM D 4873.

TABLE 681-1. GEOTEXTILE REINFORCEMENT PROPERTIES

Property	Test Method	Units	Requirement[a]	
			Type 1	Type 2
Grab Tensile	ASTM D4632	lb.	200/200	400/400
Grab Elongation	ASTM D4632	% (MD)	10	10
Wide Width Tensile	ASTM D4595	lb/in. (ultimate)	200/200	400/400
Wide Width Tensile	ASTM D4595	lb/in. (@ 5% strain)	100/100	200/200
Seam Breaking Strength	ASTM D4632	lb./in.	180	360
Puncture	ASTM D6241	lb.	500	1500
Trapezoidal Tear	ASTM D4533	lb.	100	150
AOS	ASTM D4751	U.S. sieve size	#30[b]	#30[b]
Permittivity	ASTM D4491	sec^{-1}	0.20	0.20
Flow Rate	ASTM D4491	gal./min./ft^2	10	10

[a] *Minimum Average Roll Values (MARV) in machine direction (MD) / cross-machine direction (XD) unless otherwise specified*
[b] *Maximum average roll value*

Sewing Thread. Use high strength polypropylene, or polyester. Do not use nylon thread. Use thread of contrasting color to that of the geotextile itself.

CONSTRUCTION REQUIREMENTS

681-3.1. SURFACE PREPARATION. Prepare ground surface by removing stumps, brush, boulders, and sharp objects. Fill holes and ruts over 3 inches deep, with material shown on the Plans or as approved by the Engineer.

681-3.2. GEOTEXTILE PLACEMENT. Unroll geotextile directly onto the prepared surface. Stretch geotextile to remove any creases, folds or wrinkles. Do not drag the geotextile through mud or over sharp objects that could damage the geotextile. Do not expose geotextiles to sunlight for longer than 14 days after removal of protective covering. Do not allow geotextiles to get wet prior to installation.

a. Separation and Stabilization. Lay geotextile for embankment separation and stabilization parallel to roadway centerline. On horizontal curves, place in segment lengths not exceeding those listed in Table 681-1, with butt ends cut to match and sewn or overlapped. On tangents, straighten the geotextile and sew or overlap butt ends. Shingle overlaps in the same direction as fill placement. Prevent overlapped edges from lifting during construction.

b. Reinforcement. Lay the machine direction of the geotextile for embankment reinforcement perpendicular to the roadway centerline or as shown on the Plans. Join segments by sewing or an approved bonding or attachment process. Shingle overlaps in the same direction as fill placement if seams are not sewn. Prevent overlapped edges from lifting during construction.

TABLE 681-2. GEOTEXTILE PLACEMENT ON CURVES

Degree of Curve	Maximum Segment Length (ft.)
1	125
2	90
3	75
4	65
5	55
6	50

681-3.3. JOINING. Join adjacent geotextiles for separation or stabilization by overlapping or sewing. Join adjacent geotextiles for reinforcement by sewing or as shown on the Plans.

a. Sew seams with a Butterfly or J-Seam using a double-thread chain stitch (lock stitch). Bring adjacent sections of geotextile together and fold so that the stitching penetrates four layers of geotextile for the full seam length. Make the stitching line 1-1/4 inches (±1/4-inch) from the folded edge of the seam and at least 1/2-inch from the free edge of the geotextile. Sew seams so that they face upward and can be easily inspected by the Engineer. Illustrations showing correct stitch formation and seam configurations are provided in Figure 1-2 (page 1-28) of the FHWA publication, *Geosynthetic Design & Construction Guidelines*, FHWA-NHI-07-092, August 2008.

b. Overlap geotextile sections by a minimum of 3 feet at all longitudinal and transverse joints. Place the beginning of each new roll beneath the end of the previous roll to prevent the advancing fill from lifting the geotextile. Shingle in the direction of construction.

681-3.4. MATERIAL PLACING AND SPREADING. During placing and spreading of material, maintain a minimum depth of 12 inches of cover material; or a minimum depth equal to the separation distance between multiple layers of geotextile as shown on the Plans when this separation distance is less than 12 inches; at all times between the geotextile and the wheels or tracks of the construction equipment. Limit the size and weight of construction equipment to reduce rutting in the initial lift above the geotextile to not greater than 3 inches deep to prevent overstressing the geotextile.

Spread the material in the direction of the upper overlapped geotextile. Maintain proper overlap and geotextile continuity. If sewn or bonded seams are used, place the cover material and spread in only one direction for the entire length of the geotextile. On weak subgrades limit height of dumped cover material to prevent localized subgrade and/or geotextile failure. Do not drop stones or frozen material larger than 1 foot in diameter directly onto the geotextile from a height of more than 1 foot.

Compact using a smooth drum roller. Do not allow construction equipment to make sudden stops, starts, or turns on the cover material. Do not allow turning of vehicles on the initial lift of cover material above the geotextile. Fill any ruts over 3 inches deep occurring during construction with material shown on the Plans; do not grade adjacent material into rut; and compact to the specified density.

681-3.5. GEOTEXTILE REPAIR. Repair and replace damaged geotextile (torn, punctured, or disturbed at the overlaps or sewn joints). For damage evidenced by visible geotextile damage, subgrade pumping, intrusion, or embankment distortion, remove the backfill around and under the damaged or displaced area, and repair with material matching the damaged material. Make patches overlap or sew patches to the existing geotextile.

a. **Separation and Stabilization**. Overlay torn area with geotextile with a minimum 3 foot overlap around the edges of the torn or damaged area or sew and bond according to Subsection 681-3.3a Ensure the patch remains in place when cover material is placed over the affected area.

b. **Reinforcement**. Sew according to Subsection 681-3.3a unless joining by overlap is shown on the Plans. Ensure the patch remains in place when cover material is placed over the affected area.

METHOD OF MEASUREMENT

681-4.1 Measure according to GCP Section 90, and by multiplying plan neat line width by the measured length in final position parallel to installation centerline along the ground surface. No allowance will be made for overlap, whether at joints or patches.

BASIS OF PAYMENT

681-5.1 Payment will be made at the contract unit price per square yard. Material used to fill ruts and holes will be paid for under separate materials pay items.

Payment will be made under:

Item P681.010.0000 Geotextile, Separation – per square yard

ITEM P-685 GEOGRID SOIL REINFORCEMENT

DESCRIPTION

685-1. 1 Furnish and install geogrid material at locations shown on the Plans or as directed by the engineer.

MATERIALS

685-2.1 GEOGRID. Biaxial polymer grid, specifically fabricated for use as a soil reinforcement, having high tensile strength and modulus in both principal directions. Use a single-layered, integrally-formed grid structure. Use either extruded or punched and drawn polypropylene or high density polyethylene. Geogrid must be UV-stabilized, chemically inert, and meet the physical requirements in Table 685-1.

TABLE 685-1. GEOGRID PHYSICAL REQUIREMENTS

PROPERTY	REQUIREMENT	TEST METHOD
Average Aperture Size, MD(1) XD(2)	0.8 – 2.0 in.	DD. Callipered Maximum Inside Dimension
Installation Damage Resistance	80%(3)	Sample per D5818 Test per D6637
Rip Thickness, min. (Nominal)	40 mils	Rip Thickness Callipered Minimum
Tensile Strength, min At 2% Strain At 5% Strain	MD & XD 400 lb/ft 800 lb/ft	ASTM D6637
Junction Strength, min	90%(4)	GRI GG-GG2
Flexural Rigidity, min.	0.65 in-lb.	ASTM D1388 Method A or ASTM D5732, Both Tests Modified for Geogrids

(1) MD: Machine Direction, which is along roll length.
(2) XD: Cross Machine Direction, which is across roll width.
(3) 80% relative to pre-installed Tensile Strength values. Perform Test install using GP or GW class soil.
(4) 90% relative to Ultimate Tensile Strength as determined by ASTM D6637

Package, label, handle, and store geogrid material according to ASTM D4873.

CONSTRUCTION REQUIREMENTS

685-3.1. WEATER LIMITATIONS. Do not expose geogrid to sunlight for longer than 14 days after removal of protective covering. Do not handle, store, or place geogrid at temperatures below -20°F.

685-3.2. SURFACE PREPARATION.

a. Very Soft Ground (CBR < 1). Care should be taken to avoid disturbing any surface crust overlying softer soil. In these cases the Geogrid should be placed directly on the unprepared subgrade.

If directed by the Engineer, minimize disturbance of the subgrade by leaving root mats in place, cutting stumps and other projecting vegetation as close and even to the ground surface as practical.

Swampland, peat, muskeg, or marshes may be difficult to smooth grade and/or compact. Create a surface that is as uniformly smooth as possible. Grade or crown the surface for positive drainage away from the construction zone.

b. Soft Ground (CBR 1 - 3). Prepare surface by removal of stumps, brush, boulders, and sharp objects. Fill holes and large ruts, as directed by the Engineer, with material shown on the Plans or as approved by the Engineer.

c. Firm Ground (CBR > 3). Compact and finish subgrade or subbase prior to placement of the geogrid.

685-3.3. GEOGRID PLACEMENT. Unroll geogrid directly onto the prepared surface in the direction of advancing construction, parallel to the centerline or according to the Plans. Do not drag the geogrid across the subgrade. Install the geogrid in the longest continuous practical length, free from folds, creases or wrinkles. Hold the geogrid in place with pins, staples, sandbags or piles of granular materials.

a. Very Soft Ground. Overlap geogrid panels a minimum of 36-inches at all joints with the upper geogrid in the direction that fill will be placed. Tie panels together securely with cable ties or hog rings at 5-feet intervals or as recommended by the manufacturer and approved by the Engineer.

To limit spreading and separation of overlaps, if approved by the Engineer, the Contract may unroll the geogrid transversely/perpendicular to the embankment alignment. Overlap the adjacent rolls and tie together with cable ties or hog rings at 5-feet intervals.

b. Soft Ground. Overlap geogrid panels a minimum of 24-inches at all joints, with the upper geogrid in the direction that fill will be placed. Tie panels together securely with cable ties or hog rings at 20-foot intervals or as recommended by the manufacturer and approved by the Engineer.

c. Firm Ground. Overlap geogrid panels at all joints a minimum of 12-inches, in the direction that fill will be placed. Tie panels together securely with manufacturer-recommended pins or bars. Hand-tension geogrid and stake to the ground at the edges, overlaps, and in the center of each roll, at 30-foot intervals or as specified on the plans.

685-3.4. PLACING AND SPREADING COVER MATERIAL. Do not operate equipment on the unprotected geogrid. Spread fill material in the direction of the fabric overlap. Compact using a smooth drum roller. Do not allow construction equipment to make sudden stopes, starts, or turns on the cover material.

a. Very Soft Ground. End-dump material onto previously placed material and spread over the geogrid with a low ground pressure (LGP equates to tire pressure of 4 psf) dozer to the depth permitted. Maintain a minimum depth of 12-inches of cover material at all times between the geogrid and the wheels or tracks of the construction equipment, unless otherwise shown on the Plans or directed by the Engineer. Do not dump material directly on the geogrid. To prevent a mud wave, end-dump fill along the edges of the geogrid to form toe berms or access roads that extend one to two panel widths ahead of the remainder of the embankment fill placement. After constructing the two berms, spread fill in the area between the toe berms by placing material parallel to the alignment and symmetrical from the toe berms inward toward the center to maintain a U-shaped leading edge (i.e., concave outward) to contain the mud wave. Limit height of dumped piles above the geogrid to avoid local bearing failure. Traffic on the first lift should be parallel to the embankment alignment. Do not allow construction equipment to turn on the first lift. Compact the first lift by tracking in place with dozers or end-loaders. Compact with specified compaction equipment once the embankment is at least 2-feet above the geogrid.

b. Soft Ground. End dump material onto previously placed material and spread over the geogrid with a LGP dozer to the depth permitted. Maintain a minimum depth of 6-inches of cover material at all times between the geogrid and the wheels or tracks of the construction equipment unless otherwise shown on the Plans or directed by the Engineer. Place the end-dumped material along the roadway centerline and spread it outward to the roadway edges to prevent the development of wrinkles or movement of the geogrid during construction. Fill in any ruts that form during construction with material shown on the Plans. Do not cut down the fill adjacent to the ruts.

c. Firm Ground. Maintain a minimum depth of 6 inches of cover material at all times between the geogrid and the wheels or tracks of the construction equipment.

685-3.5. GEOGRID REPAIR. If the geogrid is torn, punctured, or the overlaps disturbed – as evidenced by visible geogrid damage – remove the backfill around the damaged area and repair or replace the damaged area. Make repairs to the damaged area with a patch of the same class of geogrid originally placed. Overlay torn area with geogrid with a minimum 3-feet overlap around the edges of the torn area and secure as recommended by the geogrid manufacturer, unless otherwise directed by the Engineer.

685-3.6. STORAGE & PROTECTION OF GEOGRID MATERIALS. Lay rolled materials flat or stand on end. Do not expose to direct sunlight for periods longer than recommended by the manufacturer.

METHOD OF MEASUREMENT

685-4.1 By the square yard, in final position, determined by multiplying plan neat line width by the measured length parallel to the installation centerline and along the ground surface, for installations completed and accepted. No allowance will be made for overlap, whether at joints or patches.

BASIS OF PAYMENT

681-5.1 Payment will be made at the contract unit price per square yard. Material used to fill ruts and holes will be paid for under separate materials pay items.

Payment will be made under:

Item P685.010.0000 Geogrid – per square yard

ITEM S-142 EQUIPMENT STORAGE BUILDING

DESCRIPTION

142-1.1 Furnish all labor, materials and equipment required to construct a new snow removal equipment building at the location indicated on the Plans. Comply with the building technical specifications located in Appendix K for work on the building and related systems. This item will construct the new equipment storage building(s) on a new or existing building pad.

MATERIALS

142-2.1 Materials required to perform this work are outlined in the building technical specifications in Appendix K except as specified in subsection 142-5.1. Comply with GCP Section 60-08 for submittals.

CONSTRUCTION REQUIREMENTS

142-3.1 Comply with the Plans and Specifications outlined in the building technical specifications in Appendix L except as specified in subsection 142-5.1. Submit plans and working drawings in accordance with GCP Section 50-02.

142-3.2 TESTING. Perform testing in conformance with the Plans and Specifications outlined in the building technical specifications in Appendix K except as specified in subsection 142-5.1.

METHOD OF MEASUREMENT

142-4.1 Measure according to GCP subsection 90-02 and as follows:

a. Lump Sum. No measurement of quantities will be made.

b. Unit Prices. The quantity to be paid for will be the number of units installed, complete, in place, accepted, and ready for operation.

BASIS OF PAYMENT

142-5.1 Payment will be made at the contract lump sum price for construction of the building and related systems. This item provides full compensation for this work to include the building and internal systems.

Bollards external to building walls, all required mobilization/demobilization, surveying required for this work, airport lighting equipment, and standard signs are specified and paid for under items F-170, G-100, G-135, L series specifications, and P-661.

Earthwork associated with construction of the building pad, including the area within the building boundary line, will be specified, measured, and paid for under the appropriate earthwork (P series) bid items. Excavation and backfill of building foundation and footings will be subsidiary to item *S142.040.0000*.

Payment will also include all labor and materials necessary to connect the fuel oil tank furnished under Item S-143 with the appropriate building heating system.

Payment will be made under:

Item S142.010.0000 Equipment Storage Building (Concrete Floor) – per each
Item S142.020.0000 Equipment Storage Building (Steel Floor on Grade) – per each
Item S142.030.0000 Equipment Storage Building (Steel Floor on Skid) – per each
Item S142.040.0000 Equipment Storage Building – per lump sum

ITEM S-143 FUEL TANK

DESCRIPTION

143-1.1 This item consists of furnishing and installing a protected aboveground motor vehicle fuel or heating oil tank complete with fuel and accessories as specified. Prepare for Department use, an EPA approved Spill Prevention, Control and Countermeasure Plan (SPCC plan).

MATERIALS

143-2.1 TANK. Provide skid-mounted, doublewall, aboveground steel tank. The tank shall be of the type and capacity shown in the bid schedule. Equip tank with accessories as shown on the Plans and as follows:

a. **Overfill Alarm.** Provide a mechanical, audible overfill alarm, Ventalarm Signal as manufactured by Scully Signal Company, 70 Industrial Way, Wilmington, MA 01887 or approved equal.

b. **Automatic Shut-Off Device.** Provide a positive closing, mechanical, automatic shut-off device. Clay & Bailey model F-30 as manufactured by Clay and Bailey Manufacturing Co., 6401 East 40th Street, Kansas City, MO 64129 or approved equal.

c. **Tank-Mounted Mechanical Fuel Gauge.** Provide mechanical gauge with 12-hour clock face in feet and inches readout, activated by a stainless steel float connected to a stainless steel cable. Morrison Model 818 as manufactured by Morrison Bros. Co., P.O. Box 238, Dubuque, Iowa 52004 or approved equal.

d. **Openings.** Provide the following threaded openings and accessories on tank top:
One 2-inch Interstitial Monitoring with plug
One 2-inch Normal Vent with screen
One 2-inch Product fill opening with locking cap
One 2-inch Product pump opening with plug
One 2 to 4-inch Liquid level gauge
One 4 to 8-inch Emergency vent with plug, primary tank
One 4 to 8-inch Emergency vent with plug, secondary tank
No Drain Opening at bottom

e. **Exterior Coating.** Abrasive blast the exterior surface of the outer tank according to SSPC-SP 6. Coat the exterior surface with 8 mils total thickness of epoxy paint base and urethane paint finish.

f. **UL Labeling.** Heating oil tanks shall be manufactured and labeled according to UL 142. Motor vehicle fuel tanks shall be manufactured and labeled according to UL 142 and UL 2085.

g. **Insulation.** For motor vehicle fuel tanks install 3-inch thickness of insulation according to ASTM C332 and ASTM C495.

When a motor vehicle fuel-dispensing tank is specified, it shall meet or exceed the requirements of UL 2085, Underwriters Laboratories Standard for Safety for Protected Aboveground Tanks for Flammable and Combustible Liquids. Equip with a threaded opening for the specified fuel pump.

Tanks larger than 2,500 gallons require additional openings and accessories for UL rating.

143-2.2 MANUAL DISPENSING SYSTEM. Provide a double-action pump, equipped with detachable, self-venting bung adapter, set screws and strainer screen. Provide a dispensing system that is not gravity fed. The pump shall have 16 feet of 3/4-inch diameter hose with shut-off nozzle and deliver a minimum of 20 gallons/100 strokes. The pump supplied shall be a Gasboy, Model 1720, or approved equal.

143-2.3 ELECTRIC DISPENSING SYSTEM. Provide an electric suction or submerged turbine pump with a delivery rate up to 18 gallons per minute (gpm), 3-wheel, meter-register with reset and non-resettable 6 digit master totalizer in a cabinet, anti-siphon valve with internal pressure relief, gate valve, canister style fuel filter, flow meter, 20 ft fuel hose with swivel and breakaway coupling, hose retractor, OPW 11-A automatic nozzle with lockable nozzle holder, explosion proof pump activation switch, emergency pump shutoff switch mounted on the SRE building, warning signs, and BC fire extinguisher per International Fire Code (IFC) chapter 2201 - 2206.

143-2.4 FUEL. No. 1 diesel or No. 1 heating oil, depending on tank use.

CONSTRUCTION REQUIREMENTS

143-3.1 INSTALLATION. Install according to the International Fire Code (IFC) chapters 22 and 34 for the type of tank specified. Mount and secure the tank on the skid base. Install dispensing system to include all fittings and hose. Install wiring of the pump and emergency shut off according to National Fire Protection Association (NFPA) 30 and the current edition of the National Electrical Code (NEC) for hazardous locations. Place tank at the location shown on the Plans, or as directed. Set automatic shut-off device to 90% capacity. Fill to 90% capacity with specified fuel.

Install signs on the accessible sides of the tank or as directed by the Engineer.

143-3.2 SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN (SPCC). Provide for Department use after tank installation/modification, an EPA approved SPCC plan for the motor vehicle fuel or heating oil tank, in compliance with 40 CFR 112. (See http://www.epa.gov/oilspill/lawsregs.htm for SPCC plan requirements).

Provide two (2) copies of the SPCC Plan; deliver one to the Engineer to be retained at the site and deliver the other to the Department's Statewide Safety Officer at 5300 E. Tudor Drive, Anchorage, AK, 99507.

METHOD OF MEASUREMENT

143-4.1 Subsection GCP-90-02 and as follows:

a. Lump Sum. No measurement of quantities will be made.

b. Unit Prices. The quantity to be paid for will be the number of units installed, complete, in place, accepted, and ready for operation.

BASIS OF PAYMENT

143-5.1 At the contract unit price for the pay items listed below that appear in the bid schedule. Heating fuel distribution and delivery systems are measured and paid for under Item S-142.

Payment will be made under:

Item S143.010.1000	Heating Fuel Tank, 1,000 Gal – per each
Item S143.060.0000	Spill Prevention Control and Countermeasure Plan – lump sum

ITEM T-901 SEEDING

DESCRIPTION

901-1.1 This work consists of preparing the ground and applying seed and fertilizer in conformance with the Plans and Specifications.

The intent of this work is to provide a living vegetative cover in the areas indicated on the Plans and to maintain the cover for the term of the Contract.

MATERIALS

901-2.1 SEED. Provide the seed mixture as specified in the ~~Special Provisions~~below.

50% Tufted Hairgrass (Nortran); 75% sproutable, 80% germination, 94% purity
30% Arctared Red Fescue; 79.9% sproutable, 85% germination, 94% purity
15% Tundra Glaucous Bluegrass; 79.9% sproutable, 85% germination, 94% purity
5% annual Ryegrass; 80% sproutable, 85% germination, 94% purity

Provide seed collected or harvested within 2 years of the targeted seeding date. Provide all seed in pure live seed (PLS) unless otherwise directed.

Provide seed true of genus and species. Meet the applicable requirements of the State of Alaska Seed Regulations, 11 AAC 34, Articles 1 and 4, and the Federal Seed Act, 7 CFR Part 201.

The Engineer will review requests for species or cultivar substitution(s); genus substitution is not allowed. Substitution requests need to be submitted a minimum of 60 calendar days in advance of delivery.

a. Prohibited and Restricted Noxious Weeds and Quarantined Pests. Provide seed and appliances certified to be free of prohibited noxious weeds or quarantined pests, and certified to contain no more than the maximum allowable tolerances for restricted noxious weeds, according to Alaska Administrative Code, Title 11, Chapter 34 (11 AAC 34).

(1) Seed or appliances found to contain prohibited noxious weeds or quarantined pests will be rejected, according to 11 AAC 34.020(a) and 11 AAC 105-180, respectively.

(2) Seed or appliances found to contain restricted noxious weed seed in excess of the maximum allowable tolerance per pound will be rejected, according to 11 AAC 34.020(b).

(3) Prohibited and restricted noxious weeds are listed in 11 AAC 34.020, and can be viewed at the following webpage: http://plants.alaska.gov/invasives/noxious-weeds.htm.

b. Labeling. Ensure each bag or container of individual seed species is labeled to meet requirements of 11 AAC 34.010. Do not remove labels from bags or containers.

c. Certification. Certify seed is free of prohibited noxious weeds and restricted noxious weeds are within allowable tolerances. Provide to the Engineer no later than 10 days prior to seeding 4 signed copies of a statement signed by the vendor identifying the lot number or lot numbers, certifying each lot of seed has been tested within the preceding nine months, by a recognized seed testing laboratory, a member of the Association of Official Seed Certifying Agency (AOSCA), or the Alaska Plant Materials Center.

Include the following in each certification:

(1) name and address of laboratory

(2) date of test

(3) lot number

(4) seed name

(5) percent pure seed

(6) percent germination

(7) percent weed content

(8) percent inert matter

Seed will be rejected if:

a. Contains prohibited noxious weeds;

b. Contains restricted noxious weeds above maximum allowable tolerances;

c. Not certified as tested within the preceding nine months;

d. Wet, moldy, or otherwise damaged in transit or storage; or

e. Containers do not have labels or the labels have been removed.

Seed may be rejected for:

f. Discrepancies in the lot numbers listed on the statement to the lot numbers indicated on the labels of the seed containers.

The Contractor shall immediately remove rejected seed from the project premises. If seed is rejected for containing prohibited noxious weeds or for exceeding maximum allowable tolerances of restricted noxious weeds, dispose of rejected seed according to 11 AAC 34.075(g).

901-2.2 FERTILIZER. Provide a 20-20-10 fertilizer containing no cyanamid compounds or hydrated lime. Tolerances of the chemical ingredients shall be plus or minus 2%.

Use standard commercial fertilizer supplied separately or in mixtures, and in moisture proof containers. Mark each container with the total net weight and with the manufacturer's guaranteed analysis of the contents showing the percentage for each ingredient.

CONSTRUCTION METHODS

901-3.1 SOIL PREPARATION. Clear all areas to be seeded of stones 4 inches in diameter and larger and of all sticks, stumps, noxious weeds, and other debris or irregularities that might interfere with the seeding operation, growth of grass, or subsequent maintenance of the grass covered areas.

Just prior to seeding, roughen the surface of all areas to be seeded by track-walking transversely up and down the slopes or using a scarifying slope board. Round the top and bottom of the slopes, when necessary, to facilitate tracking and to create a pleasing appearance, but do not disrupt drainage flow lines. Where fill is adjacent to wetlands, keep the equipment entirely on the fill slope.

901-3.2 SEEDING SEASONS. Seed and fertilize between May 15 and August 15.

Do not seed during windy conditions or when climatic conditions or ground conditions would hinder placement or proper growth.

901-3.3 APPLICATION. ~~Apply seed and fertilizer at the rates specified in the Special Provisions.~~ Apply seed uniformly at a rate of 100 pounds per acre. Apply fertilizer uniformly over the area to be seeded at a rate of 500 pounds per acre. The hydraulic method shall be used. Apply mulch, with seed and fertilizer, at the rate specified in T-908 using the hydraulic method. ~~Use either of the following methods:~~

a. Hydraulic Method.

(1) Mix a slurry of seed, fertilizer, water, and other components as required by the Special Provisions. Add seed to the slurry mixture no more than 30 minutes before application.

(2) Use hydraulic seeding equipment that will maintain a continuous agitation and apply a homogeneous mixture through a spray nozzle. The pump must produce enough pressure to maintain a continuous nonfluctuating spray that will reach the extremities of the seeding area, without causing damage to the seed bed. Use a hose attachment to reach areas where a fixed nozzle cannot reach.

(3) If mulch material is required, add it to the water slurry in the hydraulic seeder after adding the proportionate amounts of seed and fertilizer.

(4) Apply slurry at a rate that distributes all materials evenly.

b. Dry Method.

(1) Use mechanical spreaders, seed drills, landscape seeders, cultipacker seeders, fertilizer spreaders, or other approved mechanical spreading equipment.

(2) Moisten the soil prior to the application of seed and fertilizer and immediately afterwards.

(3) Mix or rake the seed and fertilizer into the seed bed to a depth of 1/2 inch, unless mulch material is to be applied immediately.

901-3.4 MAINTENANCE OF SEEDED AREAS. Protect seeded areas against traffic using approved warning signs or barricades. Repair surfaces that are gullied or otherwise damaged following seeding by regrading and reseeding, as directed. Maintain seeded areas in a satisfactory condition until final inspection and acceptance of the work.

Keep temporary erosion control measures in place until the vegetation is accepted.

Water the seeded areas, as required, for proper germination and growth. Use equipment that can acceptably water all seeded areas without vehicular traffic on seeded areas.

Reseed any seeded areas not showing evidence of satisfactory growth, as directed.

901-3.5 FINAL ACCEPTANCE. Final acceptance will be based on the following criteria and must provide 70% vegetative coverage of the seeded area. If seeding is completed by July 15th, coverage must be attained by September 30th. If seeding is completed by August 15th, coverage must be attained by June 15th of the following season. Final acceptance will be based on the Engineers approval.

METHOD OF MEASUREMENT

901-4.1 Measure work according to GCP Section 90, and as follows:

a. Seeding by the acre. By the area of ground surface acceptably seeded, fertilized, and maintained. Required reseeding is subsidiary.

b. Seeding by the pound. By the weight of seed acceptably placed. Fertilizer is subsidiary. Any other work required will be measured separately.

c. Water for maintenance. By the Mgal (1,000 gallons) acceptably placed. Use a conversion factor of 8.34 pounds per gallon, if measured by weight. Use a conversion factor of 7.48 gallons per cubic foot, if measured by volume.

BASIS OF PAYMENT

901-5.1 At the contract price per unit of measure for the pay items listed below that appear on the bid schedule. Soil preparation, fertilizer, mulching, and water required for hydraulic method are subsidiary. ~~Mulching will be measured and paid for under Item T-908.~~

a. Seeding by the Acre. Payment is for established vegetative mat.

b. Seeding by the Pound. Payment is for established vegetative mat.

c. Water for ~~Seeding~~Maintenance. Water applied for growth of vegetative mat.

Payment will be made under:

Item T901.020.0000	Seeding – per pound
Item T901.030.0000	Water for Maintenance – per Mgal

ITEM T-905 TOPSOIL

DESCRIPTION

905-1.1 This item shall consist of preparing the ground surface for topsoil application, removing topsoil from designated stockpiles or areas to be stripped on the site or from approved sources off the site, and placing and spreading the topsoil on prepared areas in accordance with this specification at the locations shown on the plans or as directed by the Engineer.

MATERIALS

905-2.1 TOPSOIL. Provide a natural friable surface soil without admixtures of undesirable subsoil, refuse, or foreign materials and reasonably free from roots, clods, hard clay, noxious weeds, tall grass, brush sticks, stubble or other litter, and which is free draining and non-toxic.

The gradation shall conform to selected Class in Table 1 when tested according to ATM 304 If no class is indicated, meet the grading requirements in Table 1 for Class A topsoil.

TABLE 905-1. TOPSOIL GRADING

Sieve Designation	Percent Passing By Weight	
	CLASS A	CLASS B
3 in	-	100
1/2 in	100	-
No. 4	95-100	75-100
No. 16	64-90	50-95
No. 200	30-60	20-80
Organic Matter	10-40	5 min.

Percent of organic matter will be determined by loss-on-ignition of oven dried samples using ATM 203.

When necessary, amend natural topsoil to meet the above specifications, using approved materials and methods.

CONSTRUCTION METHODS

905-3.1 PREPARING THE GROUND SURFACE. Where grades in the areas to be topsoiled have not been established, smooth-grade the areas to the grades shown on the Plans. Maintain the prescribed grades in an even and properly compacted condition to prevent the formation of low places or pockets where water will stand.

Clear the surface of the area to be topsoiled of all stones larger than 2 inches in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting.

Immediately prior to dumping and spreading the topsoil, loosen the surface, by approved means, to a minimum depth of 2 inches to facilitate bonding of the topsoil to the covered subgrade soil.

905-3.2 OBTAINING TOPSOIL. Prior to the stripping of topsoil from designated areas, remove any vegetation, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, using approved methods.

When suitable topsoil is available on the site, remove this material from the designated areas to the depth directed. Spread the topsoil on areas already tilled and smooth-graded, or stockpile in approved areas. Grade the stockpile sites and adjacent areas which have been disturbed if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, locate and obtain the supply, subject to approval. Notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. Remove the topsoil from approved areas and to the depth as directed. Haul the topsoil to the site of the work and stockpile or spread as required.

905-3.3 PLACING TOPSOIL. Spread the topsoil evenly on the prepared areas to a uniform depth of 4 inches after compaction. Do not spread when the ground or topsoil is frozen or excessively wet.

After spreading, break up any large stiff clods and hard lumps with a pulverizer or other effective means. Rake up and dispose of all stones or rocks (2 inches or more in diameter), roots, litter, or any foreign matter. After spreading, compact the topsoil with a cultipacker or by other approved means. The compacted topsoil surface shall conform to the required lines, grades, and cross sections. Promptly remove any topsoil or other dirt falling upon pavements or other surface courses.

Track topsoil with a dozer to make track marks running perpendicular to the direction of drainage.

METHOD OF MEASUREMENT

905-4.1 Measure according to GCP subsection 90-02 and by the square yard, placed and accepted.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per square yard. Stockpiling and rehandling topsoil are subsidiary.

Payment will be made under:

Item T905.010.0010	Topsoiling, Class A – per square yard

TESTING REQUIREMENTS

ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates

ITEM T-908 MULCHING

DESCRIPTION

908-1.1 This work consists of providing, placing, and maintaining soil stabilization material where shown on the Plans.

MATERIALS

908-2.1 MULCH. NOT USED. ~~Virgin/recycled wood fiber, recycled paper (wood cellulose), or an acceptable blend containing up to 50% recycled paper, with the following characteristics:~~

- ~~**a.** Contains no growth or germination inhibiting factors.~~
- ~~**b.** Will remain in uniform suspension in water under agitation and will blend with grass seed, fertilizer and other additives to form a homogeneous slurry, when required.~~
- ~~**c.** Will form a uniform, blotter-like ground cover on application, having moisture absorption and percolation properties and the ability to cover and hold grass seed in contact with soil.~~
- ~~**d.** Will not form a hard crust upon drying.~~
- ~~**e.** Dyed a suitable color to facilitate inspection of its placement.~~

~~Ship the mulch in packages of uniform weight (plus or minus 5%) bearing the name of the manufacturer and the air-dry weight content.~~

~~Use a commercial tackifier on all slopes 4:1 or steeper. Use the amount recommended by the manufacturer.~~

908-2.2 ROLLED MATTING. Use materials that conform to one of the following standards:

- **a. Unbleached Single Jute Yarn.** Use yarn that is loosely twisted and not varying in thickness more than one-half its normal diameter. Provide jute mesh in rolled strips conforming to the following requirements.
  - **(1)** Width: 45 to 48 inches, ± 1-inch.
  - **(2)** 78 warp-ends per width of cloth (minimum).
  - **(3)** 41 weft-ends per yard (minimum).
  - **(4)** Weight: 1.22 pounds per linear yard, ± 5%
- **b. Knitted Straw Matting.** Commercially manufactured erosion control blanket. Use netting which is biodegradable. Straw shall be from oats, wheat, rye, rice, or other approved grain crops that are free from noxious weeds, mold, or other objectionable material. May contain coconut or other natural fiber to reinforce the straw. Follow the manufacturer's published recommendations.

908-2.3 STAPLES. U-shaped staples for anchoring matting, approximately 6 inches long and 1-inch wide. Machine-made: No. 11 gage or heavier steel wire. Hand-made: 12-inch lengths of No. 9 gage or heavier steel.

908-2.4 Hydraulic Erosion Control Product (HECP). The HECP upon application to the soil surface will create a three-dimensional fiber matrix forming a continuous, porous, absorbent and flexible erosion

resistant blanket that allows for rapid germination and accelerated plant growth. Provide an HECP that conforms to either HECP-1 or HECP-2 as follows:

a. **HECP-1** consisting of thermally processed or pasteurized non toxic organic defibrated fibers, dispersible interlocking natural or synthetic fibers and a cross-linked hydro-colloidal tackifier. HECP-1 is not composed of paper, cellulose fiber, or blend of paper, cellulose, and other materials. Provide an HECP-1 that is a flexible erosion control matrix and forms a strongly lofted but porous fiber mat that contains air pockets and moisture absorbing chambers that allow for the proper germination of seeds while reducing the energy of raindrops and decreases the volume of sediment loss, or:

b. **HECP-2** certified by the manufacturer to provide an equivalent level of performance to that of an HECP-1 meeting the material requirements described under "a." above. In addition, provide evidence that the HECP-2 has been shown to be at least 99% effective by testing at any of the following laboratories:

(1) San Diego State University Soil Erosion Research Laboratory, San Diego, CA

(2) Utah Water Research Laboratory at Utah State University, Logan, Utah

(3) USDA-Agricultural Research Service National Soil Erosion Research Laboratory (NSERL) at Purdue University, West Lafayette, Indiana.

(4) Texas DOT/Texas Transportation Institute (TTI) Hydraulics and Erosion Control Laboratory at Texas A & M, College Station, Texas.

Deliver materials and products in UV and weather resistant factory labeled packages. Store and handle in compliance with manufacturer's instructions and recommendations. Protect from damage from weather, excessive temperatures, and construction operations. Ensure that all components of the HECP are pre-packaged by the manufacturer to assure material performance.

CONSTRUCTION METHODS

908-3.1 SURFACE PREPARATION. Smooth the surface and backfill all gullies and potholes before application. Remove all sticks and other foreign matter that prevents contact of the HECP ~~mulch~~ or matting and the soil. Ensure that surfaces receiving an application of HECP are geotechnically stable and constructed to divert runoff away from the face of any slopes. Do not proceed with HECP installation until satisfactory conditions are established.

Ensure that the surface is moist at the time of placement. If area is to be seeded, soil preparation shall conform to subsection 901-3.1.

908-3.2 APPLICATION.

a) **Matting.** Apply soil stabilization material at the rate specified in the Special Provisions. If seeding is specified, complete the application of ~~mulch or~~ matting within 24 hours after seed is placed. When matting is shown on the plans, staple matting every 5 feet at overlapped joints and edges or as recommended by the manufacturer. Do not use vehicles or equipment which cause rutting or displacement of the subgrade or topsoil.

b) **Hydraulic Erosion Control Product (HECP)**

(1) **HECP-1.** Apply at a rate of 3500 lbs per acre (dry weight basis) in compliance with manufacturer's instructions and recommendations using an approved mechanically agitated, hydraulic seeding/mulching machine with a fan-type nozzle (50-degree tip). Apply from

opposing directions to reduce the “shadow effect” and to achieve best soil coverage. Do not apply HECP-1 in channels, swales, or other areas where concentrated flows are anticipated, unless installed in conjunction with a temporary erosion control blanket or non-degradable turf reinforcement mat. Slope interruption devices or water diversion techniques are recommended when slope lengths exceed 100 feet and/or slopes are steeper than 3H;1V. Where surfaces are to be seeded, apply HECP-1 in a two-step process unless a single step process is recommended by the manufacturer and approved by the Engineer. The single step process involves mixing all components in a single tank load. In step one of a two step process, mix and apply any seed and soil amendments with a small amount of HECP-1 for visual metering. In step two, mix and apply HECP-1 over freshly seeded surfaces. Do not leave seeded surfaces unprotected, especially if precipitation is imminent. Mix HECP-1 in the hydraulic application machine by filling the tank to middle of agitator shaft or 1/3 tank full of water. Turn on the pump to wet or purge lines. Begin agitating and keep adding water slowly while adding the HECP-1 at a steady rate. Consult the manufacturer’s application and loading charts to determine the number of bags to be added. Mix at a rate of 50 lbs HECP-1 per 125 gallons of water. Contact the equipment manufacturer to determine optimum loading and mixing rates. All HECP-1 should be loaded when the tank is approximately ¾ full. Where fertilizer is applied with HECP-1, add it when the tank is nearly full. Before application, mix the slurry for at least 10 minutes after adding the last amount of HECP-1. This is imperative to fully activate the bonding additives and to attain proper viscosity. Turn off the recirculation valve and reduce the agitator speed to minimize the potential for air entrainment within the slurry.

(2) HECP-2. Apply in accordance with manufacturer’s instructions, at a rate specified by the manufacturer.

908-3.3 MAINTENANCE. Reshape and reseed any damaged areas and repair the mulch or matting as required.

Maintain the ~~mulch~~ HECP or matting until all work on the project is complete and accepted.

METHOD OF MEASUREMENT

908-4.1 MEASUREMENT. ~~Measure the work according to GCP subsection 90-02 and by the square yard covered with mulch placed in the final position as accepted by the Engineer.~~Soil stabilization will not be measured for payment.

BASIS OF PAYMENT

908-5.1 PAYMENT. ~~At the contract unit price per unit of measure for the pay items listed below that appear on the bid schedule. Water, maintenance, and repair are subsidiary.~~ No separate payment for soil stabilization will be made. Soil stabilization is subsidiary to T901.020.0000 Seeding.

~~Payment will be made under:~~

ITEM U-500 ELECTRICAL SYSTEM

DESCRIPTION

500-1.1 Supply and install equipment and materials needed to extend the existing Puvurnaq Power Company overhead power line to the new airport Snow Removal Equipment Building (SREB). Perform work in conformance with the Plans, Specifications, and Puvurnaq Power Company requirements.

MATERIALS

500-2.1 Obtain approval of all materials and equipment proposed to be used or incorporated in the work prior to shipment to the project site. Submit to the Engineer five (5) complete listings of materials and equipment specified herein and on the Plans. Prepare the list to clearly identify the materials or equipment by item, name, or designation used on the Plans or Specifications and indicate where specified.

Provide submittals neatly bound and clearly indexed, and include applicable catalog numbers, cuts, wiring diagrams, performance data, operation and maintenance manuals, etc., for all material and equipment listed in these project Specifications under Appendix M Electrical Utility Technical Specifications, Section 33 71 00 – Electrical Utilities, and under Appendix N Detail Sheets from Rural Utilities Service (RUS) Bulletin 1728F-804.

500-2.2 Materials shall be listed in RUS Informational Publication 202-1 – List of Materials Acceptable for use on Systems of USDA Rural Development, latest edition, .and shall comply with Appendix M requirements.

CONSTRUCTION REQUIREMENTS

500-3.1 Coordinate electrical work with Puvurnaq Power Company according to GCP subsection 50-06c.(1) (Phone Number (907) 557-5615).

All work shall be performed by or under the direct supervision of a State of Alaska licensed journeyman lineman in accordance with the National Electrical Safety Code (NESC). Perform all work with qualified personnel licensed for the work involved.

Perform work in a thorough and workmanlike manner in accordance with the Plans, Appendix M Electrical Utility Technical Specifications, Section 33 05 01 – Basic Electrical Utility Requirements and Section 33 71 00 – Electrical Utilities, and Appendix N Detail Sheets from Rural Utilities Service (RUS) Bulletin 1728F-804.

Record exact locations of poles, guys and anchors. Record conductor sag and temperature when conductor was installed.

Provide testing and demonstration in accordance with Appendix M, Section 33 71 00.

Furnish a written guarantee that any materials or workmanship found defective within one year of final acceptance will be replaced at the Contractor's expense, promptly upon notification and to the satisfaction of the Engineer.

METHOD OF MEASUREMENT

500-4.1 This work will not be measured for payment.

BASIS OF PAYMENT

500-5.1 Payment will be made at the contract lump sum price for the completed and accepted job. This price will be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

Item U500.020.0000	Electrical Line Extension – per lump sum

APPENDIX A

CONSTRUCTION SURVEYING REQUIREMENTS

Alaska Department of Transportation and Public Facilities

Alaska Construction Surveying Requirements (US Customary Units)

Alaska Construction Surveying Requirements (US Customary Units)

Table of Contents

1. Survey accuracy requirements

Third order survey

- ✓ Use a 1/5000 horizontal closure.
- ✓ Use an angle closure of $30\sqrt{N}$ seconds, where N equals the number of angles in the traverse.
- ✓ An Alaska-registered professional land surveyor must perform or supervise replacement of survey monuments (property, USGS, USC&GS, BLM, etc.) or establishment of monuments (including centerline).
- ✓ All monument work must comply with AS 34.65.040 and meet standards in the latest version of the Alaska Society of Professional Land Surveyors' *Standards of Practice Manual.*
- ✓ The allowable vertical error for misclosure is $e = 0.05\sqrt{M}$ e = maximum misclosure in feet, M = length of the level circuit in miles.

Table 1—Survey accuracy requirements (in feet)

	Stationing	HI	Closure	Horizontal Angle	Distance To center line	Grade
Additional cross sections	1.0	0.01	0.04	**	0.1	0.1
Benches		0.01	0.02			
Blue tops***	1.0	0.01	0.04		0.1	0.02
Bridges	*	0.01	0.02			0.01
Centerline	*			*		
Clearing & Grubbing	1.0				1.0	
Culverts	1.0	0.01	0.04	**	0.1	0.1
Curb & gutter	1.0	0.01	0.02		0.1	0.02
Grade stakes	1.0				0.1	0.1
Guardrail	1.0				0.1	
Manholes, catch basins & inlets	1.0	0.01	0.02		0.1	0.02
Monuments	*			*		
Red tops***	1.0	0.01	0.02		0.1	0.05
Riprap	1.0	0.1	0.04		1.0	0.1
Signs	1.0				0.1	
Slope stakes & RP's	1.0	0.01	0.04	**	0.1	0.1
Under drains & sewer	1.0	0.01	0.02		0.1	0.02

* Third order survey
**Right angle prism or transit angles from center line
*** Use blue tops for top of base course and red tops for the bottom of base course.

1. Survey frequency requirements

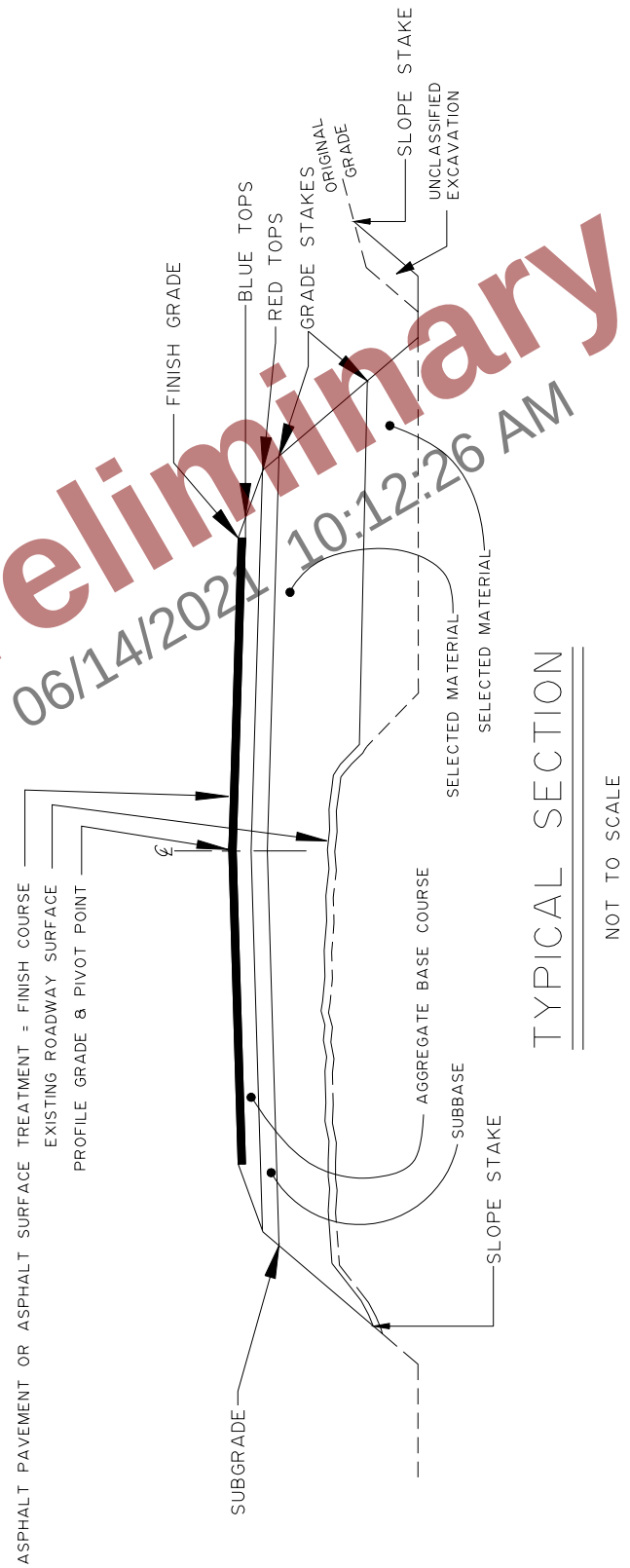
Table 2—Survey frequency requirements (in feet)

	Tangents	Curves	Interchange ramps	Stake each per plan	See special instructions on sample notes
Additional cross sections	*	*	*		
Bench marks					X
Blue tops	100	100**	25		X
Blue tops within 100 feet both sides of railroad track crossings and bridge approaches	25	25	25		X
Bridges				X	X
Center line	100	100**	25		
Clearing	100	100**	25		X
Culverts				X	X
Curb and gutter	25	25	25		
Grade stakes	100	100**	50		
Guardrail	25	25	25		
Manholes, catch basins & inlets				X	
Monuments				X	
Red tops	100	100**	25		X
Riprap	50	50	50		
Signs				X	
Slope stake / cross sections	100	100**	25		X
Under drains and sewers	50	25	25		

* Establish additional cross sections and slope stakes at all breaks in topography and where structures begin and end.

**Curves shall be staked on 50-foot stations if the curve is greater than six degrees.

2. Typical Section Drawing



3. Survey point materials requirements

- ✓ These are minimum requirements; larger sizes may be necessary.
- ✓ Use only stakes with planed sides.

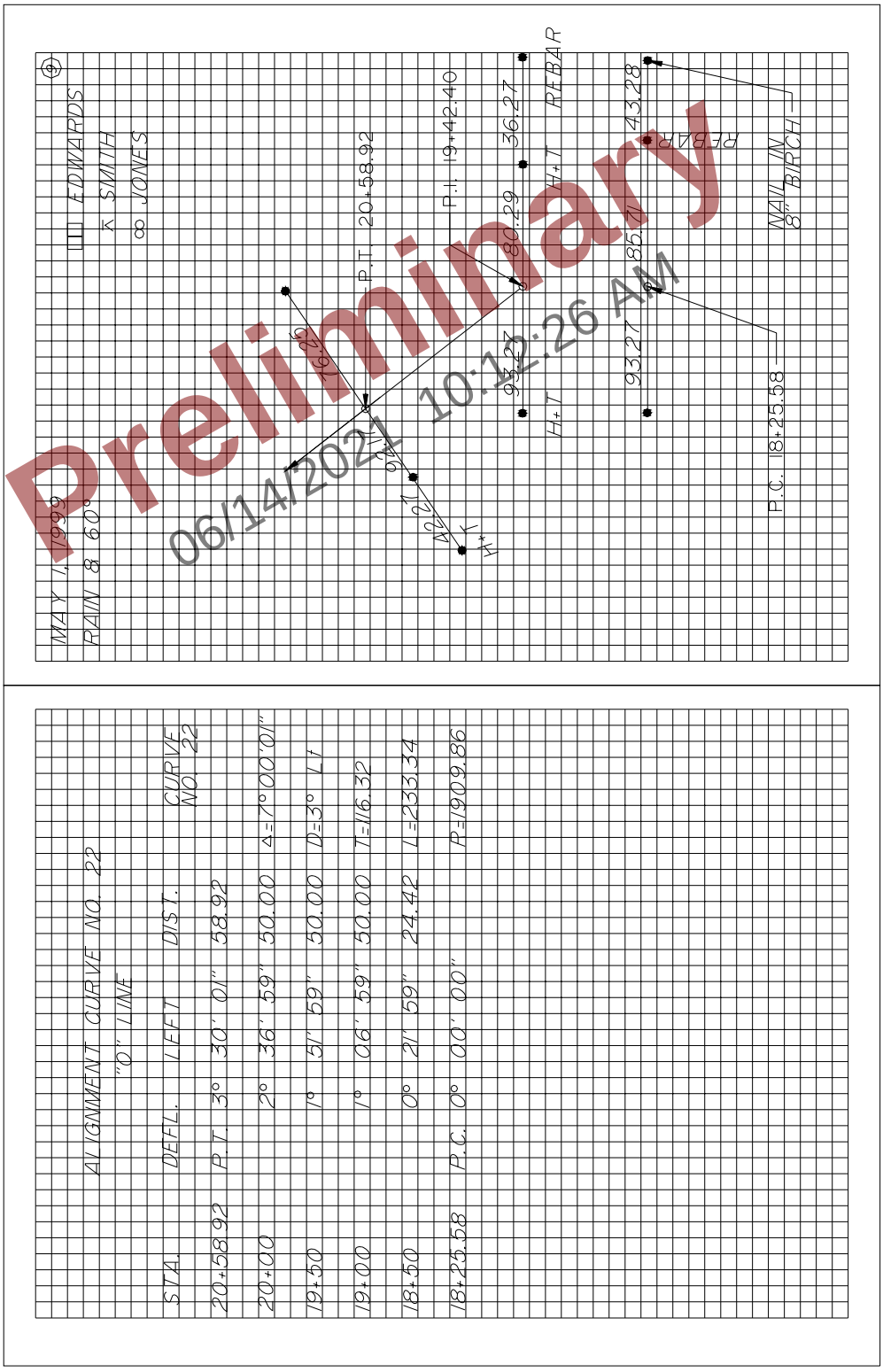
Table 3—Survey point materials requirements

	24" lath or whiskers	2" x 2" x 8" hub	2" x 2" x 12" hub	1" x 2" x 18" stake	1" x 2" x 24" stake	48" lath	Hub and tack	40d nail	60d nail	½" x 24" rebar
Benchmarks									X	
Blue tops	X	X								
Centerline P.C., P.T., P.O.T.			X	X			X *			X*
Centerline reference points			X	X			X *			X *
Centerline station				X				X		
Clearing						X				
Culvert stake			X		X	X				
Culvert stake references			X		X	X				
Curb and gutter			X		X		X			
Guardrail								X		
Major structures			X	X *	X *	X	X *			X *
Red tops	X	X								
Signs						X				
Slope stake					X	X				
Slope stake references			X		X	X				

* Optional depending on conditions, and to be determined by the Project Engineer.

4. Typical alignment notes

- ✓ The Chief of Parties must prepare the alignment book before actual staking.
- ✓ Don't use swing ties for reference points.
- ✓ Use three point right angle ties, two to the right and one left, or vice versa.
- ✓ Reference P.C., P.I., P.T., and P.O.T.



5. Typical clearing notes

- ✓ Exclude areas not needing clearing.
- ✓ Draw a diagram as required to show unusual or confusing areas.

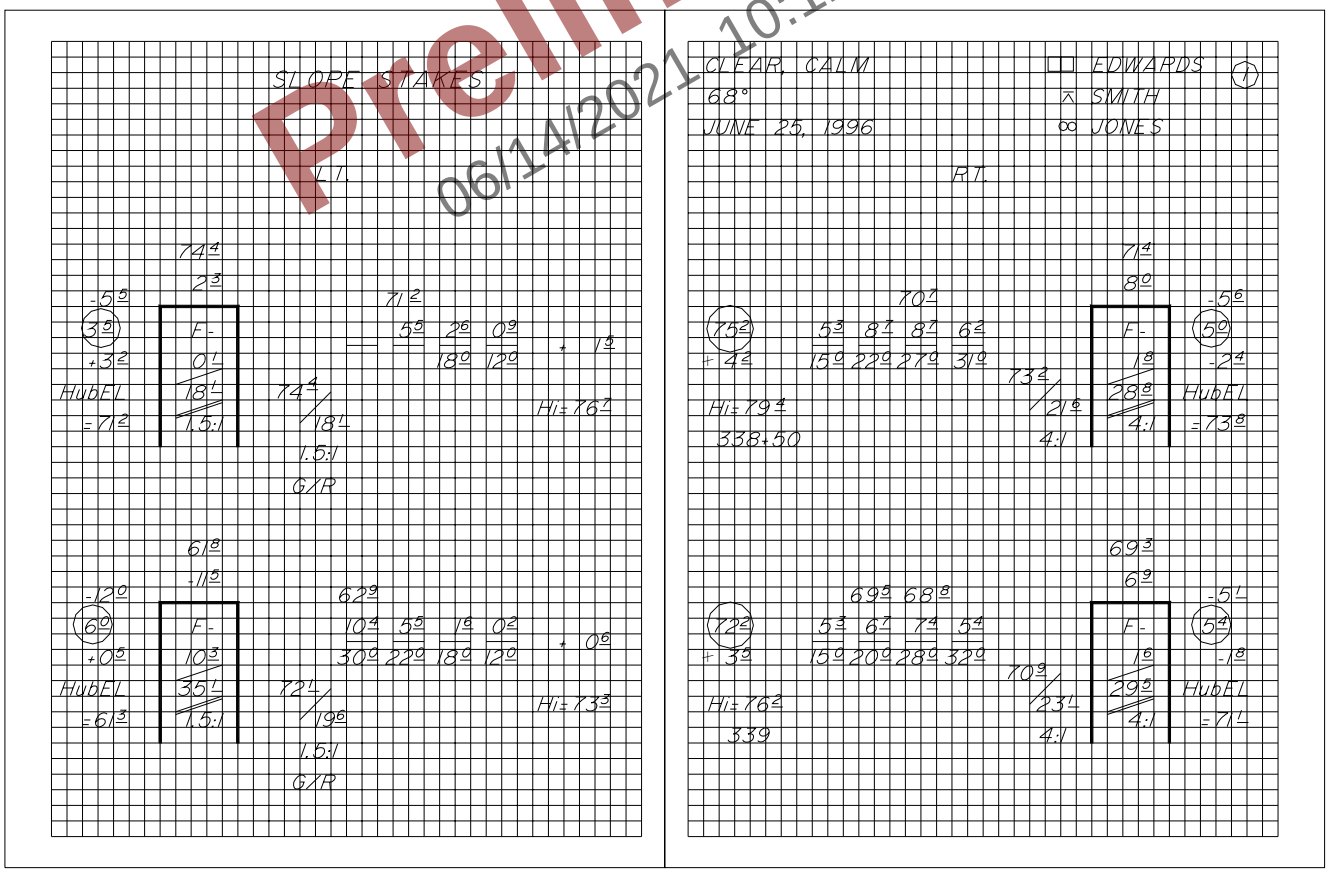
6. Typical level notes

- ✓ Balance back sights and foresights.
- ✓ Establish all benchmarks and take the centerline profile before doing any staking involving elevations.
- ✓ Don't set benchmarks in utility poles.
- ✓ Don't use side shots on benchmarks.
- ✓ Use the turn through method when establishing benchmarks.
- ✓ Re-check benchmarks after each major freeze/thaw cycle and/or any environmental event that may change the benchmark elevation.
- ✓ Do not use double rodding.
- ✓ Run separate level loops between all benchmarks.
- ✓ Set benchmarks in trees of at least six-inch diameter, unless approved by the Project Engineer.
- ✓ Correct errors in benchmark elevations so they will not affect the elevations of succeeding benchmarks.
- ✓ Consult with the Project Engineer before placing benchmarks in areas of permafrost or other unstable ground.
- ✓ Establish benchmarks at intervals and locations consistent with good engineering practice, and generally not more than 1000 feet.
- ✓ Completely describe benchmarks when establishing or re-establishing their elevation. Give centerline stationing, offset, benchmark projection, and observable benchmark characteristics. When checking into or out of benchmarks, note the book and page number that contains the most recent elevation establishment for that benchmark.
- ✓ Write the station on the top twelve inches facing centerline, with numerals a minimum of one inch in height.

STA.	BS+	HI	FS−		ELEV.	45°± CLEAR WARM CALM				⊼ ◫	(23) EDWARDS
						WILD 413579		3−23−90		⌀	SMITH
TBM #101											
6+72					161.309		Nail in	base of 12" Spruce			
								85' 10" LT.		6+72	
	3.877	165.186									
6+00			1.95		163.24						
6+25			2.32		162.87						
6+50			2.96		162.23						
T.P.			3.246		161.940						
	1.103	163.043									
6+75			2.31		160.73						
7+00			2.56		160.48						
T.P.			2.823		160.220						
	2.332	162.552									
							Nail in	base of 18" stump			
TBM #102			1.143		161.409		60' 4" RT		7+21	Elev.	161.413

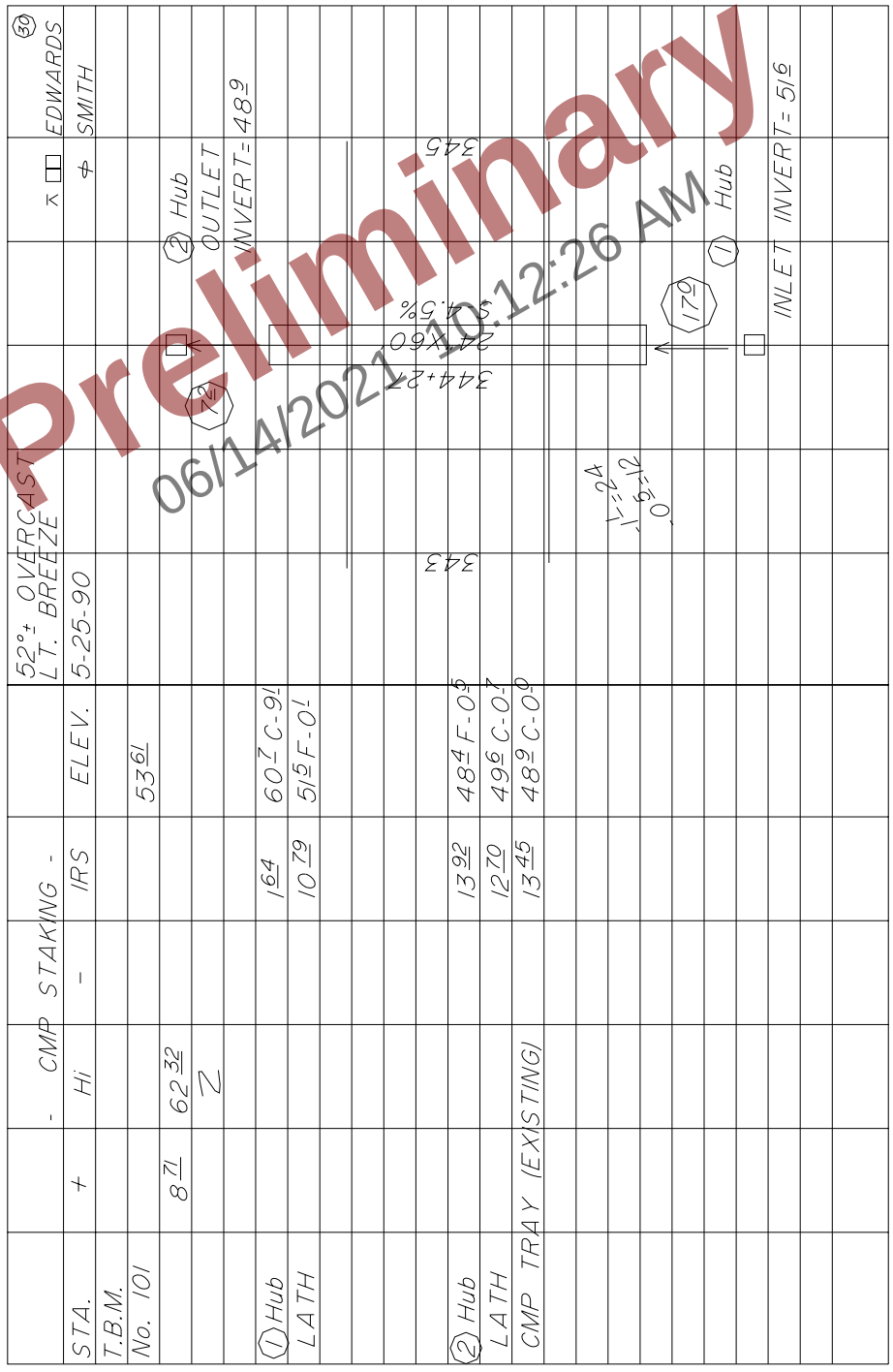
7. Typical slope stake notes

- ✓ Enter the station, elevations, shoulder distance or ditch distances, and slope in the slope stake book before staking begins.
- ✓ In areas where slides or overbreak are anticipated, extend the sections beyond the construction limits.
- ✓ Slope-stake each section that is cross-sectioned.
- ✓ Final re-cross sections are required where there are overbreaks, undercuts, etc. Re-cross section book and page numbers shall be noted on the original cross-section and slope staking page for the relevant stations.
- ✓ Use a hand level only for one turn up or down from the instrument.
- ✓ Clearly note hand level turns.
- ✓ Use a reference point that is 10-20 feet beyond the slope stake.
- ✓ The reference point must show the cut or fill to the slope stake and must include the slope stake information.
- ✓ Slope stake all abrupt changes in typical sections.
- ✓ Position all laths to face centerline.
- ✓ Include at least the following information on the stake: (1) where to begin the cut or fill (2) the slope ratio (3) the depth of cut or height of fill and (4) the station.

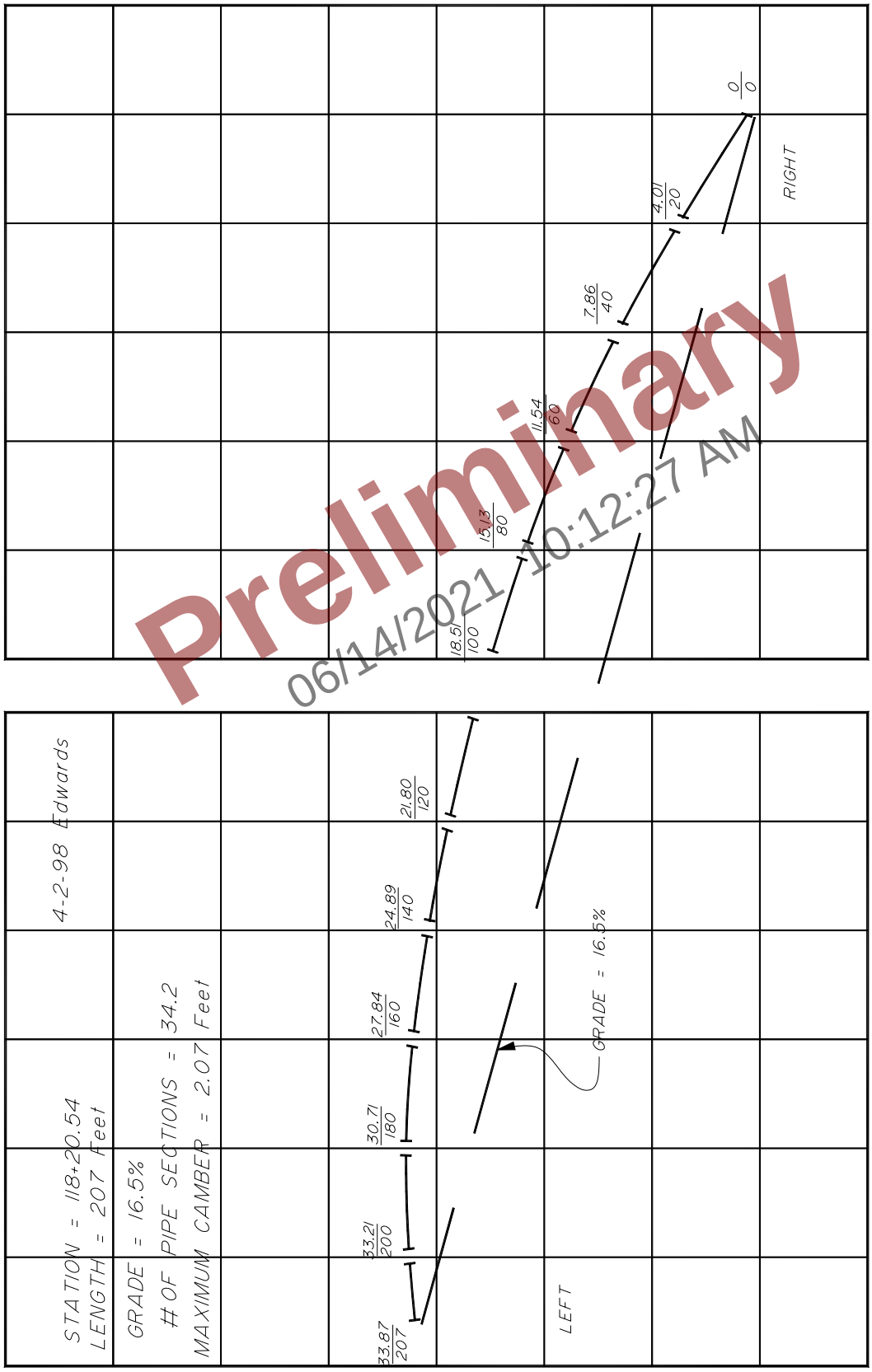


8. Typical culvert notes

- ✓ Show at least the following information on culvert stakes
  - station
  - size
  - length
  - type of pipe (e.g., 24” x 80’ CMP)
  - cut or fill from top of hub to inlet & outlet
  - skew angle
  - horizontal distance from hub to end of pipe
  - gradient of pipe
  - drop of pipe
- ✓ Ensure that all culverts have a minimum camber equal to 1% of the length of the pipe, unless the Project Engineer directs otherwise.
- ✓ Develop a culvert camber diagram showing each section of pipe and its elevation and offset.

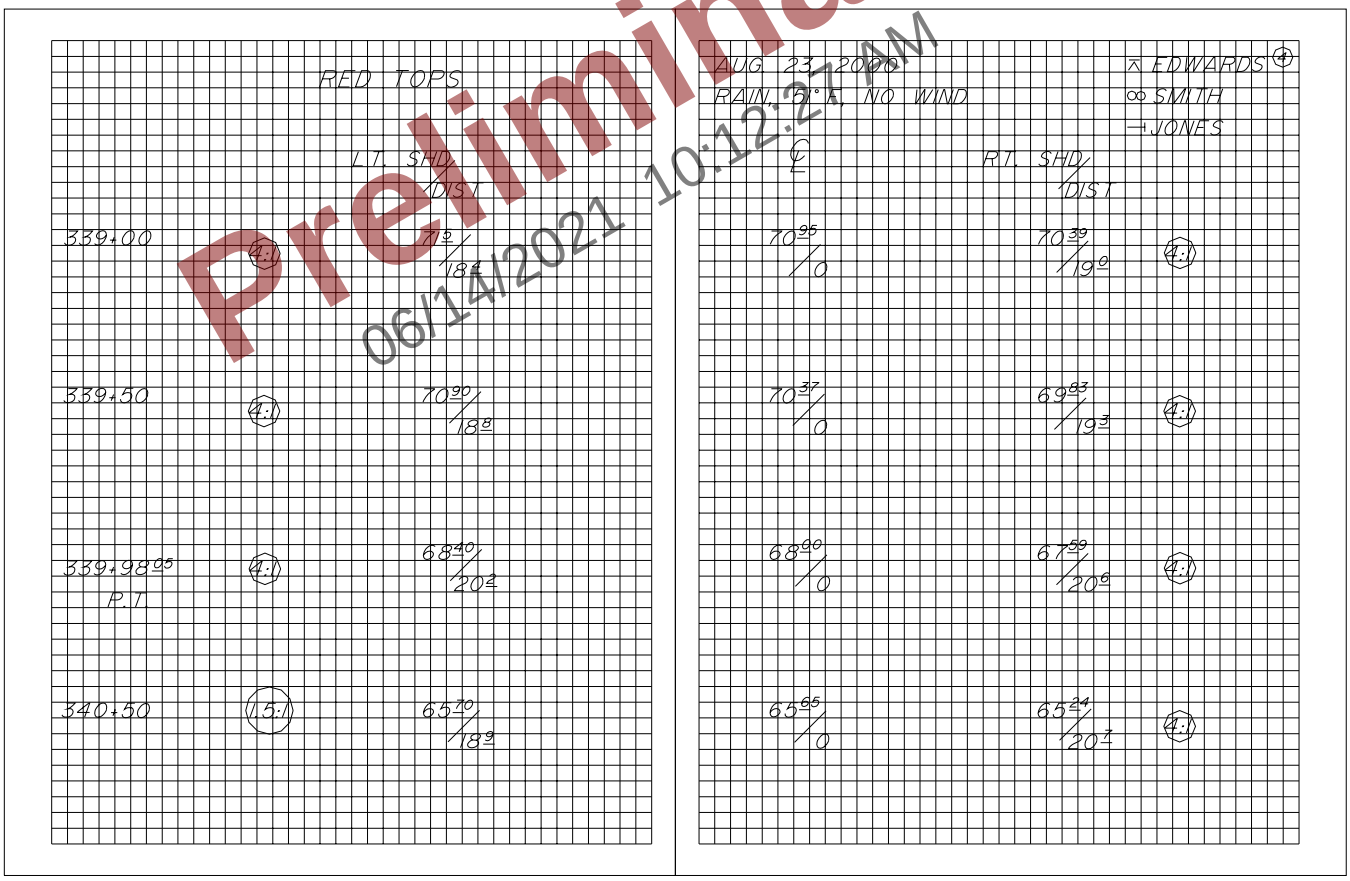


9. Typical culvert camber diagram



10. Typical blue or red tops and grade stake notes

- ✓ Place blue and red tops at each break in typical section and on centerline.
- ✓ Use blue tops for top of base course.
- ✓ Use red tops for the bottom of the base course.
- ✓ Evenly space red/blue tops at and between crown section break points with a maximum spacing of 25 feet between red/blue tops.
- ✓ Establish horizontal control from centerline references and vertical control from benchmarks.
- ✓ Place blue tops at the same interval as slope stakes.
- ✓ Stake all curve transitions.



APPENDIX B

MATERIALS SAMPLING AND TESTING FREQUENCY

AIRPORT CONSTRUCTION – Materials Sampling & Testing Frequency (MSTF) Table					
Material	**Type of Sample**	**Sample Size**	**Type of Tests**	**Frequency**	**Remarks**
Excavation	Acceptance	(5)	Gradation, P.I. (4), Moisture (or visual description if organic)	1 per 5,000 CY waste or undesignated waste cut	For unsuitable excavation number consecutively EX-W-1. No need to test if waste is designated on plans
Embankment	Acceptance	(5)	Standard Density	As required by changes in material	Number consecutively BM-SD-1 or EX-SD-1.
			Field Density (1)	1 per 1,500 CY or 1 per 3,000 Tons (6)	Number consecutively BM-D-1 or EX-D-1.
			Gradation, P.I. (4) and Deleterious (visual)	1 per 5,000 CY or 1 per 10,000 Tons (6)	Number consecutively BM-G-1 or EX-G-1.
	Independent Assurance	(5)	Standard Density (2)	1 per source	Use numbers that correspond to acceptance samples. Include field test results with sample.
			Field Density (1)	1 per 15,000 CY or 1 per 30,000 Tons	
			Gradation and Deleterious (visual)	1 per 50,000 CY or 1 per 100,000 Tons	
Bedding & Backfill for Structures (Drainage Items, Ducts, Conduits, etc.)	Acceptance	(5)	Standard Density	As required by change in material	
			Field Density (1)	(3)	
			Gradation, P.I. (4), and Deleterious (visual)	1 per source or as required by change in material	

General: When acceptance testing is performed in the Department's Regional Laboratories that are accredited in the specified test method, Independent Assurance (IA) testing is not required. If the regional laboratories perform acceptance testing and choose to perform IA testing, they must use different personnel and equipment for IA testing than was used for acceptance testing.

1) If material is impractical for field density, document quantity and/or area by reporting percent oversize and compactive effort used on a proper density acceptance form. IA density testing is not required when material (as shown by gradation testing) is Too Coarse to Test (TCTT). Any material can be rejected based on failure to meet any one of the criteria.
2) Required when Standard Density is performed in the project laboratory.
3) One density per structure (pipe, conduit, manhole, catch basin, inlet, utility vault, etc.), with a minimum of one density per 100 lineal feet of structure installed same day and same manner. Perform densities within 18 inches of the structure or outside diameter of the pipe. Frequency may be reduced to 1 per 200 lineal feet for electrical conduits when approved by Regional Quality Assurance Engineer (RQE) or Regional Materials Engineer (RME).
4) Perform Plasticity Index (P.I.) tests on the first five acceptance samples at the start of production from any source. If these tests indicate the material to be non-plastic, additional acceptance tests need only be performed when IA samples are taken. The RQE or RME may reduce the number of tests required if the source is known to have no value for liquid limit and be non-plastic.
5) See the specified test method for minimum sample size.
6) For large unclassified embankments, a field density and gradation testing frequency of 1/10,000 CY or 1/20,000 Tons is acceptable subject to the approval of the RQE, RME or Statewide Materials Engineer (SME).

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Subbase Course	Source Quality	150 lbs.	L.A. Wear, Degradation	1 per source prior to use or as required based on change in material	Allow minimum of 14 days for transport and testing. Number consecutively Q-SB-1 or Q-SC-1
	Acceptance	(6)	Standard Density	1 per source and as required based on change in material	Number consecutively SB-SD-1
			Field Density (1)	1 per 1,000 CY or 1 per 2,000 Tons	Number consecutively SB-D-1
			Gradation, L.L. P.I. (3), Deleterious	1 per 2,500 CY or 1 per 5,000 Ton (3)	Number consecutively SB-G-1
	Independent Assurance	(6)	Standard Density (2)	1 per source	Use numbers that correspond to acceptance samples. Include field test results with sample.
			Field Density (1)	1 per 10,000 CY or 1 per 20,000 Tons	
			Gradation, L.L., P.I. (3), Deleterious,	1 per 25,000 CY or 1 per 50,000 Tons	
Crushed Aggregate Base Course	Source Quality	150 lbs.	L.A. Wear, Degradation, Soundness, Nordic Abrasion (7),	1 per source prior to use or as required based on change in material	Allow minimum 14 days for transport and testing. Number consecutively Q-BC-1
	Acceptance	(6)	Standard Density	1 per source and as required based on change in material	Number consecutively BC-SD-1
			Field Density (1)	1 per 200 CY or 400 Tons	Number consecutively BC-D-1
			Gradation, L.L., P.I. (3), Fracture, SE, Deleterious,	1 per 400 CY or 1 per 800 Tons (3) (4) (5)	Number consecutively BC-G-1
	Independent Assurance	(6)	Standard Density (2)	1 per source	Use numbers that correspond to acceptance samples. Include field test results with sample
			Field Density (1)	1 per 2,000 CY or 1 per 4,000 Tons	
			Gradation, L.L., P.I. (3), Fracture, SE, Deleterious	1 per 4,000 CY or 1 per 8,000 Tons	

1) If material is impractical to test for field density, document quantity and/or area by reporting percent oversize and compactive effort used on a proper density acceptance form. IA density testing is not required when material (as shown by gradation testing) is To Coarse to Test (TCTT).
2) Required when Standard Density is performed in project laboratory.
3) Perform Liquid Limit (L.L.) and Plastic Index (P.I.) tests on the first five acceptance samples at the start of production from any source. If these tests indicate the material to be non-plastic, additional acceptance tests need only be performed when IA samples are taken. The RQE or RME may reduce the number of tests required if the source is known to have no value for liquid limit and be non-plastic.
4) Perform fracture tests on the first ten acceptance tests. If these tests indicate the fracture to be 5% or more above specification, additional acceptance tests need only be performed when IA samples are taken.
5) Perform Sand Equivalent (SE) tests on the first five acceptance tests. If these tests indicate the material meets specification, additional acceptance tests need only be performed when IA samples are taken. The SE test is not required for Aggregate Surface Course.
6) See the specified test method for minimum sample size.
7) Include Nordic Abrasion testing of source material. Report test results to Statewide Materials section.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Aggregate Surface Course	Source Quality	150 lbs.	L.A. Wear, Degradation, Soundness, Nordic Abrasion (7),	1 per source prior to use or as required based on change in material	Allow minimum 14 days for transport and testing. Number consecutively Q-SC-1
	Acceptance	(6)	Standard Density	1 per source and as required based on change in material	Number consecutively SC-SD-1
			Field Density (1)	1 per 500 CY or 1 per 1,000 Tons	Number consecutively SC-D-1
			Gradation, L.L., P.I. (3), Fracture, Deleterious,	1 per 1,000 CY or 1 per 2,000 Tons (3) (4)	Number consecutively SC-G-1
	Independent Assurance	(6)	Standard Density (2)	1 per source	Use numbers that correspond to acceptance samples. Include field test results with sample
			Field Density (1)	1 per 5,000 CY or 1 per 10,000 Tons	
			Gradation, L.L., P.I. (3), Fracture, Deleterious	1 per 10,000 CY or 1 per 20,000 Tons	

1) If material is impractical to test for field density, document quantity and/or area by reporting percent oversize and compactive effort used on a proper density acceptance form. IA density testing is not required when material (as shown by gradation testing) is To Coarse to Test (TCTT).
2) Required when Standard Density is performed in project laboratory.
3) Perform Liquid Limit (L.L.) and Plastic Index (P.I.) tests on the first five acceptance samples at the start of production from any source. If these tests indicate the material to be non-plastic, additional acceptance tests need only be performed when IA samples are taken. The RQE or RME may reduce the number of tests required if the source is known to have no value for liquid limit and be non-plastic.
4) Perform fracture tests on the first ten acceptance tests. If these tests indicate the fracture to be 5% or more above specification, additional acceptance tests need only be performed when IA samples are taken.
5) Perform Sand Equivalent (SE) tests on the first five acceptance tests. If these tests indicate the material meets specification, additional acceptance tests need only be performed when IA samples are taken. The SE test is not required for Aggregate Surface Course.
6) See the specified test method for minimum sample size.
7) Include Nordic Abrasion testing of source material. Report test results to Statewide Materials section.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Plant Hot Mix Asphalt and Asphalt Treated Base Course	Source Quality	150 lbs. Aggregate	L.A. Wear, Degradation, Sodium Sulfate Loss, Nordic Abrasion (10)	1 per source prior to use or as required based on change in material	Allow 25 days for transport and testing.
	Mix Design	500 lbs. Aggregate (7) 5 one gallon. cans of AB, 1 pint of Anti-strip	Mix Design (1) (2) L.L., P.I. (3), Fracture, Sand Equivalent (SE), Flat & Elongated (F&E),	1 per source and as required based on change in material	Allow 15 days or contract specified time for mix design and testing after receiving contractor's proposed gradation. AB = asphalt binder, same as asphalt cement. If possible sample AB at the plant for the Mix Design.
	Acceptance	(8)	MSG (Maximum Specific Gravity)	1 per Lot (1) (9)	(1) From Mix Design on first lot and then from the first sublot of each additional lot
			Mat Density, Gradation, Binder Content, L.L., P.I. (3), Fracture, F&E, SE, Deleterious, Thickness	1 per sublot (3) (4) (5) (6) (9)	Ross Count (AASHTO T 195, Coating Test) as required by RQE or RME.
			Joint Density	(9)	Top Lift (1)
	Independent Assurance	(8)	MSG	1 per project minimum (1)	Required when MSG is run in the field.
			Mat Density, Gradation, Binder Content, L.L., P.I. (3), Fracture, F&E, SE	1 per 10 sublots	Use numbers that correspond to acceptance samples. Include field test results with sample.
	Information	30 lbs.	3-Marshall Biscuits or 2-gyratory samples	1 per Mix Design minimum	Compare results to Mix Design.

1) Refer to project specifications.
2) Recommendations regarding anti-strip requirements must be determined for each mix design.
3) Perform Liquid Limit (L.L.) and Plastic Index (P.I.) tests on the first five acceptance samples at the start of production from any source. If these tests indicate the material to be non-plastic, additional acceptance tests need only be performed when IA samples are taken. The RQE or RME may reduce the number of tests required if the source is known to have no value for liquid limit and be non-plastic.
4) Perform fracture tests on the first ten acceptance tests. If these tests indicate the fracture to be 5% or more above specification, additional acceptance tests need only be performed when IA samples are taken.
5) Perform Sand Equivalent (SE) tests on the first five acceptance tests. If these tests indicate the material meets specification, additional acceptance tests need only be performed when IA samples are taken.
6) Perform Flat and Elongated (F&E) tests on the first five acceptance samples from any source. For known sources, the RQE or RME may waive this requirement.
7) For multiple stockpiles, proportion each stockpile sample to the proposed Job Mix Design blend ratio.
8) See the specified test method for minimum sample size.
9) May not be applicable to Asphalt Treated Base Course. Refer to project specifications.
10) Include Nordic Abrasion testing of source material. Report test results to Statewide Materials section.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Asphalt Binder	Source Quality	(1)	(1)	1 per each grade and source prior to use	Manufacturer's certification required
	Acceptance (1)	Three 1-quart cans		1 per 50,000 gals. or 1 per 200 Tons	Sampled on project. Test for anti-strip if required by RQE or RME.
Liquid Asphalt for: a) Prime Coat b) Tack Coat c) Seal Coats d) Asphalt Surface Treatment	Source Quality	(1)	Type and Grading	1 per each grade and source prior to use	Manufacturer's certification required
	Acceptance	1-1 gallon plastic jug (for emulsified asphalt)	(1)	1 per 50,000 gallons or 1 per 200 Tons	Sample must be tested by Lab that did not test material for Quality. Material sampled prior to dilution
Aggregate for Seal Coats and Asphalt Surface Treatments	Source Quality	150 lbs. Aggregate	Fracture, F&E, L.A. Wear, Soundness, Degradation	1 per source prior to use or as required by change in material prior to use	Allow 25 days for transport and testing.
	Acceptance	(4)	Gradation, Fracture, F&E, Deleterious (visual)	1 per 500 Tons (2) (3)	May be taken from stockpile or production
	Independent Assurance		Gradation, Fracture, F&E, Deleterious (visual)	1 per 5,000 Tons	May be taken from stockpile or production

1) Refer to project specifications.
2) Perform fracture tests on the first ten acceptance tests. If these tests indicate the fracture to be 5% or more above specification, additional acceptance tests need only be performed when IA samples are taken.
3) Perform Flat and Elongated (F&E) tests on the first five acceptance samples from any source. For known sources, the RQE or RME may waive this requirement.
4) See the specified test method for minimum sample size.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Portland Cement Concrete	Source Quality				
a. Cement and Cementitious	Quality	a. Two 1-gal. cans, each	See Remarks	1 per shipment (2) (4)	Allow 40 days for transport and testing. Manufacturer's certification required
b. Water		b. ½ gal. in glass jar	See Remarks	1 per source	Allow 20 days for testing or potable water accepted by Project Engineer.
c. Coarse Aggregate		c. 100 lbs.	Deleterious Substances, L.A. wear, Soundness	1 per source	Allow 25 days for transport and testing.
d. Fine Aggregate		d. 25 lbs.	Deleterious Substances, Soundness	1 per source	Allow 25 days for transport and testing.
Portland Cement Concrete	Mix Design Submittal (1) (3)				
a. Cement and Cementitious	Mix Design	a. 94 lbs., each	Mix Design Verification as required by RQE or RME	1 per source prior to use	For verification of Contractor-furnished mix design, allow 40 days for transport and testing.
b. Water		b. None			
c. Coarse Aggregate		c. 330 lbs.			
d. Fine Aggregate		d. 220 lbs.			
e. Admixtures		e. 1 qt. each			

1) Refer to project specifications.
2) Cement stored in silos or bins over six months, or in bags over three months, may require re-testing. See project specifications.
3) Manufacturer's certifications and aggregate test reports required.
4) Manufacturer's Certification for cement used on project may be accepted in lieu of sampling as approved by the RQE or RME.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Concrete Continued:					
Coarse Aggregate	Acceptance	(5)	Gradation and Deleterious (visual)	1 per 200 CY (6)	Number consecutively CA-G-1
Fine Aggregate			Gradation, Deleterious (visual), Fineness Modulus	1 per 200 CY (6)	Number consecutively FA-G-1
Mix		As required by test method	Temperature, Slump, % Air, Water/Cement Ratio, Unit Weight, Yield, Proportions per CY	1 per ½ days pour (2) or 1 per 200 CY	(3)
		Cylinders or beams	Compressive strength or Flexural strength (1)	1 per ½ days pour (2) or 1 per 200 CY	Mold two (6”x12”) or three (4”x8”) cylinders or 2 (6”x6”x20”) beams. Test at 28 days. (1) (4)
	Information	Cylinders or beams	Compressive strength or Flexural strength	As required (e.g. for 7 day break)	Mold two (6”x12”) or three (4”x8”) cylinders or 2 (6”x6”x20”) beams “As Required” for Strength Data.
Coarse Aggregate	Independent Assurance	(5)	Gradation and; Deleterious (visual)	1 per 2,000 CY with minimum of 1 per project if over 100 CY is placed (6)	Use numbers that correspond to acceptance samples. Include field test results with sample.
Fine Aggregate			Gradation, Deleterious (visual), Fineness Modulus		
Mix		As required by test method	Temperature, Slump, % Air, Water/Cement Ratio, Unit Weight, Yield, Proportions per CY	1 per 2,000 CY	
		Cylinders or beams	Compressive strength or Flexural strength	1 per 2,000 CY	Mold two (6”x12”) or three (4”x8”) cylinders or 2 (6”x6”x20”) beams.

1) Refer to project specifications.
2) Half day’s pour considered to be 6 hours or less.
3) Commercial sources which are periodically inspected do not have to be tested if day’s total quantity of concrete placement is less than 5 CY as determined by the Project Engineer. Placement reports summarizing all minor pours will be completed.
4) For non-structural or minor concrete construction, as determined by the RQE or RME, 1 set minimum per project is recommended.
5) See the specified test method for minimum sample size.
6) For known Commercial sources that are periodically inspected, the RQE or RME may reduce the frequency of sampling and testing to 1 per project per mix design.

Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Misc. Hardware	Source Quality	(1)		1 per pay item or assembly, min.	Approved by designated authority; reference MCL
Concrete Reinforcing Steel	Source Quality	(2)		1 for each type, grade and size in a shipment	Approved by designated authority; reference MCL
Joint Sealer, Joint Filler, and Curing Materials for Concrete	Source Quality	1 Quart for each liquid (see remarks)	See remarks (1)	1 per type	Project Engineer documentation if on QPL. If not on QPL, manufacturer's certification or sample for testing.
Porous Backfill	Source Quality	(3)	Clay Lumps, Deleterious	1 per source (4)	
	Acceptance		Gradation, Deleterious (visual)	1 per source or as required based on change in material	Number consecutively PB-G-1
Topsoil	Source Quality	15 lbs.	Organic content, Gradation, pH	1 per source prior to use or as required by change in material	Allow 15 days for transport and testing.
	Acceptance	(3)	Gradation	1 per 15,000 SY or 1 per 2,500 CY	Number consecutively TS-G-1
Signals and Lighting	Quality and Acceptance	Within 30 days following award of the contract, the contractor shall submit to the Project Engineer for approval a complete list of material and equipment that is proposed to be used for this item. The data shall include catalog cuts, diagrams, test reports, manufacturers' certifications, etc. The above data shall be submitted in eight sets. Any proposed deviation from the plans shall also be submitted.			

1) Certificates of Compliance per Specifications GCP- 60.
2) Mill Test Reports to include heat numbers, fabrication date, physical and chemical properties, and Buy American certification (when required by specifications).
3) See the specified test method for minimum sample size.
4) For known quarry sources, the RQE or RME may waive Clay Lumps testing if visual inspection for deleterious materials has been performed and the percent passing (by weight) the No. 200 sieve is 3% or less.

Small Quantities of Miscellaneous Materials and Installations

If the Pay Item quantity at bid opening is equal to or less than the amounts listed below, the following applies:

1. Acceptance and Independent Assurance sampling & testing is not required.
2. Documentation required to support the Acceptance decision is:
   - I. Asphalt/Aggregate Mixtures and Bituminous Materials – Mix design and Project Materials Report (PMR).
   - II. Portland Cement Concrete – Mix design, batch tickets, Concrete Placement Report (CPR), and PMR.
   - III. Soils and Aggregates – PMR.
3. Inspection of materials and workmanship is still required.
4. Source quality testing may be required as noted below.

I. Small Quantities of Asphalt/Aggregate Mixtures and Bituminous Materials:

a) Bituminous Material — not to exceed 85 Tons of asphalt binder or 15 Tons for other liquid asphalt.
b) Landscaping, paved ditches and flumes -- all quantities.
c) Temporary materials -- all quantities.

II. Small Quantities of Portland Cement Concrete:

a) Sidewalks — not to exceed 150 Square Yards per day.
b) Curb and gutter — not to exceed 250 Lineal Feet per day.
c) Slope paving and headers -- all quantities.
d) Landscaping, paved ditches and flumes -- all quantities.
e) Catch basins, manholes, inlets, inspection holes; and grout for risers, pipes and invert channels – all quantities.
f) Culvert headwalls for pipe diameters 48 inches or less -- all quantities.
g) Cable markers -- all quantities.
h) Temporary materials -- all quantities.

III. Small Quantities of Soils and Aggregates:

a) Embankment, Borrow, Aggregates for Base Course, Surface Course, and Subbase — not to exceed 500 Tons or 250 Cubic Yards with PMR; 1,000 Tons or 500 Cubic Yards with PMR and source quality report (4).
b) Riprap or Armor Stone — not to exceed 500 Tons or 250 Cubic Yards.
c) Topsoil — not to exceed 600 Square Yards or 100 Cubic Yards.
d) Temporary materials -- all quantities.

APPENDIX C

CONSTRUCTION SAFETY AND PHASING PLAN

STATE OF ALASKA

Department of Transportation

and

Public Facilities

Central Region

Construction Safety and Phasing Plan

Kongiganak Airport Improvements

Project No. CFAPT00433

Kongiganak Airport

Kongiganak, AK

Prepared by: DOT&PF

May 2021

Table of Contents

List of Acronyms

AC ..... Advisory Circular
AOA ..... Airport Operations Area
ATO ..... Air Traffic Organization
AWOS ..... Automated Weather Observing System
BMP ..... Best Management Practices
CFR ..... Code of Federal Regulations
CONUS ..... Continental United States
CPM ..... Critical Path Method
CSPP ..... Construction and Safety Phasing Plan
CTAF ..... Common Traffic Advisory Frequency
DOT&PF ..... State of Alaska Department of Transportation and Public Facilities
DUY ..... Kongiganak Airport
ESCP ..... Erosion and Sediment Control Plan
FAA ..... Federal Aviation Administration
FOD ..... Foreign Object Debris
GCP ..... General Contract Provision
HAZMAT ..... Hazardous Material
HMCP ..... Hazardous Materials Control Plan
NAS ..... National Airspace System
NAVAIDs ..... Navigational Aids
NOTAM ..... Notice to Airmen
NTP ..... Notice to Proceed
NWS ..... National Weather Service
OFA ..... Object Free Area
OFZ ..... Obstacle Free Zone
OSHA ..... Occupational Safety and Health Administration
PAPI ..... Precision Approach Path Indicator
P&R ..... Planning & Requirements
RA ..... Reimbursable Agreement
RDC ..... Runway Design Code
REIL ..... Runway End Identifier Light
ROFA ..... Runway Object Free Area
ROFZ ..... Runway Obstacle Free Zone
RSA ..... Runway Safety Area
RW ..... Runway
SPCC ..... Spill Prevention, Control and Countermeasure
SPCD ..... Safety Plan Compliance Document
SREB ..... Snow Removal Equipment Building
SSC ..... System Service Center
SWPPP ..... Storm Water Pollution Prevention Plan

TOFA ..... Taxiway Object Free Area
TSA ..... Taxiway Safety Area
TW ..... Taxiway
UNICOM ..... Universal Communications
VGSI ..... Visual Glide Slope Indicator
WSA..... Western Service Area

Introduction

This Construction Safety and Phasing Plan (CSPP) is to be used during the construction activity for the Kongiganak Airport Improvements project on Kongiganak Airport (DUY). The purpose of this plan is to present information needed for safe airport operations during construction activities, to minimize disruption to operations of air and ground traffic, and to facilitate completion of construction in the shortest time possible. The CSPP is to be used as the basis for the Contractor to develop their Safety Plan Compliance Document (SPCD). Per General Contract Provision (GCP) 80, the Contractor must submit an SPCD to the Project Engineer in accordance with the provisions set forth in the current version of Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5370-2, Operational Safety on Airports During Construction.

This plan is intended to supply useful information to assist the Contractor in the preparation of other plans as required by the contract. Many of the topics covered in this plan are also addressed, often in more detail, in the contract specifications. The CSPP is not intended to contradict the specifications. If any discrepancy exists, follow the order of precedence in GCP 50-04. Work necessary to meet the requirements of the CSPP is subsidiary to the contract and no additional payment will be made.

Failure to comply with airport rules, regulations, and the CSPP may result in penalties, fines, and/or work stoppage.

DUY, located in Kongiganak, Alaska, is the city's primary means for transporting passengers, cargo, and mail. Air transport is (medevac) is the only means of transferring seriously injured or ill patients to the nearest hospital in Bethel from Kongiganak' s Lillian E. Jimmy Memorial medical clinic. The airport operates a single runway (RW), RW 01/19, which is 2,400 feet in length.

(1) Coordination

The preconstruction conference must be conducted as soon as practicable after the contract has been awarded and before issuance of the Notice to Proceed (NTP). Sufficient time should be allowed to notify all parties so schedules can be arranged accordingly. **A 10 day minimum notification is recommended.** At the preconstruction conference, the Contractor must introduce and discuss the subject of airport operational safety during construction and the construction phasing. Safety for air operations, personnel, and the public is the highest priority. The participants will vary according to the effect the proposed construction will have on airport operations. As applicable, the sponsor should invite the following parties to participate:

- Sponsor's Engineer
- Project Engineer
- Airport Manager
- Contractor and subcontractor(s)
- Contractor's project superintendent
- Contractor's project clerk
- Airport users, including airline representatives, fixed base operators, Air Line Pilots Association representative, Air Transport Association regional representative, and military representative (for joint-use airports)
- Utility companies affected by the proposed construction
- Federal, state, or local agencies affected by the proposed construction
- FAA Air Traffic Organization (ATO) Engineering Services Project Engineer
- Representative of FAA Airports regional or field office

(a) Contractor Progress Meetings

Construction progress meetings must be held throughout the duration of the project on a coordinated schedule. At a minimum, required attendees will include the Airport Manager, the Project Engineer, the Contractor, and subcontractors. Construction phasing, operational safety, security, and traffic must be a standing agenda item for discussion during progress meetings throughout the project. At these meetings, the Contractor will remind personnel of safety and security issues, requirements, and boundaries that affect their work areas.

(b) Scope or Schedule Changes

Any scope or schedule changes must be addressed in accordance with GCP 40 and GCP 80. Changes in the scope or duration of the project may necessitate revisions to the CSPP and review and approval by the airport operator and the FAA.

The Project Engineer will hold coordination conferences as necessary for the purpose of assuring coordination of the work covered by this contract and/or scope or schedule changes. The Contractor must attend all such conferences and address the effects on the approved CSPP.

The Contractor will develop a Critical Path Method (CPM) schedule according to the requirements in G-300. The goal of the schedule is to facilitate construction activities while maintaining airport operations to the fullest extent possible.

An acceptable schedule must be based on the following operational constraints and mitigation efforts:

- Aircraft operations will continue day and night.
- Short-term closures, if needed for certain work areas and for construction phase changes, should be coordinated with the Engineer.Aircraft access for the taxiway in and around the project area will be maintained except where described in this CSPP and the CSPP drawings.
- All efforts will be made to minimize impacts to airport operations.

(c) FAA ATO Coordination

Early coordination with FAA ATO is required to schedule airway facility shutdowns and restarts.

The Contractor shall notify the FAA ATO Planning and Requirements (P&R) Western Service Area (WSA) office, through the Engineer, at least 45 days prior to the physical construction start date, RW closures (partial or full), re-opening a closed RW, or displacing a RW threshold by notifying the Engineer who will email an "Airport Sponsor Strategic Event Submission Form" including all date, time and/or duration changes via email to 9-AJV-SEC-WSA@faa.gov.

There are no FAA owned facilities currently located at the airport, therefore a flight check inspection and coordination for FAA NAVAID or AWOS infrastructure is not anticipated.

(2) Phasing

During all phases of construction the Contractor must coordinate and maintain access to the active apron and all leaseholder and/or permitted facilities.

The construction schedule will be developed by the Contractor, and coordinated with and approved by the Engineer. The Contractor will propose a schedule for construction staging to the Engineer at the preconstruction conference. This must be approved prior to commencement of any construction activities in the Aircraft Operations Area (AOA). Construction activity will occur on the existing RW; this could require the brief closure of the RW at certain times during the course of the project.

Advance scheduling and communication are essential to enable the Engineer to ensure all appropriate Notice to Airmen (NOTAM) are issued in a timely manner. ***The Contractor shall***

notify FAA (through the Engineer) at least 45 days prior to runway closures (partial or full), re-opening a closed runway, or displacing a threshold as outlined in Section 1.c above. To file the appropriate NOTAMs, the Contractor shall follow the procedures outlined in Section 9.b below.

Except in extraordinary cases with the approval of the Engineer, the RW must remain open for the duration of this project. For scheduled and unscheduled aircraft operations, construction activities must halt and all personnel and equipment must be evacuated to the Safe Zones (as shown in the Safe Zone details in the CSPP drawings) 5 minutes prior to and 5 minutes after all arrivals and departures. When personnel or equipment cannot be evacuated to the Safe Zones, they must evacuate the Runway Safety Area (RSA) and/or Taxiway Safety Area (TSA) and move as far away from the runway centerline as practical during airport operations. ***In no case can personnel or equipment be inside the RSA or TSA during aircraft operations.***

This project includes the following scope of work:

Runway:

- Expand the RSA
- Resurface the RW:
  - Regrade the existing surfaces
  - Place Crushed Aggregate Surface Course (CASC)
- Replace airfield lighting system
- Replace threshold markers and cones
- Apply dust palliative

Taxiway:

- Resurface the TW:
  - Regrade the existing surfaces
  - Place CASC
- Replace TW edge lighting system
- Apply dust palliative

Apron:

- Expand apron to accommodate additional parking and a new single-bay Snow Removal Equipment Building (SREB)
- Relocate exiting SREB
- Relocate Electrical Equipment Building (EEB)
- Relocate Overhead Electrical Utility
- Resurface the apron:
  - Regrade the existing surfaces
  - Place CASC
- Apply dust palliative
- Intall Tie Downs

Unlighted Wind Cone Pad/Lighted Wind Cone and Segmented Circle Pad and Access

- Resurface the unlighted wind cone pad and access
  - Regrade the existing surfaces

  - Place CASC
- Rehabilitate portions of the segmented circle pad and access
  - Regrade the existing surfaces
  - Place CASC

Navigational Aids

- Install new rotating beacon on a tip-down pole

Utilities:

- Adjust utilities for the connection to the relocated Electrical Enclosure Building (EEB)
- Relocate utility pole and service drop located on the apron

(a) Phase Elements

Contractor staging areas will be provided as shown in the CSPP drawings. For RW closures (partial or full), re-opening a closed RW, displacing a RW threshold, or implementing an event that causes impacts to NAVAIDs, the procedures detailed in 1.c and 3.a.1 of this CSPP must be followed. The project is comprised of two (3) phases of work which are described in more detail below.

Phase 1

Complete the following prior to Phase 1 construction:

- Coordinate through the Engineer 45 days prior to construction to issue a NOTAM for partial closure of RW 01/19 and other NOTAMS as required.
- Install Hazard Marker Barriers
- Install temporary marking and lighting
- Install appropriate Best Management Practices (BMPs) per Contractor's approved Storm Water Pollution Prevention Plan (SWPPP) as defined in contract specification P-641
- Deactivate RW lighting within Phase 1 limits

Complete the following during Phase 1 construction:

- Remove existing lighting and conduits within Phase 1 limits
- Construct RW and RSA within Phase 1 limits
- Install RW light cans and conduit within Phase 1 limits
- Install light bases within Phase 1 limits

Complete the following after Phase 1 construction:

- Remove hazard marker barriers
- Remove temporary marking and lighting
- Topsoil and seed all soil disturbance areas within Phase 1 limits
- Remove BMP's
- Coordinate through the Engineer to cancel NOTAM for partial closure of RW 01/19.

Phase 2

Complete the following prior to Phase 2 construction:

- Coordinate through the Engineer 45 days prior to construction to issue a NOTAM for half width operation of RW 01/19 and other NOTAMS as required.
- Grade the temporary runway according to the CSPP details
- Deactivate permanent RW and TW lighting per CSPP plans
- Install Hazard Marker Barriers
- Install temporary marking and lighting
- Install appropriate Best Management Practices (BMPs) per Contractor's approved Storm Water Pollution Prevention Plan (SWPPP) as defined in contract specification P-641

Complete the following during Phase 2 construction:

- Construct RW and RSA within Phase 2 limits
- Construct TW within Phase 2 limits
- Rehabilitate portions of Segmented circle pad and access
- Install RW light cans within Phase 2 limits
- Install lighting conduit and bases within Phase 2 limits
- Construct apron expansion
- Construct drainage improvements within Phase 2 limits

Complete the following after Phase 2 construction:

- Remove hazard marker barriers
- Remove temporary marking and lighting
- Topsoil and seed all soil disturbance areas within Phase 2 limits
- Remove BMP's

Phase 3

Complete the following prior to Phase 3 construction:

- Coordinate through the Engineer 45 days prior to construction to issue a NOTAM for half width operation of RW 01/19.
- Grade the temporary runway according to the CSPP details
- Deactivate permanent RW and TW lighting per CSPP plans
- Install Hazard Marker Barriers
- Install temporary marking and lighting
- Install appropriate Best Management Practices (BMPs) per Contractor's approved Storm Water Pollution Prevention Plan (SWPPP) as defined in contract specification P-641

Complete the following during Phase 3 construction:

- Construct RW and RSA within Phase 3 limits

- Construct TW within Phase 3 limits
- Rehabilitate supplemental windcone access
- Construct drainage improvements
- Install RW light cans within Phase 3 limits
- Install lighting conduit and bases within Phase 3 limits
- Relocate overhead electric utility
- Relocate existing SREB and EEB
- Install new SREB
- Install Rotating Beacon
- Rehabilitate apron
- Install tiedowns
- Install airport signage

Complete the following after Phase 3 construction:

- Remove hazard marker barriers
- Remove temporary marking and lighting
- Install RW and TW light fixtures for lights installed with blank covers
- Topsoil and seed all soil disturbance areas within Phase 3 limits
- Remove BMP's
- Coordinate through the Engineer to retract NOTAM for half width operation of RW 01/19.

(b) Construction Safety Drawings

The CSPP drawings are included in Appendix D of the construction plan set.

(3) Areas and Operations Affected by the Construction Activity

RW, TW, and apron should remain in use by aircraft to the maximum extent possible without compromising safety.

(a) Identification of Affected Areas

(1) Closing or partial closing of Runway, Taxiway, and apron

Portions of the RW, TW, and apron will be closed at different times during construction. A combination of RW closure markers, hazard marker barriers, temporary RW lighting, and temporary marker cones must be placed to limit access to the RW, TW, and apron construction areas, as shown in the CSPP drawings. The hazard marker barriers must be lighted when dark to prevent aircraft from inadvertently entering the closed portion of the RW, TW, or apron. See GCP 70-09 for more information.

To limit RW closure impacts, RW 01/19 will operate at partial length full width in phase 1, and full length half width in phases 2 and 3 while the RW construction work

is occurring. See Section (14) of this CSPP as well as the CSPP drawings for information regarding required visual aids and markings for the RW.

The table below shows the area to be protected for aircraft traffic along the RW for each construction phase. See the CSPP drawings for the location of the RW for each phase.

Table 3.1 Runway Edge Protection

Runway	Phase	Aircraft Approach Category	Airplane Design Group	RSA Width Divided by 2 (Distance from Centerline)
01-19	1	A	II	60′
01-19	2	A	II	30′
01-19	3	A	II	30′

The table below shows the area to be protected for aircraft traffic beyond the runway threshold for each phase. See the CSPP drawings for the temporary RW locations for each phase.

Table 3.2 Runway Threshold Protection

Runway	Phase	Aircraft Approach Category	Airplane Design Group	Min. RSA Prior to the Threshold	Min. Separation of 15′ tall Equipment from Threshold Based on Required Approach Slope	
01-19	1	A	I	240′	500′	20:1
01-19	2	A	II	240 / 300′	500′	20:1
01-19	3	A	II	240′ / 300′	500′	20:1

Note: See the Safe Zone details in the CSPP drawings.

To limit TW closure impacts, taxiways will operate at half width while construction work is occurring. See Section (14) of this CSPP and the CSPP drawings for additional information regarding required TW visual aids.

Sufficient wingtip clearance must be available at all times for aircraft that are taxiing, turning, and parking. Hazard marker barriers will be placed to limit aircraft access to the closed portion of the aprons. See the CSPP drawings for more information.

Construction areas and “Construction Prohibited” areas on and around the TW have been sized for a design aircraft with a maximum wingspan of 67’. See table below for

wingspans of typical aircraft that operate at Kongiganak. Be aware that larger aircraft may require greater clearance from construction materials and equipment while taxiing, turning, and parking.

Table 3.3 Aircraft Wingspans

Aircraft	Wingspan
Piper PA-32	33′
Cessna C206 Stationair	36′
Cessna 172 Skyhawk	36′
Piper PA-31 Navajo	41′
Gipps Aero Ga8 Airvan	41′
Cessna C208 Caravan	52′
Casa C-212 Aviocar	67′

(2) *Closing of Aircraft Rescue and Fire Fighting (ARFF) access routes*
This section is not applicable since there are no ARFF facilities on the airport.

(3) *Closing of access routes used by airport and airline support vehicles*
The project will involve resurfacing the apron and the public approach to the apron. The Contractor must coordinate and maintain access to the active apron during construction.

(4) *Interruption of Utilities, Including Water Supplies for Firefighting*
No water facilities for firefighting are available at the airport. Electrical power will need to be disconnected in order to relocate the EEB. The utility pole located behind the existing SREB will require relocation. Electrical power will be extended to the existing meter on the relocated SREB. Primary power will be extended to a new transformer near the apron. Interruption of utilities will be necessary during transition to the new primary supply, connection to the relocated SREB meter bases, and connection of the relocated EEB. No water facilities for firefighting are available at the airport.

(5) *Approach/Departure Surfaces Affected by Height of Objects*
A 20:1 approach surface allows for an equipment height of 15 feet at 500 feet from the threshold, beyond the RW 01 and RW 19 ends. The 20:1 approach is based on the threshold elevation, so the vehicle height may need to be reduced if the ground elevation rises beyond the threshold. See the Safe Zone details in the CSPP drawings. Since taller equipment could still obstruct the approach, the Engineer and the Contractor must remain aware of the equipment operating in this sensitive area,

and calculate and enforce the ceiling beneath which equipment can operate safely without obstructing aircraft flight paths.

(6) *Construction Areas, Storage Areas, and Access Routes near Runways, Taxiways, And Aprons*

The construction staging area and haul route are shown in the CSPP drawings.

(b) Mitigation of Effects

The Contractor will appoint a Safety Officer who will be the primary point of contact for all safety issues including worker and airfield safety. The Safety Officer will have the authority to immediately direct Contractor and subcontractor personnel and equipment to evacuate an area or otherwise address a potentially unsafe situation. The Safety Officer will inspect the jobsite daily for compliance with safety requirements. All State, Contractor, and subcontractor personnel must be instructed to remain alert for situations which could negatively impact the safety of air operations or the safety of personnel or the public. When an unsafe situation or condition is identified, regardless of the source, immediate action must be taken to create a safe and healthy environment.

The Contractor will maintain a 24-hour point-of-contact for safety issues that arise, requiring immediate attention. This duty may be shared by more than one person as long as the personnel are identified to the Engineer in writing. These personnel must have the power to immediately take action involving contractor personnel and equipment.

(1) *Temporary changes to runway and/or taxiway operation*

The runway and taxiway will be in half width operations during construction. The temporary changes to the runway and taxiway will be mitigated by the use of temporary runway surface markings, runway closure crosses, temporary runway lighting, temporary runway/taxiway markers, hazard marker barriers, NOTAMs, and an airport flagger(s).

(2) *Detours for ARFF and other airport vehicles.*

This section is not applicable since there are no ARFF facilities on the airport.

(3) *Maintenance of essential utilities*

Ensure that all lighting systems, telecommunications, and control cables remain in operation continuously throughout the construction period except as noted in the plans and specifications. Facilities that are directly related to work items for this project may be placed out of service only as long as necessary to make the alterations shown in the plans. See the CSPP and electrical plan drawings for details.

(4) *Temporary changes to air traffic control procedures. Such changes must be coordinated with the ATO.*

This section is not applicable since there is no Air Traffic Control Tower (ATCT) on the airport.

(4) Navigation Aid (NAVAID) Protection

No FAA NAVAIDS will be affected by this project. The RW and TW edge lighting systems will be affected by this project. The RW and TW edge lighting systems will be removed and replaced with new equipment during construction.

(5) Contractor Access

(a) Location of Stockpiled Construction Materials

The Contractor is limited to placement of stockpiled material to the staging areas shown in the plans; see the CSPP drawings for more information. Material stockpile heights must be limited so as to not create an obstacle hazard for active runways.

Stockpiled materials and equipment storage are not permitted within the RSA and OFZ, and if possible should not be permitted within the Object Free Area (OFA) of an operational runway. The Contractor must ensure that stockpiled materials and equipment adjacent to these areas are prominently marked and lighted during hours of restricted visibility or darkness. This includes determining and verifying that materials are stabilized and stored at an approved location so as not to be a hazard to aircraft operations and to prevent attraction of wildlife and foreign object damage from blowing or tracked material.

The Contractor must receive approval from FAA, through submittal of Form 7460-1, and the Engineer, prior to locating stockpiles or equipment within an ROFA or TOFA; see Section (9).(e) of this CSPP. The RSA, ROFZ, ROFA, TSA, and TOFA dimensions are described below in Section (17) of this CSPP and are shown on the CSPP Plans.

No material or equipment may be stockpiled or staged on the active aprons without the approval of the Engineer. All fuel storage and filling operations must occur in a staging area approved by the Engineer.

Stockpiling of material must be performed in a manner to protect from water or wind erosion. The Contractor must follow the SWPPP for these protection measures.

Ample space must remain available for all arriving and departing aircraft to taxi, turn, and park. Aircraft always have the absolute right-of-way and must be given a wide berth by other vehicles and equipment.

(b) Vehicle and Pedestrian Operations

All vehicles and pedestrians must obey state laws. Vehicle operators must have an appropriate level of knowledge of airport rules and regulations. The Contractor shall have

a training program in place to provide vehicle operators with the level of training necessary for their positions so they are capable of operating safely on the airside of an airport. For more information, see the current version of FAA AC 150/5210-20 Ground Vehicle Operations on Airports.

Flaggers are required where haul routes pass through populated areas. Flaggers will be utilized as follows:

- At each position shown on the plans or at an alternate location as directed by the Engineer.
- Where construction activity is being conducted within 200' of an active ROFZ or within the RSA and where construction activity is being conducted within 25' of an active taxiway OFA or within the TSA.
- To protect the safety of the public where construction traffic is passing through populated areas.
- To maintain vehicular traffic on an existing road or street during construction activities.
- Anytime the Engineer determines a flagger is needed to enhance safety.

Flaggers must also:

- Be trained by the Contractor on the location and dimensions of the RSA, TSA, OFA, and OFZ and know how to immediately evacuate these areas for aircraft use.
- Monitor the Common Traffic Advisory Frequency (CTAF) for aircraft on approach to land or preparing for takeoff.

(1) Construction site parking

Vehicle parking for Contractor employees shall be in designated staging areas or other areas as approved by the Engineer. Do not park vehicles in the RSA, TSA, OFA, or OFZ.

(2) Construction equipment parking

Park and service all construction vehicles in designated staging areas or other areas as approved by the Engineer. Do not park vehicles or equipment in the RSA, TSA, OFA, or OFZ.

(3) Access and haul roads

The access/haul routes are designated on the CSPP drawings. Contractor access and hauling operations are strictly limited to the access/haul routes shown in the plans. Construction vehicles and equipment must remain confined to the approved haul routes and work areas as directed by the Engineer.

The Contractor is responsible for any improvements and maintenance of haul routes as needed to efficiently perform construction activities. Following construction

completion, the Contractor is required to restore the haul route to its original or better condition. Provide water or other dust palliative and appropriate distribution equipment, as required, for dust control on the haul route surfaces and in the work area.

(4) *Marking and lighting of vehicles*

Each Contractor licensed vehicle must display a company logo on both sides. Each vehicle must also have a yellow flashing light affixed to the uppermost part of the vehicle and a 3'x3' checkered flag with 1'x1' orange and white checks. The flag must be on a staff attached to the vehicle so it is readily visible. The beacon must be visible from any direction, day and night, including from the air. Specialized construction equipment do not require signs or rotating beacons. The Contractor's Safety Officer's vehicle shall have both a yellow flashing beacon and a separate visual and/or audible signal (e.g. colored flashing/rotating beacon other than yellow, megaphone, air horn, 2-way radio contact, etc.) used to signal workers to clear the RW and TW safety areas and the Object Free Zones during aircraft takeoffs and landings. For more information, see the current version of FAA AC 150/5210-5.

(5) *Description of proper vehicle operations*

Vehicles and pedestrians must yield the right of way to moving aircraft and responding emergency vehicles and equipment and be aware that pilots have poor visibility of objects and vehicles on the ground. During airport emergency conditions, all vehicles and pedestrians must yield to aircraft in distress in addition to responding emergency vehicles and equipment. If radio communication capabilities with any construction vehicle or equipment (as described in Section (5)(b)(9), below) is lost due to radio failure or other causes, that vehicle must immediately evacuate from all aircraft operating areas.

(6) *Required escorts*

If vehicles or equipment operate on the active apron, taxiway, within the ROFZ, or within the ROFA and are not CTAF radio equipped, they should be escorted by a CTAF radio equipped vehicle.

(7) *Training requirements for vehicle drivers*

Personnel who drive vehicles or equipment on the apron, taxiway, within the ROFZ, or within the ROFA must be trained in safety requirements. The Contractor is responsible for providing safety training in accordance with the current version of FAA AC 150/5210-20.

(8) *Situational awareness*

There are a number of factors that hamper vehicle operator situational awareness. Situational awareness can decline due to fatigue, running behind schedule,

incomplete communication, or degrading operational conditions. Situational awareness can be enhanced by establishing dedicated marked routes through congested areas or blind spots, or eliminating or relocating fixed objects that hinder a vehicle's line of sight.

(9) Two-way radio communication procedures

(a) General

All construction vehicles and equipment must have functioning radio communication (non-aviation band radio) for communication amongst Contractor personnel. When it is not practical to install radios in the equipment, the Contractor must provide additional personnel with radio communications in constant and immediate proximity to the equipment lacking radio equipment. When operating vehicles on or near open runways or taxiways, construction personnel must understand the critical importance of maintaining radio contact, as directed by the airport operator, with airport operations and CTAF.

(b) Area requiring two-way radio communication with the ATCT

This section is not applicable since there is no ATCT at the airport.

(c) Frequencies to be used

The Contractor must continuously monitor the CTAF on a separate aviation band transceiver during hours of construction activity in aircraft operation areas.

CTAF ..... **122.7 MHz**

(d) Proper radio usage

Only one representative from the Contractor shall be in communication with pilots on an aviation band transceiver over the CTAF. All other Contractor personnel must use non-aviation radios for communication amongst themselves.

(e) Proper phraseology

Personnel in communication with pilots must be trained, by the Contractor, in proper radio usage and phraseology, including the International Phonetic Alphabet.

(f) Light gun signals

This section is not applicable since there is no ATCT on the airport.

(10) Maintenance of the secured area of the airport

The airport does not have continuous fencing and gates or badging requirements, therefore signs are posted to keep pedestrian and vehicular traffic out of the aircraft operations area.

(6) Wildlife Management

The Contractor must review the current version of FAA AC 150/5200-33, Hazardous Wildlife Attractants On or Near Airports and FAA CertAlert 98-05, Grasses Attractive to Hazardous Wildlife. The Contractor must carefully control and continuously remove waste or loose materials, including food scraps or land clearing debris that might attract wildlife. Contractor personnel must be aware of and avoid construction activities that can create wildlife hazards on airports. The Contractor must mitigate the following items.

(a) Trash

All construction personnel will dispose of trash and food scrapes in closed containers provided by the Contractor. The Contractor must perform trash clean-up on a daily basis and empty all trash containers at an approved landfill off site.

(b) Standing Water

If standing water remains for more than (3) hours after a rainfall, the Contractor will immediately re-grade any runway, taxiway, or apron area that has been disturbed by construction activities. The Contractor shall provide temporary drainage during construction to avoid standing water for all other work site areas.

(c) Tall Grass and Seeds

The Contractor must adhere to the requirements of section T-901, Seeding, of the contract specifications.

(d) Poorly Maintained Fencing and Gates

This section is not applicable since there are no gates or fencing on the airport.

(e) Disruption of Existing Wildlife Habitat

The Contractor must notify airport operations immediately of any wildlife sightings on the airfield.

(7) Foreign Object Debris (FOD) Management

Waste and loose materials, commonly referred to as foreign object debris (FOD), are capable of causing damage to aircraft landing gear, propellers, and engines. The Contractor must:
Avoid leaving FOD on or near active aircraft movement areas.
Continuously remove materials capable of creating FOD during the construction project.
Secure and cover trash and other materials to prevent them from being carried by the wind.

For more information, see the current version of FAA AC 150/5210-24, Foreign Object Debris (FOD) Management.

(8) Hazardous Material (HAZMAT) Management

If any construction vehicle or equipment is operated within airport property, the Contractor must be adequately prepared to expeditiously contain and clean-up spills resulting from fuel or hydraulic fluid leaks or other hazardous material spills. Special care must also be taken when handling or transporting hazardous materials on airport property. Do not stage motorized equipment on dirt surfaces in the staging area without a drip pan. For more information, see the current version of FAA AC 150/5320-15, Management of Airport Industrial Waste, and GCP-70. The Contractor must prepare and follow all Hazardous Material Control Plan (HMCP) and Spill Prevention Control and Countermeasures (SPCC) plans required in the contract. See contract specification section P-641 for more information.

(9) Notification of Construction Activities

(a) List Responsible Representatives

The State of Alaska Department of Transportation and Public Facilities (DOT&PF) Project Engineer will be the central point of contact between the Contractor, the Toksook Bay Airport Manager, and the FAA. Until the Project Engineer has been assigned, the primary contact for DOT&PF will be:

Ericka Moore, P.E.
DOT&PF Construction Project Manager
ericka.moore@alaska.gov
Phone: (907) 269-4550

All questions and notices to the FAA shall be coordinated through the Project Engineer. The following person will be the point of contact with FAA ATO/Technical Operations in matters relating to FAA facilities at the Toksook Bay Airport:

Andrew Riffe
FAA Bethel System Support Center (SSC) Manager
Phone: (907) 271-2205 (ANC Office)
Phone: (907) 543-3533 (BET Office)
Phone: (907) 370-3298 (Cell)

Through the Engineer, contact the FAA Bethel Systems Support Center (SSC), listed above, and Frank Smith, Coordinator, at (907) 543-3533 and submit the FAA form titled "Airport Sponsor Strategic Event Submission Form", including all date, time

and/or duration changes via email to 9-AJV-SEC-WSA@faa.gov at least 45 days prior to:

- Closing the runway (partial or full),
- Re-opening the closed runway,
- Interrupting service or removal of visual or navigational aids,
- Displacing a runway threshold, or
- Implementing an event that causes in impact to NAVAIDs.

For unplanned impacts to FAA facilities contact:

FAA Systems Operations Control Center at:
Phone: (800) 478-2139

(b) Notices to Airmen (NOTAM)

The Kongiganak Airport Manager will issue NOTAMs for the airport and verifying NOTAMS are active prior to the Contractor beginning operations. The following person, or his/her designated representative, has authority to issue NOTAMs and will be the point of contact, through the Engineer, for required issuances, updates, and cancellations:

Joe Laraux
Kongiganak Airport Manager
P.O. Box 505
Bethel, AK 99559-0505
joe.laraux@alaska.gov
Office Phone: (907) 543-2498
Cell: (907) 545-4670
Fax: (907) 543-4442

All changes in the status of operations need to be included in NOTAMs. ***Provide information to the Engineer to enable the Airport Manager to issue a NOTAM at least 5 business days prior to conducting operations/construction to allow for processing and issuance of NOTAMS.*** In addition, provide a weekly faxed update of construction work and impact on current airport operation patterns to regularly scheduled air carriers and to those providing emergency services. Coordinate with the Engineer and Airport Manager to verify carriers.

After work is completed and all areas have been returned to standard conditions, the Contractor, through the Engineer, shall notify the Airport Manager the work which needed a NOTAM has been completed and the NOTAM can be cancelled.

(c) Emergency Notification Procedures

In the case of an emergency, the Contractor must immediately contact the Airport Manager. If the Airport Manager is unavailable, the Contractor must immediately contact the back-up contact listed below. In case of a medical emergency the closest facility is the Kongiganak Village Clinic. The nearest hospital is the Yukon-Kuskokwim Delta Regional Hospital in Bethel.

Airport Manager

Joe Laraux (Bethel)	(907) 543-2498 (Office in Bethel)
	(907) 545-4670 (Cell – After Hours)

Back-Up Contact for Airport Manager

Tim Bee (Bethel)	(907) 543-2495 (Office in Bethel)
	(907) 545-4670 (Cell – After Hours)

Medical

911 for emergencies	
Lillian E. Jimmy Memorial Clinic	(907) 557-5127
Yukon-Kuskokwim Delta Regional Hospital	(907) 543-6395
Bethel, Alaska (Emergency Department)	

Fire/Emergency Responders

911 for emergencies	
Kongiganak Volunteer Fire Department	(907) 557-5607

Village Public Safety Officer (VPSO)

911 for emergencies	
Alaska State Troopers Post in Bethel	(907) 543-2294
(No VPSO is stationed in Kongiganak)	

(d) Coordination with ARFF Personnel

This section is not applicable since there are no ARFF facilities.

(e) Notification to the FAA

(1) FAR Part 77

Any person proposing construction or alteration of objects that affect navigable airspace, as defined in FAR Part 77, must notify the FAA. This includes construction equipment and proposed parking areas for the equipment (i.e. cranes, graders, etc.) on airports. The Contractor must provide this information to the Project Engineer and Airport Manager. ***Form 7460-1, Notice of Proposed Construction or Alteration, must be submitted to the FAA through the Engineer,***

following the instructions on the form, for approval at least 45 days prior to the start of construction. This form may be submitted here: https://oeaaa.faa.gov

(2) FAR Part 157

This section is not applicable since this is a federally funded project.

(3) NAVAIDS

In case of emergencies concerning FAA facilities, contact the FAA Bethel Systems Support Center (SSC), Andrew Riffe, Manager, at (907) 271-2205 (ANC Office) or (907) 543-3533 (BET Office), or Frank Smith, Coordinator, at (907) 543-3533.

For unplanned or emergency (short-notice) notification about impacts to FAA owned facilities or NAVAIDS, contact the FAA System Operations Control Center: (800) 478-2139.

(a) Airport Owned/FAA maintained

This section is not applicable.

(b) FAA Owned

1. General

Notify FAA ATO Service Area Planning and Requirements (P&R) Group a ***minimum of 45 days prior*** to implementing an event that causes impacts to NAVAIDs. Initiate coordination for outage and restoration of FAA-owned NAVAID facilities with Andrew Riffe, Manager, Bethel System Support Center at (907) 271-2205 (ANC Office) or (907) 543-3533 (BET Office).

2. Coordination

Coordinate work for an FAA owned NAVAID shutdown with the local FAA ATO/Technical Operations office. ***In addition, provide seven days' notice of the actual shutdown.***

(10) Inspection Requirements

(a) Daily Inspections

The Contractor must inspect the project site daily for FOD and employ a "clean as you go" approach throughout the project. The Contractor must perform joint inspections with the Engineer and Airport Manager throughout the project, with immediate remedy of any deficiencies, whether caused by negligence, oversight, or project scope change. Daily inspections must be completed to assure all traffic control devices are in proper location and working order.

(b) Final Inspections

Prior to opening work areas to aircraft operations, the Contractor must coordinate with the Airport Manager for inspection of work area. Work area must be free of any FOD that could cause damage to aircraft engines. All soil areas must be free of dirt clods, ruts, or

surface irregularities that could damage aircraft should it leave the runway or taxiway surface.

(11) Underground Utilities

The Contractor must request locates from all utilities having facilities in the area prior to any work being performed in the area. Locates from the local utilities listed below can obtained by calling the Alaska Dig Line at:

Puvurnaq Power Company (PPC)	
Business Line	(907) 557-5616
Utility Clerk	(800) 557-5614
United Utilities, Inc. (UUI)	
Bethel Office Locates	(907) 543-5000

In addition, contact the following utilities separately and individually for locates of their utility lines. All costs associated with this work are considered subsidiary to other pay items and no separate payment will be made.

AIA Field Maintenance	(907) 266-2425
AIA Field Maintenance, Electric	(907) 266-2423
FAA Anchorage SSC	(907) 271-6783
FAA Turnagain SSC	(907) 271-6780

Approximate locations of the utilities known to the DOT&PF within the work area are shown on the plans. The actual locations, elevations, and true nature of utilities may vary and additional utilities may exist at locations other than those shown in the plans.

When the Contractor's operations meet any of the following conditions, the Contractor will advise the owning utility in writing at least 24 hours in advance of the work.

- Operations anticipated within 10 feet of an overhead electric line.
- Operations anticipated within 5 feet of an underground electrical line according to the locations provided by the owning utility.
- Operations requiring the use of equipment capable of coming within 10 feet of an overhead electrical line.

The notice must indicate the location and duration of the work to be performed.

Take all precautions necessary to protect the safety of workers and the public when performing work involving utilities. Carefully work around existing underground utilities. If utility lines are found in areas of excavation, hand dig pot-holes every 100 feet along the cable to maintain visibility of the cable. Carefully uncover utilities where they intersect the work.

Ensure that all lighting systems, telecommunications, and control cables remain in operation continuously throughout the construction period except as noted in the plans and specifications. Facilities that are directly related to work items for this project may be placed out of service only as long as necessary to make the alterations shown in the plans. The Contractor will obtain permission from the Engineer before taking any of the above facilities out of service. The Contractor must provide at least 72 hours' notice to the Airport Manager, through the Engineer, before placing any airport lighting or NAVAIDs out of service for the NOTAM to be filed.

Immediately stop excavating in the vicinity of a utility and notify the Engineer and the utility owner if an underground utility is discovered that was not field marked or was inaccurately field marked. Promptly notify the utility owner and the Engineer in the event of accidental interruption of utility service, and cooperate with the utility owner and the Engineer until service is restored. The Contractor must repair any damage to utilities, including FAA utilities and equipment, caused by the Contractor's operations at no cost to the DOT&PF.

The Contractor is required to work around aboveground and underground utility facilities, either existing or relocated, throughout the project unless advised by the utility that the facility is abandoned in place.

Relocation or adjustment of underground utilities will not normally be performed when the ground is frozen. Also, the utilities may prohibit the Contractor from working near the utility's underground facilities when the ground is frozen.

See Section 50-06 of the contract documents for more details.

(12) Penalties

Failure to comply with the safety rules of this CSPP, the General Contract Provisions, Occupational Safety and Health Administration (OSHA) regulations, or any other federal, state, or local laws may result in suspension of construction activities or imposition of fines or other legal action. The Contractor will be liable for any penalty levied against the State resulting from actions by the Contractor or those for whom the Contractor is responsible.

(13) Special Conditions

Airport operations take precedence over all work, especially if a question of safety is involved. Special conditions such as low visibility, snow removal, aircraft in distress, aircraft accident, security breach, or work being completed by others may require the suspension or rescheduling of project construction to accomplish air safety.

(14) Runway and Taxiway Visual Aids

(a) General

All temporary markings, lighting, or signs must be clearly visible and secured in place to prevent movement and constructed of materials that would minimize damage to an aircraft in the event of inadvertent contact.

(b) Markings

Markings must be in compliance with the current version of FAA AC 150/5340-1, Standards for Airport Markings.

(1) Closed Runways and Taxiways

(a) Permanently Closed Runways

This section is not applicable since no runways will be permanently closed as part of this project.

(b) Temporarily Closed Runways

For temporarily closed runways, place an X at each end and at 500 foot intervals along the runway as shown in the CSPP drawings.

(c) Partially Closed Runways

Construction of this project will require half-width closures of the runway. A combination of temporary surface markings and runway lighting will be required to indicate the useable portion of the runway for aircraft. See below and the CSPP drawings for details on markings required for partially closed runways.

(d) Taxiway

Construction of this project will require half-width closure of the taxiway. No temporary taxiway surface markings will be required, but see the CSPP plans for information regarding other required visual aids.

(e) Temporarily Closed Airport

This section is not applicable since the airport will not be temporarily closed.

(2) Temporary Markings

Areas on the temporary runway suitable for takeoff and landing will be marked with temporary white centerline stripes and threshold bars. These markings on active operational surfaces must be installed using paint to avoid FOD potential that would be introduced with the use of other materials. Areas unsuitable for takeoff or landing but in line with the open runway centerline will be marked with yellow chevrons. Closed sections of the runway not in line with the temporary runway centerline will be marked with closure X's.

(3) Removal of Markings

This section is not applicable since the existing and proposed surfaces are not paved and do not have permanent painted markings.

(4) Outboard Markings

This section is not applicable since no outboard runway markings will be necessary as part of this project.

(5) Paint Application

The application rate of paint to mark short-term temporary runway markings may deviate from the standard (see Item P-620, Runway and Taxiway Painting in FAA AC 150/5370-10 and in the project specifications), but the dimensions must meet the existing standards. See the CSPP drawings for more information and details regarding temporary markings.

(c) Lighting and Visual NAVAIDs

Lighting that will be affected by this project include the edge lighting systems and primary wind cone. These lighting and visual NAVAIDs will be shut down at various stages during construction and/or appropriate NOTAMs issued. See Section (4) of this CSPP for additional information.

Several temporary lighting and visual aids will be required during construction of this project. Temporary runway edge lights with clear lenses will be placed at the edges of the temporary, half-width runway. Temporary threshold lights with red/green bidirectional will be placed at the thresholds of the temporary runways. Temporary RSA end markers in the form of 18-inch cones with orange retro-reflective sheeting will be placed at the ends of the temporary RSAs. Temporary taxiway markers in the form of 18-inch cones with blue retro-reflective sheeting will be placed at the edges of the partial-width taxiways. See CSPP plans for details.

Temporary lighting systems shall be arranged as shown in the CSPP drawings and conform to the latest versions of FAA ACs 150/5340-30 *Design and Installation Details for Airport Visual Aids*, 150/5345-50 *Specification for Portable Runway and Taxiway Lights*, and 150/5345-53 *Airport Lighting Certification Program*.

Construction activities involving lighting or visual NAVAIDS require the issuance of NOTAMs. See Section (2) and Section (9) of this CSPP for additional information regarding the issuance of NOTAMs.

(1) Partially Closed Runways

Disconnect edge and threshold lights on that part of the runway at and behind the threshold (that is, the portion of the runway that is closed). Alternatively, cover the light fixtures in such a way as to prevent light leakage.

(2) Temporary Displaced Runway Thresholds

Threshold moves are prohibited during half width operations. Threshold relocations can only occur once full runway width is restored.

(3) Temporary Runway Thresholds

Temporary runway thresholds and runway ends must be lighted if the runway is lighted and it is the intended threshold for night landings. Temporary threshold lights and runway end lights and related visual NAVAIDs are installed outboard with bases at grade level or as low as possible, but not more than 3 inches above ground. (The

standard above ground height for airport lighting fixtures is 14 inches). When any portion of a base is above grade, place properly compacted fill around the base to minimize the rate of gradient change so aircraft can, in an emergency, cross at normal landing or takeoff speeds without incurring significant damage. See the current FAA AC 150/5370-10 for additional information

(4) Temporary Runway Threshold and Edge Lighting

Maintain threshold and edge lighting color and spacing standards as described in the current FAA AC 150/5340-30. Battery powered, solar, or portable lights that meet the criteria in the current FAA AC 150/5345-50 may be used.

(5) NAVAIDS and Temporary Visual Aids

Installation of temporary visuals aids may be necessary to provide adequate guidance to pilots on approach to the affected runway.

(6) NOTAMs

Issue a NOTAM to inform pilots of temporary lighting conditions following the procedures outlined in Section 9.b.

(7) Temporarily Closed Taxiways

This section is not applicable since no taxiways will be closed as part of this project.

(d) Signs

There are currently no runway or taxiway signs. Therefore, temporary runway or taxiway signs will not be required.

(15) Marking and Signs for Access Routes

The Contractor is responsible for supplying and installing all necessary markings and signage for all access routes to and from the site to be used by contractor personnel, subcontractor personnel, or delivery operations. Any pavement markings and signs for construction personnel will conform to the current version of FAA AC 150/5340-18, Standards for Airport Sign Systems, and, to the extent practicable, with the Federal Highway Administration (FHWA) Manual on Uniform Traffic Control Devices (MUTCD) and the Alaska Traffic Manual (ATM) Supplement. All signage in the Airport Operations ROFA or TOFA must be frangible, these requirements are detailed in the current version of FAA AC 150/5220-23, Frangible Connections, which may require modification to size and height guidance in the MUTCD. All visual aids must conform to the current version of FAA AC 150/5340-30, Design and Installation Details for Airport Visual Aids.

(16) Hazard Marking and Lighting

(a) Purpose

Hazard marking and lighting prevents pilots from entering areas closed to aircraft and prevents construction personnel from entering areas open to aircraft. Hazard marking and lighting must also be used to identify open manholes, open excavations, trenches, hazardous areas, small areas under repair, stockpiled material, and waste areas. Consider less obvious construction-related hazards and include markings to identify airport surfaces, such as RSA, ROFA, and ROFZ, cables and power lines to make it easier for

contractor personnel to avoid these areas. Barricades are not permitted in any active RSA or TSA.

(b) Equipment

(1) Barricades

Low profile barricades, including traffic cones, (weighted or sturdily attached to the surface) are acceptable methods used to identify and define the limits of construction and hazardous areas on airports. Careful consideration must be given to selecting equipment that poses the least danger to aircraft but is sturdy enough to remain in place when subjected to typical winds, prop wash, and jet blast. The spacing of barricades must be 4 feet, so that a breach is physically prevented barring a deliberate act. Barricades must be interlinked when construction work is adjacent to an active runway. If barricades are intended to exclude pedestrians, they must be continuously linked. Continuous linking may be accomplished through the use of ropes, securely attached to prevent FOD.

The Contractor is responsible for supplying and installing all hazard marker barriers. Hazard marker barriers must be in accordance with GCP 70-09 and P-670. Hazard marker barriers will be used as shown in the CSPP drawings and as required by the direction of the Engineer and Airport Operations.

(2) Barricade Lights

The hazard marker barriers must be lighted to prevent aircraft from inadvertently entering closed portions of the runway, taxiway, or apron. Lights must be operated between sunset and sunrise and during periods of low visibility whenever the airport is open for operations. Lights must be red, either steady burning or flashing, and must meet the luminance requirements of the DOT&PF. Batteries powering lights will last longer if lights flash. Lights must be mounted on barricades and spaced at no more than 10 feet. They may be operated by photocell, but this may require that the contractor turn them on manually during periods of low visibility during daytime hours.

(3) Supplemental Barricades

Provide supplemental barricades with signs as necessary, for example “No Entry” or “No Vehicles”. Be aware of the increased effects of wind and jet blast on barricades with attached signs.

(4) Air Operations Area - General

Barricades are not permitted in any active safety area or on the runway side of a runway hold line. Within a runway or taxiway OFA and on aprons, use orange traffic cones, flashing or steady burning red lights as noted above, highly reflective collapsible barricades marked with diagonal, alternating orange and white stripes; and/or signs to separate all construction/maintenance areas from the movement

areas. All barricades adjacent to any open runway or taxiway, TSA, or apron must be as low as possible to the ground and no more than 18 inches high, exclusive of supplementary lights. Barricades must be of low mass; easily collapsible upon contact with an aircraft or any of its components; and weighted or sturdily attached to the surface to prevent displacement from prop wash, jet blast, wing vortex, and other surface wind currents. If affixed to the surface, they must be frangible at grade level or as low as possible, but not exceed 3 inches above the ground. These locations are denoted in the CSPP drawings.

(5) *Air Operations Area – Runway/Taxiway Intersections*
Use highly reflective barricades with lights to close taxiways leading to closed runways. The use of traffic cones is appropriate for short duration closures.

(6) *Air Operations Area – Other*
Beyond a runway and taxiway OFA and aprons, barricades intended for construction vehicles and personnel may be different shapes and made from various materials, including railroad ties, sawhorses, jersey barriers, or barrels.

(7) *Maintenance*
The Contractor must have a person on call 24 hours a day for emergency maintenance of airport hazard lighting and barricades. The Contractor must file the contact person's information with the airport operator, through the Engineer. Lighting should be checked at least once a day, preferably at dusk.

(17) Work Zone Lighting for Night time Construction

Lighting equipment must adequately illuminate the work area if the construction is to be performed during nighttime hours. Refer to AC 150/5370-10 for minimum illumination levels for nighttime paving projects. Additionally, it is recommended that all support equipment, except haul trucks, be equipped with artificial illumination to safely illuminate the area immediately surrounding their work areas. The lights should be positioned to provide the most natural color illumination and contrast with a minimum of shadows. The spacing must be determined by trial. Light towers should be positioned and adjusted to aim away from active runways to prevent blinding effects. Shielding may be necessary. Light towers should be removed from the construction site when the area is reopened to aircraft operations. Construction lighting units should be identified and generally located on the construction phasing plans in relationship to active runways and taxiways.

(18) Protection of Runway and Taxiway Safety Areas

Runway and taxiway safety areas, OFA's, OFZ's, and approach surfaces are described in FAA AC 150/5300-13. Protection of these areas includes limitations on the location and

height of equipment and stockpiled material. Coordinate with the appropriate FAA Airports Regional or District Office if there is any doubt as to requirements or dimensions as soon as the location and height of materials or equipment are known.

(a) Runway Safety Area (RSA)

The RSA dimensions for each phase of construction are shown in Table 18.1, below. Exceptions to these construction limitations may occur only with the permission of the Engineer and after the proper NOTAM has been issued. See Section (5) of this CSPP for details regarding vehicle and personnel movement within safety areas and material stockpiling restrictions. See Section (16) of this CSPP for details regarding the hazard marking and lighting devices used to identify open excavations. Construction activities within the existing RSA are subject to the following conditions:

(1) No construction may occur within the existing RSA while the runway is open for aircraft operations. The RSA dimensions are temporarily adjusted for each phase of construction. See the CSPP drawings for details.

(2) Adjustments of the RSA dimensions must be coordinated with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and a NOTAM issued.

(3) Excavations

(a) Open trenches or excavations are not permitted within the RSA while the runway is open. If possible, backfill trenches before the runway is opened. If the runway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the runway across the trench without causing damage to the aircraft.

(b) The Contractor must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(4) Erosion Control

Soil erosion must be controlled to maintain RSA standards. The RSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting the occasional passage of aircraft without causing structural damage to the aircraft.

(b) Runway Object Free Area (ROFA)

The ROFA dimensions for each phase of construction are shown in Table 18.1, below. Construction, including excavations, may be permitted in the ROFA. However, equipment must be removed from the ROFA when not in use and material should not be stockpiled in the ROFA if not necessary. Equipment or stockpiling material in the ROFA requires approval from the Engineer and submittal of a 7460-1 form and justification provided to the appropriate FAA Airports Regional or District Office for approval, see Section (9).(e) of this CSPP.

(c) Taxiway Safety Area (TSA)

The TSA dimensions for each phase of construction are shown in Table 18.1, below. Construction activities within the TSA are subject to the following conditions:

(1) No construction may occur within the TSA when the taxiway is open for aircraft operations. The TSA dimensions are temporarily adjusted for each phase of construction. See the CSPP drawings for details.

(2) Adjustments of the TSA dimensions must be coordinated with the appropriate FAA Airports Regional or District Office and the local FAA air traffic manager and a NOTAM issued.

(3) Excavations

(a) Open trenches or excavations are not permitted within the TSA while the taxiway is open. Trenches should be backfilled before the taxiway is opened. If the taxiway must be opened before excavations are backfilled, cover the excavations appropriately. Covering for open trenches must be designed to allow the safe operation of the heaviest aircraft operating on the taxiway across the trench without damage to the aircraft.

(b) The Contractor must prominently mark open trenches and excavations at the construction site with red or orange flags, as approved by the airport operator, and light them with red lights during hours of restricted visibility or darkness.

(4) Soil erosion must be controlled to maintain TSA standards. The TSA must be cleared and graded and have no potentially hazardous ruts, humps, depressions, or other surface variations, and capable, under dry conditions, of supporting the occasional passage of aircraft without causing structural damage to the aircraft.

(d) Taxiway Object Free Area (TOFA)

The TOFA dimensions for each phase of construction are shown in Table 18.1, below. Except as noted below, no construction may occur within the taxiway object free area while the taxiway is open for aircraft operations.

(1) The TOFA dimensions may be temporarily adjusted if the taxiway is restricted to aircraft operations requiring a TOFA that is equal to the TOFA width available.

(2) Offset taxiway centerline and edge pavement markings (do not use glass beads) may be used as a temporary measure to provide the required taxiway object free area. Where offset taxiway pavement markings are provided, centerline lighting, centerline reflectors, or taxiway edge reflectors are required. Existing lighting that does not coincide with the temporary markings must be taken out of service.

(3) Construction activity, including open excavations, may be accomplished without adjusting the width of the taxiway object free area, subject to the following restrictions:

(a) Taxiing speed is limited to 10 mph

(b) Appropriate NOTAM issued.

(c) Marking and lighting meeting the provisions of Sections (14) and (16) of this CSPP are implemented.

(d) Five foot clearance is maintained between equipment and materials and any part of an aircraft (including wingtip overhang). If such clearance can only be maintained if an aircraft does not have full use of the entire taxiway width, then it will be necessary to move personnel and equipment for the passage of that aircraft.

(e) Flaggers furnished by the Contractor must be used to direct and control construction equipment and personnel to a pre-established setback distance for safe passage of aircraft and airline and/or airport personnel. Flaggers must also be used to direct taxiing aircraft, however due to liability issues, the airport operator should require airlines to provide flaggers for directing taxiing aircraft.

(e) Obstacle Free Zone (OFZ)

The OFZ dimensions for each phase of construction are shown in Table 18.1, below. In general, personnel, material, and/or equipment may not penetrate the OFZ while the runway is open for aircraft operations. The OFZ must be immediately evacuated 5 minutes prior to until 5 minutes after an aircraft takeoff or landing. If a penetration to the OFZ is necessary, it may be possible to continue aircraft operations through additional operational restrictions. Coordinate with the FAA through the appropriate FAA Airports Regional or District Office, through the Engineer.

(f) Runway Approach/Departure Surfaces

The runway approach surface during construction is 20:1 for both the RW 01 and 19 ends. The approach surfaces begin 200 feet beyond each runway threshold. All personnel, materials, and/or equipment shall not be permitted to penetrate these surfaces. Objects that do not penetrate these surfaces may still be obstructions to air navigation. For example, the boom of an excavator or a raised dump bed, for instance, could potentially obstruct an aircraft on approach for landing. The Engineer and the Contractor must remain aware of the equipment operating in this sensitive area, and calculate and enforce the ceiling beneath which equipment can operate safely without needing to evacuate upon aircraft approach. Construction activity in a runway approach/departure area may result in the need to partially close a runway or displace the existing runway threshold. Obstacles 15 feet or greater in height must be setback 500 feet from the thresholds. See the Safe Zone details in the CSPP drawings.

Table 18.1 Runway and Taxiway Protection Areas

Design Element	Phase	Width (Centered on Centerline)	Length Beyond R/W End
RSA	1	120′	240′ / 300′
	2, 3	60′	240′ / 300′
ROFA	All	500′	240′ / 300′
ROFZ	All	250′	200′
TSA	1	79′	NA
	2, 3	79′	NA
TOFA	1	115′	NA
	2, 3	115′	NA

(19) Other Limitations on Construction

(a) Prohibitions

(1) No use of equipment taller than 15 feet unless a 7460-1 determination letter is issued for such equipment.

(2) No use of open flame or welding torches unless fire safety precautions are provided and Airport Operations has approved their use.

(3) No use of electrical blasting caps on or within 1,000 feet of the airport property.

(4) No use of flare pots within the AOA.

(b) Restrictions

(1) Construction suspension required during specific airport operations
Construction may be suspended when low visibility operations are in effect.

(2) Areas that cannot be worked on simultaneously
Construction activity for each phase is limited to the areas shown in the CSPP drawings. No phase may be conducted concurrently with another phase.

(3) Day or night construction restrictions
There are no day or night construction restrictions.

(4) Seasonal construction restrictions
Seasonal shutdown is required by September 30th of each construction season. All work for this project shall be completed by the completion date stated in GCP-80.

APPENDIX D

PERMITS

APPENDIX E

TRAFFIC PLAN

(Not Used)

APPENDIX F

SIGN PLAN

(Not Used)

APPENDIX G

MINING PLAN

(Not Used)

APPENDIX H

AVIATION MATERIALS CERTIFICATION LIST

AIRPORT MATERIALS CERTIFICATION LIST

Project Name Kongiganak Airport Improvements

Project Number CFAPT00433 / 3-02-0380-004-2022

Project Engineer Signature

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
D-701 STORM DRAINS AND CULVERTS										
Pipe										
CS Pipe, 36-inch	D-701-2.2									
Concrete Mix Design	D-701-2.3 & P-610									
Rubber Gaskets	D-701-2.4									
Joint mortar										
Portland Cement	D-701-2.5									
Joint fillers	D-701-2.6									
Class B Bedding	D-701-2.10									
Pipe form fitting bands	D-701-3.4									
Culvert Marker Posts	D-701-2.9									
End Sections	D-701-2.11									
Dissimilar Pipe Coupler	D-701-2.12									
F-162 CHAIN-LINK FENCE										
Fabric	F-162-2.1									
Barbed Wire	F-162-2.2									

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		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Posts, Rails, and Braces	F-162-2.3 & Plans									
Gates	F-162-2.4									
Wire Ties And Tension Wires	F-162-2.5									
Misc. Fittings And Hardware	F-162-2.6									
Marking	F-162-2.8									

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		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Gate Locks	F-162-2.9									
Keyless Locks	F-162-2.10									
G-135 CONSTRUCTION SURVEYING AND MONUMENTS										
Monument Cases	G-135-2.1 & Plans									
Primary Monument	G-135-2.2									
Secondary Monument	G-135-2.3									
L-101 AIRPORT ROTATING ROTATING BEACONS										
Beacon, L-801A, Class II	L-101-2.2									
Arctic Kit	L-101-2.2 a.									
Internal Heater	L-101-2.2 b.									
Weatherproof Cabinets	L-101-2.5									
Wire	L-101-2.6									
Conduit	L-101-2.7									
Paint										
Priming for ungalvanized metal	L-101-2.8 a.									
Priming for galvanized metal	L-101-2.8 b.									
Orange	L-101-2.8 c.									
White	L-101-2.8 d.									
Disconnect Switch	L-101-2.9 / Plans									

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		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Obstruction Lights	L-101-3.12									
L-103 AIRPORT BEACON TOWERS										
Tower										
Hinged Pole Tower	L-103-2.2 b.									
Lighting Protectoin										
Lightning Rod	L-103-2.3 a.									
Down Conductor	L-103-2.3 b.									
Ground Rod	L-103-2.3 c.									
Paint										
Priming for galvanized steel	L-103-2.4 a.									
Priming for ungalvanized steel	L-103-2.4 b.									
Orange	L-103-2.4 c.									
White	L-103-2.4 d.									
Foundation	L-103-2.5									
L-108 UNDERGROUND POWER CABLE FOR AIRPORTS										
L-824 Cable										
5000 V	L-108-2.2/ Plans									
600V	L-108-2.2/Plans									
Counterpoise Conductors	L-108-2.2/Plans									

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		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Bare Copper Wire	L-108-2.3									
Cable Connections										
Field-attached Plug-in Splice	L-108-2.4 b.									
Factory-molded Plug-in Splice	L-108-2.4 c.									
Taped Splice	L-108-2.4 d.									
Elecrical Tape	L-108-2.10									
Exothermic Bonding	L-108-3.9									
L-109 AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT										
Steel Conduit	L-109-2.5									
Ground Rods	L-109-2.13									
FAA-Approved Equipment										
Constant Current Regulators and Regulator Monitors	L-109-2.16									
Other Electrical Equipment	L-109-2.17									
Wire										
Control circuits	L-2.18 a.									
Power Circuits	L-2.18 b.									
Wood Platform Foundation	L-109-2.19									
Flexible Metal Conduit	L-109-2.21									
Tapes										

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		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Pipe Sealing Tape	L-109-2.22 a.									
Corrosion Preventive Tape	L-109-2.22 b.									
Electrical Insulating Tape	L-109-2.22 c.									
Panel Board Circuit Breakers	L-109-2.27									
Identification Ties	L-109-2.29									
Service Entrance Equipment	L-109-2.30									
Plug Cutout	L-109-2.31									
Hardware	L-109-2..35									
L-110 UNDERGROUND ELECTRICAL DUCT BANKS AND CONDUITS										
Steel Conduit	L-110-2.2									
Type III, rigid, HDPE pipe	L-110-2.3 b.									
Marker Tape	L-110-2.7									
Transtion Fitting	Plans									
L-125 INSTALLATION OF AIRPORT LIGHTING SYSTEMS										
Constant Current Regulator, L-828	L-125-2.1 a.(1)									
Runway Edge Light, Medium Intensity, L-861	L-125-2.1 a.(3)									
Taxiway Edge Light, Medium Intensity, L-861T	L-125-2.1 a.(4)									
Airport Light Base, L-867	L-125-2.1 a.(7)									
Isolating Transformer, L-830	L-125-2.1 a.(10)									

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Spacer Ring, L867	L-125-2.1 a (21)									
Light Base Extension, L-867	L-125-2.1 a (22)									
Adhesive Sealant	L-125-2.1 b.(1)									
Conduit Sealant	L-125-2.1 b.(2)									
Transformer Support Platform	L-125-2.1 c./ Plans									
Gasket	L-125-2.1 i.									
Temporary Runway Lighting system	L-125-2.1 n.									
Drain Rock	L-125-2.1 o									
P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT										
Ditch Lining	L-152-2.1 h.									
P-154 SUBBASE COURSE										
Aggregate	P-154-2.1									
P-610 CONCRETE FOR MISCELLANEOUS STRUCTURES										
Premolded Joint Material	P-610-2.8									
Joint Filler	P-610-2.9									
Steel Reinforcement	P-610-2.10									
Concrete Mixture	P-610-3.2									
Cover Materials for Curing										
Burlap Cloth	P-610-2.11									

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Sheet materal for curing Concrete	P-610-2.11									
Liquid Membrane-Forming	P-610-2.11									
P-620 RUNWAY AND TAXIWAY PAINTING										
Waterborne										
White	P-620-2.2 a.									
Yellow	P-620-2.2 a.									
Paint, Solvent Base										
White	P-620-2.2 b.									
Yellow	P-620-2.2 b.									
P-641 EROSION, SEDIMENT AND POLLUTION CONTROL										
BMP Installations	P-157-2.5								Stabilization Materials identified and documented in	
P-650 AIRCRAFT TIE-DOWN										
Soil Anchor Tie-Downs	P-650-2.1 & 2.2									
Rock Anchor Tie Downs	P-650-2.1 & 2.3									
Temporary Tie-Downs	P-650-2.4/Plans									
P-660 RETROREFLECTIVE MARKERS AND CONES										
Type II Markers	P-660-2.1 b.									
Cone, 18-Inch	P-660-2.1 c.									
P-670 HAZARDOUS AREA BARRIERS										
Hazard Marker Barrier, Plastic	P-670-2.1 b.									

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Flasher Unit for Plastic Barrier	P-670-2.3 b.									
P-681 GEOTEXTILE FOR SEPARATION AND STABILIZATION										
Separation Geotextile	P-681-2.1 a.									
Stabilization Geotextile	P-681-2.1 b.									
Reinforcement	P-681-2.1 c.									
S-143 FUEL TANK										
Tank	S-143-2.1 d., e., f. & g.									
Overfill Alarm	S-143-2.1 a.									
Automatic Shut-Off Device	S-143-2.1 b.									
Tank-Mounted Mechanical Fuel Gage	S-143-2.1 c.									
Electric Dispensing System with signs and Fire Extinguisher	S-143-2.3									
Fuel	S-143-2.4									
T-901 SEEDING										
Seed	T-901-2.1									
Fertilizer	T-901-2.2									
T-905 TOPSOIL										
Topsoil	T-905-2.1									
T-908 SOIL STABILIZATION										
Hydraulic Erosion Control Product	T-908-2.1									
Rolled Matting										
Unbleached Jute Yarn	T-908-2.2 a.									

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Knitted Straw Matting	T-908-2.2 b.									
Staples	T-908-2.3									
Hydraulic Erosion Control Product (HECP)										
HECP-1	T-908-2.4 a.									
HECP-2	T-908-2.4 b.									
ADDITIONAL MATERIALS										
Assembly A5.1	U500 / Appendix N									
Assembly C5.11G	U500 / Appendix N									
Assembly E1.1	U500 / Appendix N									
Assembly E1.1L	U500 / Appendix N									
Assembly E1.5	U500 / Appendix N									
Assembly F3.6	U500 / Appendix N									
Assembly F3.8	U500 / Appendix N									
Assembly F3.10	U500 / Appendix N									
Assembly F3.12	U500 / Appendix N									
Assembly F6.6	U500 / Appendix N									
Assembly F6.8	U500 / Appendix N									
Assembly F6.10	U500 / Appendix N									
Assembly G1.6	U500 / Appendix N									
Assembly H1.1	U500 / Appendix N									

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Materials Item	Specification	Construction			Design		Statewide Materials		Remarks	Materials Certificate Location e.g. Binder #
		Project Engineer	Regional Materials or QA Engineer	Airport Ltg. Equipment Certification Program	Civil Design Engineer of Record	Electrical Design Engineer of Record	*Qualified Products List (QPL)	State Materials or QA Engineer		
Assembly H2.1	U500 / Appendix N									
Assembly S1.1	U500 / Appendix N									

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APPENDIX I

FAA TECHNICAL SPECIFICATIONS
FOR
APPROACH LIGHTING AIDS

(Not Used)

APPENDIX J

MANDATORY POST-AWARD
CONFERENCE NOTICE AND AGENDA

(Not Used)

APPENDIX K

SNOW REMOVAL EQUIPMENT BUILDING
TECHNICAL SPECIFICATIONS

SPECIFICATION

TABLE OF CONTENTS

END OF TABLE OF CONTENTS

SECTION 01 91 00
COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. As defined by ASHRAE Standard 202, the commissioning process is a quality focused process for enhancing the delivery of a project. The process focuses upon verifying and documenting that all the commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements (OPR). For the commissioning of this project, the bid documents shall be considered the OPR.

B. Section Includes:

1. Description of Commissioning Work.
2. Equipment and Systems to be Commissioned.
3. Submittals.
4. Commissioning Plan.
5. Equipment and system verification checks.

C. Related Sections:

1. Section 22 08 00 - Commissioning of Plumbing.
2. Section 23 08 00 - Commissioning of HVAC.
3. Division 26: Electrical - Lighting Control Systems, Transfer Switch, Receptacle Control.

1.2 REFERENCES

A. American Society of Heating, Refrigeration, and Air Conditioning Engineers:

1. ASHRAE 202 - Commissioning Process for Buildings and Systems.

1.3 DESCRIPTION OF WORK

A. Work includes the completion of formal commissioning procedures on selected equipment and systems. Commissioning is defined as the process of verifying and documenting that the installation and performance of selected building systems meet the specified design criteria and therefore satisfies the design intent and the Owner's operational needs. The Contractor shall be responsible for participation in the commissioning process.

B. Commissioning procedures will be designed and conducted under the direction of the Commissioning Authority (CxA) hired by the Contractor.

1.4 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum three years experience.

B. The CxA shall be certified as a commissioning professional by American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE), the Associated Air Balancing Council Commissioning Group (ACG), Building Commissioning Association (BCA), the University of Wisconsin - Madison (UWM), or the National Environmental Balancing Bureau (NEBB).

1.5 DEFINITIONS

A. Commissioning Authority (CxA): The independent Commissioning Authority shall be hired directly by the prime contractor and shall not be a member of the design team, employed by the design firms, or employed by the installing contractor. The Commissioning Authority shall be solely responsible for the performance of all commissioning activities and may not subrogate any duties to any other member of the construction team. The commissioning authority shall lead, review and oversee the completion of the commissioning process activities.

B. Functional Performance Test (FPT): Component and Control System sequence of operations verification. The systems are run through all control system's sequences of operation and components are verified to be responding as the sequences state. The Commissioning Team utilizes the FPT Checklist for the verification test procedures. Forms are updated throughout the construction process to include any changes, additions, or other modifications to the equipment, system, or control sequences.

1.6 SUBMITTALS

A. The following Commissioning Documentation shall be submitted in accordance with accepted submittal procedures:

1. Submittals for Review:

   a. Commissioning Authority current certification and qualifications.

   b. Commissioning Guidelines to be utilized on the project and under which certification is maintained.

   c. Commissioning Plan.

   d. Commissioning Schedule.

e. Functional Performance Test (FPT) Checklists. Submit a minimum of 30 days prior to the on-site commissioning activities.

2. Closeout Submittals

a. Draft Commissioning Report for Owner Review.

b. Final Commissioning Review.

PART 2 - PRODUCTS

2.1 NOT USED

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM

A. The Commissioning Team will include Contracting Representatives, Facility Users/Maintenance, construction contractors, designers of record and the commissioning agent. The specific members of the team or their delegate are as follows: Commissioning Authority (CxA); Owner's Representative or Project Manager; User or Facility Manager; General Contractor; Designer of Record; Mechanical Contractor; Electrical Contractor; Controls Contractor; Testing, Adjusting, and Balancing Contractor.

3.2 COMMISSIONING PLAN

A. Commissioning Plan identifies the scope, strategies and responsibilities for all the team members within the commissioning process for the construction phase of the project. It outlines the overall process, sequence, organization, responsibilities and documentation for the commissioning process. The following items are also included in the Commissioning Plan:

1. Cx Team Member Names and Contact Information.

2. Current Project Schedule integrated with Cx Activities.

3. Communications Protocol.

4. Equipment List.

5. Functional Performance Test Checklists.

6. Issues Log, Meetings, and Meeting Minutes.

B. Commissioning Team Roles:

1. CxA: Coordinates and documents the Cx process, develops and updates Commissioning Plan, maintains issues log, writes tests; oversees and documents performance tests; develops the Commissioning Report.

2. CxA: The CxA documents the commissioning process through use of progress reports, field reports, issues log and meeting minutes.

3. CxA: The CxA leads the functional testing process on site to demonstrate the equipment and systems are functioning in accordance with the design intent and owner's expectations.

4. Contractor: Facilitates the commissioning process, ensures that Subcontractors perform their requirements and integrates commissioning into the construction process and schedule. The Contractor provides lifts, equipment, tools, and testing materials necessary to access, operate, verify, and observe tests to be performed.

5. Subcontractors: Attend commissioning meetings, verify proper operation of equipment and systems prior to functional performance test, demonstrate proper system performance during functional performance test.

6. Design Team: Reviews submittals, assists in resolving issues.

C. Commissioning Meetings: All Commissioning Team Members shall attend all commissioning meetings. After approval of the CxA and Commissioning Plan, and 30 days prior to FPT, the Contractor and CxA shall schedule and lead a meeting via teleconference, to address the commissioning process, review the commissioning plan, review commissioned equipment and systems, review commissioning schedule, review commissioning documents, review project status, and discuss potential issues. The CxA shall lead the meeting and provide meeting minutes. Additional meetings shall be scheduled by the CxA as required to successfully accomplish the commissioning process.

3.3 COMMISSIONING REPORT

A. The report shall include an Executive Summary; Completed Checklists; Overview of Commissioning and Testing Scope; Issues Log; list of any equipment or systems that do not meet Contract Document requirements at completion of the commissioning process and summarize steps made or steps to be made to correct or improve the condition. Each non-compliance issue shall be referenced in the Issues Log to the specific functional performance test, inspection, trend log, etc. where the deficiency is documents.

B. Recommendations for improvement to equipment, equipment operations, or commissioning process changes, including lessons learned, are to be listed in the report.

3.4 COMMISSIONING MASTER EQUIPMENT AND SYSTEMS LOG (SAMPLE)

A. The following sample Cx Master Equipment and Systems Log is provided to show general format only and does not include all the equipment and systems to be commissioned. Refer to Divisions 22, 23, and 26 for specific systems, subsystems and equipment to be commissioned.

3.5 COMMISSIONING MASTER EQUIPMENT AND SYSTEMS LIST

PRODUCTS	System/Equipment Tag	System/Equipment Description	Equipment Submittal Approved	PC and FT Checklists Approved	PC Completed	FT Completed	Training Completed
Divisions 21, 22, 23 - Mechanical							
4							
5							
6							
Divisions 26, 27 and 28 - Electrical							
72							
73							
74							

3.6 COMMISSIONING PRE-FUNCTIONAL INSTALLATION (PC) AND FUNCTIONAL PERFORMANCE TEST (FC) CHECKLISTS (SAMPLES)

A. The following sample Cx checklists are provided to show general format only and do not include all equipment and systems to be commissioned. Refer to Divisions 22, 23, and 26 for specific systems, subsystems and equipment to be commissioned.

Pre-Functional Installation Checklist(PC)

Air Handling Unit

PROJECT: _____		UNIT NO:	_____
LOCATION: _____		SERVICE:	_____
MANUFACTURER: _____		MODEL:	_____

ITEM	OK	COMMENT
PRE-START-UP INSPECTION		
Mountings Checked (Shipping Bolts Removed)		
Vibration Isolators Installed		
Seismic Restraints Installed		
Equipment Guards Installed		
Pulleys Aligned and Belt Tension Correct		
Plenums Clear and Free of Loose Material		
Fans Rotate Freely		
Fans, Motors and Linkages Lubricated		
Fire & Balance Dampers Positioned		
Temporary Start-up Filters Installed		
Electrical Connections Completed		
Disconnect Switch Installed		
Overload Heaters in Place (Sized Correctly)		
Heating Coil Clean and Clear – Piping Complete		
Cooling Coil Clean and Clear – Piping Complete		
Condensate Drains Clear		
Humidifier Section Installation Completed		
Safety Controls Operational		
Building & Fan Room Clean For Start-up		
Duct Cleaning Completed		
Control System Completed (End to End Checks)		

Review (Foreman): _____ DATE: _____

Review (CCR): _____ DATE: _____

Approved (Department's Representative): _____ DATE: _____

Functional Performance Checklist (FC)

Air Handling Unit

PROJECT: _____		UNIT NO:	_____
LOCATION: _____		SERVICE:	_____
MANUFACTURER: _____		MODEL:	_____

ITEM	OK	COMMENT
START-UP INSPECTION		
Start-up By Manufacturer's Representative		
Fan Rotation Correct		
Electrical Interlocks Verified		
Fan Status Indicators Verified (Local / Remote)		
Freeze Protection Operational		
Local Air Leakage Acceptable		
Vibration & Noise Level Acceptable		
Motor Amps – Rated _____Actual _____		
Motor Volts – Rated _____Actual _____		
Final Operating Filters Installed		

COMMENTS:

_____

_____

_____

Functional Testing By:	_____	DATE:	_____
Review (Foreman):	_____	DATE:	_____
Approved (CCR):	_____	DATE:	_____
Approved (Department's Representative):	_____	DATE:	_____

END OF SECTION

SECTION 05 12 10

STRUCTURAL STEEL FRAMING: SKID FOUNDATION

PART 1 - GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Use latest edition.

1. International Building Code (IBC) – Latest Edition adopted by the State of Alaska including any amendments
2. ASCE 7: Minimum Design Loads for Buildings and Other Structures – Latest Edition
3. AISC M013 - Detailing for Steel Construction.
4. AISC M016 - ASD Manual of Steel Construction.
5. AISC M017 - Connections.
6. AISC S303 - Steel Buildings and Bridges.
7. AISC S329 - Allowable Stress Design Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
8. AISC S334L - Load and Resistance Factor Design Specifications for Structural Joints Using ASTM A 325 or A 490 Bolts.
9. AISC S335 - Structural Steel Buildings Allowable Stress Design and Plastic Design.
10. ASTM A 36 - Carbon Structural Steel.
11. ASTM A 53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
12. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
13. ASTM A 325 - Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
14. ASTM A 992 - Standard Specification for Structural Steel Shapes

15. ASTM A 1085 - Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)

16. ASTM A 563 - Carbon and Alloy Steel Nuts.

17. ASTM A 572 - High-Strength Low-Alloy Columbium-Vanadium of Structural Steel.

18. ASTM F 436 - Hardened Steel Washers.

19. ASTM F 959 - Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.

20. AWS D1.1 - Structural Welding Code Steel.

21. SSPC SP 1 - Solvent Cleaning

22. SSPC SP 10 - Near-White Blast Cleaning

23. SSPC PA 1 - Shop, Field, and Maintenance Painting.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 SYSTEM DESCRIPTION

A. Provide the structural steel system, including shop coatings where specified, complete and ready for use. Structural steel systems including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing shall be provided in accordance with AISC M016 and AISC M017 except as modified in this contract.

1.4 DEFINITION OF STRUCTURAL STEEL FOR THIS SPECIFICATION

A. "Structural Steel" as defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and "Specification for Architectural Exposed Structural Steel" and further defined for this specification to include the following:

1. All materials for field and shop connection of steel including anchor bolts.

B. All other items called out in this Section and miscellaneous steel detailed on the Drawings.

1.5 MODIFICATIONS TO REFERENCES

A. In AISC M016, AISC M017, AISC S335, AISC S303, and AISC S329, except as modified in this section, shall be considered a part of AISC M016 and AISC M017 and is referred to in this section as AISC M016 and AISC M017.

1.6 SUBMITTALS

A. Submit under provisions of GCP 60-08 – Submittal Procedures. If manufacturers standard product data is submitted mark out non-applicable items.

B. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy American Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

C. Drawings

1. Fabrication Drawings: Submit fabrication drawings for approval prior to fabrication. Prepare in accordance with AISC M013, AISC M016 and AISC M017. Drawings shall not be reproductions of contract drawings. Include complete information for the fabrication and erection of the structure's components, including the location, type, and size of bolts, welds, member sizes and lengths, connection details, blocks, copes, and cuts. Use AWS standard welding symbols.

D. Statements

1. Welding Procedures and Qualifications: Prior to welding, submit certification for each welder stating the type of welding and positions qualified for, the code and procedure qualified under, date qualified, and the firm and individual certifying the qualification tests. If the qualification date of the welding operator is more than one-year old, the welding operator's qualification certificate shall be accompanied by a current certificate by the welder attesting to the fact that he has been engaged in welding since the date of certification, with no break in welding service greater than 6 months

E. Certificates

1. Steel

2. Bolts, Nuts, and Washers

F. Coatings

1. Submit manufacturer's technical data sheets for specified coatings.

1.7 GENERAL CONSTRUCTION TESTING AND INSPECTION

A. Contractor shall provide and pay for the services of an Independent Testing and Inspection Agency qualified to perform sampling and tests required by these specifications and referenced standards. Minimum field testing requirements are noted in Part 3 - Execution. These tests and inspections are not associated with the Engineer's Special Inspection and Testing described in this specification.

B. Contractor shall submit a general report, which includes inspector reports and test results, weekly, to the Engineer in accordance with GCP 60-08 Submittal Procedure.

C. Contractor shall notify Engineer a minimum of 24 hours in advance of any "General Construction Testing and Inspections" required by the Construction Documents or reference specifications.

D. Provide safe access for testing agency so that required inspection and testing can be accomplished.

1.8 SPECIAL INSPECTION

A. Special inspection is not required for components fabricated in an AISC certified fabrication facility.

B. Day-to-day inspection and testing shall be the responsibility of the Contractor. However, representatives of the Engineer can and will inspect construction as considered appropriate and will monitor operations of the Contractor's Independent Testing and Inspection Agency. Inspection or testing by the Engineer's Representative will not relieve the Contractor of any of his testing responsibilities.

C. The Engineer will hire an Independent Testing and Inspection Agency to perform "Special Inspections" as required by the International Building Code (IBC) Section 1701 and noted on the drawings. This work is in addition to inspection work required of the Contractor and shall not relieve the Contractor of his responsibilities; this may result in a duplication of inspection effort.

D. Contractor shall notify Engineer a minimum of 72 hours in advance of any "Special Inspections" required by the Construction Documents or reference specifications.

E. Contractor shall provide safe access to items of work requiring inspection.

PART 2 - PRODUCTS

2.1 STEEL

A. Structural Steel Beams: ASTM A 992, 50 ksi minimum yield.

B. Structural Steel Shapes and Plates: ASTM A 36

C. Structural Steel Tubing: ASTM A 500, Grade B

D. Steel Pipe: ASTM A 53, Type E or S, Grade B, weight class STD (Standard).

2.2 BOLTS, NUTS, AND WASHERS

A. Provide the following unless indicated otherwise.

B. For Structural Steel

1. Bolts: ASTM A 325, Hot dip galvanized. The bolt heads and the nuts of the supplied fasteners must be marked with the manufacturer's identification mark, the strength grade and type specified by ASTM specifications.

2. Nuts: ASTM A 563, Hot dip galvanized, Grade and Style for applicable ASTM bolt standard recommended.

3. Washers: ASTM F 436 washers hot dip galvanized for ASTM A 325.

2.3 STRUCTURAL STEEL ACCESSORIES

A. Welding Electrodes and Rods: AWS D1.1.

2.4 SHOP PAINT / COATINGS

A. All metal framing components except top of pattern floor plate: Devoe Bar Rust 235 or equal. Two coats with total minimum 10 mil DFT.

B. Non-skid (pattern floor plate) coating: Primer: American Safety Technologies MS-7CZ, 2-3 mil DFT; Topcoat: American Safety Tech AS-550 Non-Slip Floor and Deck Coating, or approved equal.

2.5 FABRICATION

A. Markings: Prior to erection, members shall be identified by a painted erection mark. Connecting parts assembled in the shop for reaming holes in field connections shall be match marked with scratch and notch marks. Do not locate erection markings on areas to be welded. Do not locate match markings in areas that will decrease member strength or cause stress concentrations. Affix embossed tags to hot-dipped galvanized members.

PART 3 - EXECUTION

3.1 ERECTION

A. Lay up steel on fabrication tables, templates or sound cribbing, to achieve the slopes and grades noted on the drawings. Call for Engineer's inspection after skid is tacked together, before final welding.

3.2 CONNECTIONS

A. Except as modified in this section, connections not detailed shall be designed in accordance with AISC S335. Build connections into existing work. Punch, sub-punch and ream, or drill bolt holes. Bolts, nuts, and washers shall be clean of dirt and rust, and lubricated immediately prior to installation.

B. Common Grade Bolts: ASTM A 307 bolts shall be tightened to a "snug tight" fit. "Snug tight" is the tightness that exists when plies in a joint are in firm contact.

C. High-Strength Bolts: ASTM A 325 bolts shall be fully tensioned to 70 percent of their minimum tensile strength unless shown otherwise. Bolts shall be installed in connection holes and initially brought to a snug tight fit. After the initial tightening procedure, bolts shall then be fully tensioned, progressing from the most rigid part of a connection to the free edges.

3.3 WELDING

A. AWS D1.1 Provide AWS D1.1 qualified welders, welding operators, and tackers.

3.4 SHOP COATINGS

A. Environmental Conditions

1. Do not apply coating when air or substrate conditions are:

   a. Less than 3 degrees C 5 degrees F above dew point;

   b. Below 10 degrees C 50 degrees F or over 35 degrees C 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

B. Surface Preparation

1. Remove dirt, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance before application of paint or surface treatments. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces.

2. Solvent Cleaning

   a. SSPC SP 1. Remove visible oil, grease, and drawing and cutting compounds by solvent cleaning.

3. Blast Cleaning

   a. SSPC SP 10. After solvent cleaning, complete surface preparation by near-white blast cleaning. Remove residual dust from blasted surface by blowing with dry, oil-free air, vacuuming, or sweeping. Provide surface profile of 1 1/2-mil thickness.

C. Application

1. Coating Application

   a. Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

   b. Unless otherwise specified or recommended by the paint manufacturer, paint shall be applied by spray.

   c. Paints shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

   d. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

   e. Touch up damaged coatings before applying subsequent coats.

2. Mixing

   a. Mix and power stir components to a smooth, uniform consistency. Stir coating periodically during induction period. Follow coating manufacturer's requirements for induction time and pot life of mixed batches.

D. General

1. Apply primer or first coating to dry surfaces not more than 4 hours after near-white blast cleaning. Apply coats of each system so that finished surfaces are free from runs, sags, brush marks and variations in color.

2. Unless otherwise specified by manufacturer's recommendations, do not allow drying time between coats to exceed 72 hours. Under conditions of direct sunlight or elevated ambient temperatures of 90 degrees F or greater, limit intercoat drying period to a maximum of 24 hours.

3. Repair detected coating holidays, thin areas, and exposed areas damaged prior to or during installation by surface treatment and application of additional coating or by manufacturer's recommendations.

4. Apply each coat at a dry film thickness of not less than one half the final coating DFT noted in Part 1. If one coat system, apply at a dry film thickness not less than the final coating DFT noted in Part 1.

3.5 FIELD QUALITY CONTROL

A. Perform field tests, and provide labor, equipment, and incidentals required for testing. The Engineer shall be notified in writing of defective welds, bolts, nuts, and washers within 7 working days of the date of weld inspection.

B. Welds

1. Visual Inspection: AWS D1.1. Furnish the services of AWS-certified welding inspectors for fabrication and erection inspection and testing and verification inspections. Welding inspectors shall visually inspect and mark welds, including fillet weld end returns.

C. High-Strength Bolts: Inspection procedures shall be in accordance with AISC S329, Section 9. Confirm and report to the Engineer that the materials and field work meet the project specification.

END OF SECTION

SECTION 07 21 29
SPRAYED INSULATION

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 06 10 00 - Rough Carpentry: wall and roof construction

B. Section 07-21-10– Building Insulation

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this Specification. The publications are referred to in the text by basic designation only. In case of conflict the most stringent shall apply.

1. ASTM C177 - Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
2. ASTM C518 - Test Method for Steady State Thermal Transmission Properties by means of the heat flow meter apparatus.
3. ASTM C1029 - Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
4. ASTM D1621 - Test Method for Compressive Properties of Rigid Cellular Plastics.
5. ASTM D1623 - Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
6. ASTM D2126 - Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
7. ASTM D2842 - Test Method for Water Absorption of Rigid Cellular Plastics.
8. ASTM D2856 – Test Method for Open Cell Content of Rigid Cellular Plastics by the Air Pyenometer
9. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
10. ASTM E96 - Tests Method for Water Vapor Transmission of Materials.
11. International Building Code (IBC), Chapter 26.

12. Underwriters Laboratories Inc (UL) - Fire Resistance Directory.
13. Intertek Testing Services NA, Inc. (Intertek).

1.4 SYSTEM DESCRIPTION

A. Spray applied (foamed in place) urethane-isocyanurate rigid foam plastic insulation.

B. IBC approved thermal (fire) barrier and low permeance water vapor barrier where exposed.

1.5 SUBMITTALS

A. Product Data: Indicate product descriptions, performance data, materials, recommended use, application instructions, substrate surface preparation, and special curing temperature requirements.

B. Manufacturer and Installer qualifications.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum of 5 projects similar to material proposed where specified product was used.

B. Applicator Qualifications: Minimum of installing 5 similar sprayed insulation systems in Alaska, and must be approved, in writing, by manufacturers for installation of materials installed.
1. Same installer shall apply entire insulation and barrier systems.

C. Provide project names, location, date, product used and owner telephone number.

1.7 REGULATORY REQUIREMENTS

A. Completed installation with barrier coatings shall conform to IBC Chapter 26 including:
1. Foam plastic 75 maximum flame spread rating per ASTM E84.
2. Foam plastic 450 maximum smoke developed per ASTM E84.
3. Interior of building separated from foam plastic by thermal barrier per IBC 2603.4.

1.8 PRE-INSTALLATION MEETING:

A. Applicator, CONTRACTOR, and CONTRACTING OFFICER shall hold a pre-construction meeting at least 1 week prior to commencing insulation installation.

1.9 STORAGE AND PROTECTION

A. Deliver products to site in manufacturer's original unopened labeled containers or packages.

B. Store above freezing in dry area away from sparks or open flames and in accord with manufacturer's written recommendations.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Apply insulation, and barrier coatings at ambient temperatures and conditions recommended in writing by the manufacturer's and in no case when ambient and substrate temperatures are below 50 degrees F, or with dirt, frost or water on surfaces to be coated. Maintain temperatures for 24 hours before, during application, and until each coating has cured and dried.

B. Provide insulated tarps, ventilation and heat as necessary. Follow foam and coating manufacturer's instructions not exposing foam to excess heat or open flame.

PART 2 - PRODUCTS

2.1 SPRAY INSULATION

A. Spray applied (foamed-in-place) 2-component polyurethane/isocyanurate type rigid foam plastic insulation formulated for existing climatic conditions in accord with ASTM C1029.
   1. "Heatlok Soy"" 200 Plus": www.demilecusa.com or approved equal

B. Physical and Performance Requirements: Foam shall meet the following minimum in place requirements when tested in accordance with standard indicated:
   1. Thermal Resistance of 1.0 inch thickness: R6 minimum per ASTM C177. Density 1.5 to 3 pounds per cubic foot (24to 48 kg/m_3)
   2. Compressive Strength: 15-psi minimum per ASTM D1621.
   3. Water Absorption: 0.1 percent maximum per ASTM D2842.
   4. Tensile Strength: 40-psi minimum per ASTM D1623.
   5. Closed cell content: 90 percent minimum per ASTM D2856.
   6. Meet specified "Regulatory Requirements" for flame, fuel, and smoke.

C. Provide primer for substrate in accord with insulation manufacturer instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine Drawings and verify field conditions to receive insulation are securely fastened or adhered, clean, dry and free of contaminants that will inhibit insulation adhesion.

B. Verify work within walls and ceiling-roof over is complete and secure prior to insulation application.

C. Beginning of installation shall mean acceptance of substrate and project conditions as capable of producing an acceptable well-adhered job.

3.2 PREPARATION

A. Clean and dry substrate as recommended in writing by insulation manufacturer.

B. Mask and protect adjacent surfaces from overspray and dusting.

3.3 INSULATION APPLICATION

A. Apply insulation in accord with manufacturer's instructions and approved submittals. Prime in accord with spray insulation manufacturer recommendations for substrate.

B. Apply insulation by spray method in uniform passes not exceeding 1-1/2 inches. Allow insulation to foam completely before successive layers are applied. Apply full thickness in same day.

C. Apply to a minimum cured thickness of 5½ - 6 inches.

D. Apply insulation to a uniform monolithic density without soft spongy consistency, free from depressions, pinholes or voids and securely bonded to substrate. Foam surface shall be smooth orange peel or coarse orange peel profile.
   1. Unacceptable surface conditions are smooth hard, "popcorn" or " tree bark" surfaces.
   2. Remove non conforming areas and refoam to acceptable surface as necessary.

3.4 CLEANING

A. Remove excess materials and debris caused by application as work progresses.

B. Leave adjacent areas free of overspray and clear of soil caused by

insulation and coating application.

END OF SECTION

SECTION 07 41 40
INSULATED METAL WALL AND ROOF PANELS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 07 92 00 - Joint Sealants

B. Section 13121 - Pre-Engineered Building

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this Specification. The publications are referred to in the text by basic designation only. In case of conflict the most stringent shall apply.

1. ASTM A36 - Specification for Carbon Structural Steel.
2. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
3. ASTM A792 – Specifications for Sheet Steel, 55 Aluminum – Zinc Alloy – Coated by the Hot – Dip Process.
4. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus.
5. ASTM C518 - Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of Heat Flow Meter Apparatus.
6. ASTM D522 – Test Method for Mandrel Bend Test of Attached Organic Coatings.
7. ASTM D523 – Test Method for Specular Gloss.
8. ASTM D822 – Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
9. ASTM D968 - Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive.
10. ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
11. ASTM D2247 - Practice for Testing Water Resistance of Coating in 100 PerCent Relative Humidity.
12. ASTM D3363 - Test Method for Film Hardness by Pencil Test.
13. ASTM D3794 - Practice for Testing Coil Coatings.
14. ASTM D4145 – Test Method for Coating Flexibility of Prepainted Sheet.
15. ASTM D4214 – Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.

16. ASTM D5324 – Guide to Testing Water-Borne Architectural Coatings.
17. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.
18. ASTM E331 - Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
19. ASTM E1646 – Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
20. ASTM G23 - Practice for Operating Light - Exposure Apparatus (Carbon-Arc Type) With and Without Water Exposure of Non-metallic Materials.
21. International Building Code (IBC) 2006.

1.4 PERFORMANCE REQUIREMENTS

A. Fire Characteristics: IBC 2603 foam plastic compliant.
   1. Panel approval based on large scale tests per FM 4880, UL 1040, or NFPA 286.

B. Size components to withstand inward and outward seismic and wind loads without causing detrimental effects to the wall panels and panel joints in accordance with the following as laboratory tested and measured in accordance with ANSI/ASTM E330.
   1. Provide panels which perform with loads and with frame locations provided by Section 13121-Pre-engineered Buildings.

C. Thermal Movement: provide for expansion and contraction with surface temperatures between minus 45 degree Fahrenheit and plus 130 degrees Fahrenheit without causing buckling, cracking of finish, or failure of joints or fasteners.

D. Thermal Transmission: Manufacturer minimum certified thermal “R”:
   1. R19 for wall panels.
   2. R38 for roof panels.

E. Water Penetration: No uncontrolled water penetration to inside of building when panel joints tested in accord with ASTM E331 at 15 psf and 5 gallons water per square foot for 15 minutes.

1.5 SUBMITTALS

A. Shop Drawings, Calculations and Product Data to Illustrate:
   1. Conformance with Performance Requirements:
      a. Wind loads.
   2. Installation Layout and Details:
      a. Layout of Panels: Indicate size of panels, joints and edges at adjacent different materials.
      b. Details of flashing.
      c. Location of closure strips and sealant.
      d. Location and flashing details at penetrations.
   3. Fasteners:
      a. Manufacturer’s rated withdrawal value for screws, into substrates indicated on pre-engineered metal building with minimum safety factor of 3.

b. Type, corrosion resistance and size and spacing to be used for each condition with manufacturer's pullout rating.
c. Screw spacing and anchorage at edges, joints and field.
d. Attachment of perimeter flashing.

4. Joints:
a. Inter-relationship of components and flashing.
b. Configuration of backed butt joints.
c. Sealant and sealant tape specifications.

5. Panel fire certification and test data to verify IBC 2603 conformance.

B. Samples:
1. Minimum 12-inch long, sample of two panels, illustrating joint system.
2. Minimum 6 by 6 inch paint samples of selected finish color

C. Certificates:
1. Manufacturer's certification of conformance for experience qualifications and performance requirements, with engineering calculations signed and sealed by a registered Alaskan Engineer.
2. Installer qualifications and approval by manufacturer.
3. Independent test lab verifying thermal performance.

D. Warranties:
1. Panel Manufacturer.
2. Paint Manufacturer.

1.6 QUALITY ASSURANCE

A. Panel Manufacturer Qualifications:
1. Minimum 25 similar successful installations manufacturing concealed fastener metal faced plastic foam insulated panels.
2. Manufacturers recommended installation details including attachment, joints, panel edges, abutting wall and penetration flashing.
3. Manufacturer's installation training.

B. Installer Qualifications:
1. Approved in writing by the panel manufacturer.
2. Document 5 successful comparable projects with metal panels completed by the proposed installer. Submit Job Names, Owner, General Contractor, and Architect phone numbers.

C. Pre-Installation Conference: Attended by CONTRACTOR, installer, and OWNER'S Representative.
1. Schedule in advance of start of work and when at least part of work is ready for panel installation.
2. Bring approved submittals and samples of panel materials to the conference

1.7 ENVIRONMENTAL REQUIREMENTS

A. Installation of Expansion Joints, Sealants, and Underlayment:
1. At a temperature between 25 and 55 degrees F.
2. Surfaces free of rain, snow, or frost.

1.8 WARRANTIES

A. Panels: Manufacturer's 2-year warranty that panels will not delaminate, rupture, or fail structurally.

B. Paint Finish: Manufacturer's 10-year warranty covering color fade, chalking, and film integrity (no peeling or cracking).

C. Installer: installed panel system 2 year warranty that panels wil not show water on inside panel surfaces.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to meeting specified criteria:
   1. Kingspan: http://www.kingspanpanels.us
   2. Centria: http://www.centria.com
   3. Metlspan: http://www.metlspan.com
   4. IPS Insulated Panel Systems: http://www.insulated-panels.com
   5. All Weather: http://www.awipanels.com
   6. Or approved equal

2.2 PANELS

A. General: Panels shall be insulated sandwich type recommended by manufacturer for conditions of use, consisting of a core of polyurethane/isocyanurate foam plastic insulation between interior facing of 26 gage minimum sheet metal and exterior facings of 24 gage minimum sheet steel with stucco embossed texture and manufacturer's standard ribs.
   1. Conform to Performance Requirements
   2. Panels shall span supports indicated under design loads with deflection limited to L/180 and no failure of joint seals.

B. There shall be no through metal connections between facings.
   1. Wall panels shall be one piece continuous from foundation wall to the roof line.
   2. Roof panels shall be minimum 20 feet long.
   3. Any panel end splice joints shall be manufacturer cut offset interlocking with backer and added fasteners.
   4. Panel side joints shall be offset interlocking without exposed sealant.

C. Attachment screws shall run through the building structure to meet Performance Requirements.

D. Panel Sheet Metal Facing and Trim: roll formed G-90 galvanized galvalume or steel conforming to ASTM A653 or ASTM A792.

2.3 PANEL COATING

A. Prime both panel sides; complete finish outside and interior side.

B. Polyvinylidene fluoride, with minimum 70 percent resins Kynar 500 Fluorocarbon Coating System.

C. Coating Thickness: One mil (Primer 0.2 mil plus finish 0.8 mil).

D. Gloss: 25 to 35 at 60 degrees in accord with ASTM D523.

E. Weathering - no checking, blistering or adhesion loss when tested for 2,000 hours in accordance with ASTM G23 or ASTM D822.

F. Chalking - no chalk greater than No. 8 rating when tested for 2,000 hours in accordance with ASTM D4214.

G. Fading - color change shall not exceed 5 NBS units when tested for 2,000 hours in accordance with ASTM D2244.

H. Humidity –less than 5 percent of No. 8 blisters when tested for 2,000 hours in 100 percent humidity at 100 degrees F. in accordance with ASTM D2247.

I. Salt Spray - no more than 1/16 inch creep or tape off from scribe and less than 5 percent No. 6 blisters when tested for 1,000 hours in 5 percent salt fog at 95 degrees F. in accordance with ASTM B117.

J. Flexibility - no rupture of coating when tested in accordance with ASTM D4145 or ASTM D522.

K. Hardness - F-2H pencil hardness when testing in accordance with ASTM D3363.

L. Abrasion Resistance: withstand 80 liters falling sand before appearance of base metal in accord with ASTM D968.

M. Panel Color:
1. One of the manufacturer's standard colors will be selected for the panel outsides. Match for associated flashing and trim.
2. One of the manufacturer's standard near-white colors will be selected for the panel interior sides.

2.4 FASTENERS

A. Screws recommended by the panel manufacturer but not smaller than Number 14 (1/4 inch) diameter stainless steel or carbon steel steel corrosion resistant coated to resist 1000 hours of salt spray per ASTM B117 with no more than 5 percent red rust appearing on head or shank. Screw threads shall completely penetrate materials to be joined but shall not extend more than 1.5 inch through inside surface. Design to resist the negative wind load specified with a minimum factor of safety of 3.

B. Exposed Fasteners: for flashing trim only: Number 14 (1/4 inch) diameter screws preassembled with a 3/4 inch diameter 18 gage tapered lip stainless steel washer bonded to an EPDM sealing washer. Factory paint heads and washers to match adjacent panel finish.

C. Minimum pullout value 400 pounds when tested in predrilled pilot holes through 16 gage thick, ASTM A653 steel.

D. Rivets or nails not permitted.

2.5 FLASHING, CLOSURES, AND TRIM

A. Provide 24 gage steel flashing or trim at edges of the panel system and at interface with adjacent different materials, ridges, corners, and at penetrations.
   1. Provide as recommended by panel manufacturer for weather tight installation per Performance Requirements.
   2. Provide flashing with projected drip edges over wall penetrations such as doors.
   3. Provide flashing inset from roof panel eaves to cover foam and provide drip edge.

2.6 GASKETS, SEALANTS AND CLOSURES

A. Place seal near inside face of panel joints to act as vapor retarder.

B. Seal panel side laps and flashings with pressure-sensitive sealant tape or continuous 1/4 inch sealant bead.
1. Seal material shall be a resilient blend of butyl and EPDM rubbers, with less than 50 per cent butyl recommended by manufacturer for adhesion to metals, plastics, and painted surfaces.

C. Closures: resilient EPDM or closed cell foam PVC closures or approved equal matching the panel profile.

D. Liquid sealant: single component non-sag silicone type per ASTM C920, with non-gassing polyethylene backer rod.

E. Field Foam Insulation: 2 pound density spray applied polyurethane. Cover any exposed foam with metal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate, Drawing details, and conditions under which panels will be installed.

B. Verify field measurements. Modify work as required for fit.

C. Beginning installation shall mean acceptance of existing conditions as capable of producing an acceptable job.

3.2 INSTALLATION OF INSULATED PANELS

A. Install in accordance with approved shop drawings and manufacturer's written instructions.

B. Erect panels with horizontal lines straight and level and vertical lines plumb.

C. Locate panel attach screw 6 inches maximum from panel ends and as necessary to meet Performance Requirements.

D. Screw attach through structure at each structural furring, girt, purlin or edge member.

E. Install side lap tape sealant at panel side lap and install extra sealant over and under attachment clips. Apply continuous sealant bead along inner panel facing joints to provide vapor retarder. Replace any factory applied sealant and gasket that is damaged or lost resiliency.

F. Secure panels without warp or deflection.

G. Fill any voids between joints at roof ridge, panel corners, and penetrations with spray foam insulation.

3.3 INSTALLATION OF FLASHINGS AND ACCESSORIES

A. Conform to Drawings, panel manufacturer instructions and approved Shop Drawings.

B. Flashing Intersecting Panel Ribs: Match roofing profile as needed for weathertight closure.

C. Install closures set in continuous bead of sealant with screw through center.

D. Screw flashing spacing: 10 inches maximum and 2 inches maximum from edges.

E. Seal flashing joints in lapped bed of 1/4 inch round sealant bead.

3.4 TOLERANCES

A. Alignment: 1/4 inch in 20 feet, maximum variation from vertical and level.

B. 1/8-inch maximum variation from adjacent panel surface.

C. Panel flatness: maximum 0.8 percent of panel length out of flat plane. No obvious “oil canning” when viewed from 10 feet.

3.5 ADJUSTING AND CLEANING

A. Remove cuttings and metal shavings and protective shipping coatings from finished surfaces at the end of each day. Remove stains immediately.

B. Paint field cut edges, minor scratches and abrasions with panel manufacturer approved paint immediately after cutting, using smallest brush practical. Spray touch-up not permitted.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 07 41 40 - Insulated Metal Wall and Roof Panels

B. Section 08 11 13 – Steel Doors and Frames

C. Section 08 35 20 – Folding Exterior Doors

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this Specification. The publications are referred to in the text by basic designation only. In case of conflict only the most stringent shall govern.
   1. Federal Specification (FS): Specific References as noted.
   2. American Society for Testing and Materials (ASTM) ASTM C510 - Test Method for Staining and Color Change of Single or Multicomponent Joint Sealants.
   3. ASTM C717 - Terminology of Building Seals and Sealants.
   4. ASTM C919 - Practice for Use of Sealants in Acoustical Applications.
   5. ASTM C920 - Specification for Elastomeric Joint Sealants.
   6. ASTM C1193 - Guide for Use of Joint Sealants.
   7. ASTM D1667 - Specification for Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed-Cell Form).
   8. ASTM C1330 – Specification for Cylindrical Sealant Backing for use with Cold Liquid Applied Sealants

1.4 SUBMITTALS

A. Sealants including colors, backing, bond breaker: Manufacturer’s Literature: Including recommendations for cleaning substrate, application temperatures and compatibility with adjoining surfaces and application.
   1. If manufacturer’s sealed containers include this data on labels, no additional data need be submitted.
   2. Verify Sealant adhesion, primer and staining requirements.

B. Product Labeling: Each sealant material container shall bear manufacturer’s label and name, type, color, and applicable standards.

C. Manufacturer qualifications.

1.5 QUALITY ASSURANCE

A. Manufacturer of sealant shall have been in business of manufacturing construction sealants with at least 500 successful projects of similar size.

B. Applicator shall be responsible for verifying sealants used are compatible with joint substrates.

1.6 DELIVERY AND STORAGE

A. Deliver in manufacturer's original unopened container, clearly indentifying each product.

B. Store in accord with manufacturer's recommendations.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply sealants at ambient temperatures below those recommended in writing by the manufacturer, and in no case below 10 degrees F, in rain or snow, or with, dirt, frost or water on the components.

B. Install sealants in metal flashing with temperature between 25 and 55 degrees F. by temporary enclosure and heating as necessary for 12 hours before, during and 24 hours after installation.

C. Protect sealants until cured.

PART 2 - PRODUCTS

2.1 GENERAL

A. Compatibility: Provide sealants, backing, and primers that are compatible with one another and with substrates for conditions of service.

B. Acceptable Sealant Manufacturers: Subject to compliance with specified criteria:
1. Dow Corning http://www.dowcorning.com
2. General Electric http://www.gesealants.com
3. Tremco http://www.tremco.com
4. Sika Corporation http://www.sikaindustry.com
5. Or approved equal.

2.2 TYPICAL JOINT SEALANTS

A. Typical use unless otherwise noted: Single component non-sag, non-staining silicone type movement range plus or minus 50 percent shore A hardness 15-25 recommended in writing by manufacturer for the condition of use.
1. Federal Specification (FS) TT-S-00230C or ASTM C920.

2. Color: match adjacent surfaces as closely as possible unless indicated otherwise on the DRAWINGS, using one of the manufacturer's standard colors of at least black, white, brown, grey and translucent.

B. For metal flashing: Single component non-sag non-staining polyurethane type: movement range plus or minus 25 percent shore A hardness 25-40:
1. FS TT-S-00230C or ASTM C920.
2. Color: Same as those specified for silicone.

2.3 DRY FOAM TAPE SEALANT

A. Self-stick adhesive roll form with resilient PVC foam core per ASTM D1667.
1. Pressure sensitive adhesive one side.
2. 3/16 inch minimum thickness or as necessary for 30 percent compression in completed joint.
3. Closed cell, water absorption: none.
4. Corrosive reaction to bare metal: none.
5. Service temperature range: 65 degrees F -200 degrees F.
6. Storage life: indefinite at 100 degrees F or below.
7. Shrinkage: none.

B. Acceptable Manufacturers: Subject to specified criteria:
1. Schnee-Morehead, Inc.http://www.chemrex.com
2. Gaska-Tape Inc. http://www.gaska-tape.com
3. Norton Performance Plastics http://www.nortonadhesives.com.
4. Or approved equal.

2.4 FLOOR SEALANT

A. Self-leveling, silicone type single or multi field component movement range plus or minus 25 percent shore A hardness 25-40, non-staining polyurethane type recommended in writing by manufacturer for horizontal traffic floor joints.
1. Federal Specification: FS TT-S-00230C or ASTM C920.
2. Color: gray for concrete surfaces. For other than concrete floors match adjacent surfaces as closely as possible with manufacturer's standard black, gray or brown.

2.5 BACKING MATERIALS AND BOND BREAKERS

A. Flexible non-gassing polyethylene or polyurethane foam backing filler rod in accord with ASTM C1330 and recommended in writing by the sealant manufacturer for joint conditions. These materials shall not stain adjacent materials.

B. Oversized thirty to fifty percent larger than joint width.

C. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application to prevent 3 sided adhesion where backer rod cannot be used.

2.6 PRIMERS AND CLEANERS

A. Recommended in writing by the sealant manufacturer for the joint material and condition of use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine DRAWINGS and field conditions to receive sealants for defects that will adversely affect the work, and for deviations beyond allowable tolerances.

B. Beginning of installation shall mean installer accepts existing conditions as capable of producing an acceptable job.

3.2 PREPARATION

A. Clean and remove loose dirt, oil, corrosion, protective coatings, existing sealants, waterproofers, moisture, frost and other foreign material from surfaces to receive sealants and primers using approved techniques and cleaning agents recommended by sealant manufacturer.

B. Primer: Where recommended by sealant manufacturer shall be neatly applied before back-up materials and sealant application. Mask or otherwise protect adjacent surfaces from excess primer.

3.3 BACKING MATERIALS AND BOND BREAKERS INSTALLATION

A. Install in accordance with ASTM C1193, approved sealant manufacturer's written recommendations and the following. Apply acoustical sealants in accord with ASTM C919. Verify non-staining of adjacent porous materials and compatibility.

B. Use joint backer bond breaker filler rod for joints over ¼ -inch wide.

C. Allow for manufacturer's recommended width to depth ratio. Do not set deeper than width of joint.

D. Do not stretch lengthwise to joint.

3.4 SEALANT INSTALLATION

A. Apply in accordance with manufacturers written recommendations.

B. Mask as necessary to provide straight neat edges.

C. Size sealant materials to achieve sealant manufacturer's recommended width to depth ratio: typical depth in joint shall be 1/2 width of joint. Sealant depth shall be 1/4 to 3/8 inch and joint width at least 2 times expected movement.

D. Lapped joints: shall receive continuous bed of sealant or sealant tape before assembly. Whenever practical, joints shall be bedded or coated continuously before assembly. Lap joint sealant shall have a minimum lap width of 3/8 inch by 1/4 inch minimum depth.

E. Apply under continuous pressure ahead of sealant gun.

F. Tool joints as necessary to produce a consistent smooth joint without voids and foreign matter.

G. Completed sealed joints shall have uniform, straight sealant bead free of voids, sags, and foreign material.

3.5 JOINTS TO RECEIVE SEALANT

A. Exterior: Building joints exposed to the weather and moisture in the completed work as specifically indicated on DRAWINGS and including:
   1. Door and window frames.
   2. Thresholds.
   3. Pipe, duct, and light fixture penetrations in walls and roof.
   4. Flashing joints.

B. Interior as specifically indicated on DRAWINGS and including:
   1. Metal roof wall and panel joints.
   2. Around door frames.
   3. Around wall and roof penetrations.

C. Other Joints: As indicated on DRAWINGS and SPECIFICATIONS.

3.6 CLEAN UP

A. Remove surplus materials and excess sealant from surrounding surfaces at completion of each day's work.

END OF SECTION

SECTION 08 11 13
STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 07 41 40 - Insulated Metal Wall and Roof Panels

B. Section 07 92 00 - Joint Sealants

C. Section 13121 - Pre-Engineered Building

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this Specification. The publications may be referred to in the text by basic designation only. In case of conflict the most stringent shall apply.

1. A568 – Standard Specification for Steel, Sheet, Carbon and High Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
2. ASTM A924 – Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
3. ASTM A653 - Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
4. Steel Door Institute (SDI) SDI-100 (ANSI A 250.8)-Recommended Specifications for Standard Steel Doors and Frames.
5. Steel Door Institute (SDI) SDI-105 (ANSI A250.11) - Recommended Erection Instructions for Steel Frames.
6. National Association of Architectural Metal Manufacturers (NAAMM) Hollow Metal Manufacturers Association Division (HMMA) Standard 820 - Hollow Steel Frames.
7. NAAMM Standard 840 - Installation and Storage of Hollow Metal Doors and Frames.
8. Society for Protective Coatings (SPC) - Systems and Specifications.
9. (NAAMM): HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.
10. International Building Code (IBC) 2003.

1.4 SUBMITTALS

A. Indicate frame profile, construction, thickness, finish, anchor types and locations,

location of cutouts for hardware, reinforcement, and installation-adjustment instructions.

B. Indicate door elevations, construction, thickness, finish, internal reinforcement, construction method at edges, top and bottom, and installation-adjustment instructions.

C. Certificate from Installer that installation meets these SPECIFICATIONS.

1.5 QUALITY ASSURANCE

A. Conform to requirements of HMMA and these SPECIFICATIONS.

1.6 STORAGE AND PROTECTION

A. Store above ground, vertical in dry area, spaced and vented, protected from weather.

PART 2 - PRODUCTS

2.1 DOORS

A. SDI-100 or HMMA 861 full flushface hollow steel construction and meeting this specification. Face sheets 16 gage.

B. Hardware reinforcements: 10 gage at hinges, 14 gage at locks, and closers.

C. Door Core
1. Exterior:
   a. Polyurethane or polystyrene foam insulation filled cavity, minimum thermal R value 4.

2.2 FRAMES

A. Fourteen gage:
1. Continuously welded corners finished smooth.
2. Minimum 12-gage reinforcing plates around hardware.

B. Wall Anchors: 18 gage minimum hot-dip galvanized or 3/8-inch diameter galvanized countersunk head anchors evenly spaced not over 24-inches apart and 6-inches maximum from top and bottom of door.

2.3 MINIMUM EQUIVALENT GAGE THICKNESS

A. Minimum uncoated steel thickness:
1. 10 gage 0.118 inches.
2. 12 gage 0.097 inches.
3. 14 gage 0.068 inches.
4. 16 gage 0.054 inches.

5. 18 gage 0.043 inches.

2.4 HARDWARE

A. Finish: ANSI A156.18 No. 630 Satin Stainless Steel.

B. Hinges: Mortise Stainless Steel 0.180 inches thick, 4.5 inches high.
   1. Three hinges per door.

C. Lockset: commercial cylindrical type per ANSI A156.2 grade 1:Schlage AL 53RD with 626 finish series with interchangeable key core 6 pin E Keyway: *or equal*.
   1. Request Key Code from OWNER prior to procurement.
   2. F-09 "Entry" function: latchbolt operated by lever either side except the outside lever made inoperative or inside push button.
   3. Provide four keys.

D. Closers: Cast iron shell with steel rack and pinion piston surface mount: LCN 4000 Series or approved equal.
   1. Rated for heavy duty use.
   2. Through door mount bolts.
   3. Extra clearance shim mounts so weatherstrip is not cut.
   4. Low temperature fluid.
   5. Extra heavy-duty forged steel parallel arm.

E. THRESHOLDS
   1. Extruded aluminum full width single piece: 6 inch by 1/4 inch with beveled edges and anti slip fluted top in accord with ANSI/BHMA A156.21: J32130, PEMKO 272 or equivalent Zero or Reese.
   2. Fasten thresholds with countersunk-head screws 12-inches spacing maximum.

F. WEATHERSTRIPPING
   1. Dense layered plastic bristle brush weatherstrip. Brush fibers fused into place, flexible at minus -30 degrees F. held in extruded aluminum holder-mount with pre-punched pre-slotted holes for mounting with screws. ANSI and PEMKO Corporation numbers listed, equivalent Sealeze, or Zero acceptable.
   2. Full-length single piece.
   3. Door head and Side Jambs: 40 to 45-degree angle mount, 3/8 inch brush ANSI R3A36 PEMKO 45041.
   4. Door Bottom: 1-inch brush; ANSI R3A415 and PEMKO 18100.

2.5 FABRICATION

A. Fabricate in accordance with HMMA 861, SDI, these specifications, and approved submittals. Doors and frames to be rigid, exposed welds and fabrication marks ground flush, smooth, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Close joints tight, even space and flush. Grind welded corners flush and smooth.

B. Fabricate typical doorframes with 5/8-inch high integral stops and 2-inch faces.

C. Prepare doors and frames to receive finish hardware specified: Including cutouts, hardware, reinforcing plates welded in place around hardware attachment areas, drilling and tapping for mortised hardware in accordance with approved finish hardware schedule.

D. Close top edge of exterior doors flush with inverted steel channel closure. Seal joints watertight. Provide weep holes in bottom edge.

2.6 DOOR AND FRAME FINISH

A. Hot dip galvanealled doors and frames with 0.40 ounce zinc coating total both sides conforming to ASTM A653 or A924 prior to factory preparation and factory prime painting.

B. Typical: factory chemically clean and phosphate treat for paint adhesion outside of door surfaces and each side of frames and factory prime and finish paint with rust inhibiting prime paint in accordance with SPC or HMMA recommendations. Exposed surfaces smooth and free of scratches and paint runs.

C. Factory finish paint door and jamb with semi-gloss paint, selected from one of manufacturer's standard colors, or field prime and paint 2 coats corrosion resistant enamel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine DRAWINGS and verify field conditions to receive frames for defects that will adversely affect the work and for deviations beyond allowable tolerances.

B. Beginning of Work shall mean acceptance of existing conditions as capable of producing an acceptable job.

3.2 INSTALLATION

A. Frame Insulation:
   1. Fill exterior frames with foamed in-place urethane insulation.

B. Seal both sides of frame to adjoining wall surfaces with a continuous bead of silicone sealant in accordance with Section 07920 - Joint Sealants.

3.3 TOLERANCES

A. Smooth, visually flat surfaces with maximum Diagonal Distortion (Warp) 1/16 inch gap under a straight edge, corner to corner.

B. Plumb and square within 1/16 inch.

C. Doors centered in frames with the following maximum clearances:
   1. Jambs and Head: 1/16 to 1/8 inches.
   2. Bottom: 1/8 to 1/2 inch from threshold or floor finish.

D. Allow for and accommodate interfacing substrate tolerances indicated in substrate specification sections.

3.4 HARDWARE

A. Install after finish painting.

B. Install in accordance with hardware manufacturer's written recommendations, using proper templates for approved hardware.

3.5 ADJUSTING

A. Adjust completed door assemblies to swing freely, close smoothly and latch easily with the latched door in uniform, continuous contact with stops.

B. Closed door shall not rattle.

C. Doors with closers shall self-latch.

END OF SECTION

SECTION 08 35 20
FOLDING EXTERIOR DOORS

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 07 41 40 -Insulated Metal Wall and Roof Panels

B. Section 07 92 00 - Joint Sealants

C. Section 13121 - Pre-Engineered Building

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 APPLICABLE PUBLICATIONS

A. Publications listed below form a part of Specification. Publications may be referred to in the text by basic designation only. In case of conflict the most stringent shall apply.
   1. American Society for Testing and Materials (ASTM) A36-Specification for Carbon Structural Steel
   2. ASTM A501 – Specification for Hot-formed Welded and Seamless Carbon Steel Structural Tubing
   3. ASTM A653 - Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
   4. ASTM E330 - Test for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.

1.4 SYSTEM DESCRIPTION AND PERFORMANCE REQUIREMENTS

A. Horizontal Bi-fold opening insulated door assembly.
   1. Manual operation.
   2. Uniform wind force as indicated on Structural Drawings positive and negative with door in closed position with cane bolts locked into sill without causing damage as tested in accordance with ASTM E330, or provide calculations signed by licensed engineer.

1.5 SUBMITTALS

A. Manufacturer experience qualifications.

B. Installer experience qualifications.

C. Shop Drawings and Product Data: Indicate fabrication and installation details, locations in project, size of components, anchorage, required opening clearances, and installation instructions.

D. Engineer Calculations or test results demonstrating compliance with Performance Requirements.

E. Manufacturer's certification that proposed doors meet these SPECIFICATIONS.

F. Operation and maintenance instructions.

1.6 QUALIFICATIONS

A. Manufacturer: Company manufacturing the doors specified in this Section with a minimum 5 years documented experience.

B. Installer: approved by door manufacturer with a minimum of 5 similar door installations within last 5 years.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to meeting specified criteria:
1. Door Engineering and Manufacturing Co.: www.doorengineering.com
2. Electric Power Door Co.: www.electricpowerdoor.com
3. Door-Man Manufacturing: www.door-man.com
4. Or approved equal.

2.2 GENERAL

A. Vertical Bi-fold 4-panel door assemblies with flush face sheets and insulated cores complete with tracks and hardware recommended by manufacturer for commercial exterior use.

2.3 DOOR SECTIONS

A. Face sheets minimum 14 gage galvanealed sheet steel zinc coated per ASTM A653.

B. Door Insulation: 3 inch rigid polyurethane or expanded polystyrene minimum: thermal R18 minimum.

C. Framing: 1/8-inch minimum sheet or steel tube galvanized.

D. Windows: one 12 x 12 x 1/2 inch clear UV resistant acrylic plastic in each

panel. Screw attach from inside for ready replacement.

E. Factory Finish: prime and paint exposed surfaces with corrosion resistant epoxy enamel paint system in manufacturers standard white color.
   1. Paint: enamel powder coat any exposed trim and hardware that is not galvanized or stainless steel.

2.4 HARDWARE

A. Heavy duty hardware and tracks suitable for commercial heavy use: hot dip galvanized or stainless steel for corrosion resistance, including:
   1. Three Surface Mount strap type hinges with through bolts for each door panel: 3/4-inch minimum diameter pins and grease zerk fittings.
   2. Tracks, guides, trolleys, and brackets. Trolleys with bronze oil impregnated bearings.
   3. Floor to door bottom heavy duty manually operated cane bolts with cane bolt floor receivers.
   4. Heavy duty steel hasps with holes to receive padlock
      a. Padlock provided by OWNER.
   5. Bolt and screw attachments and anchors as necessary.
   6. Emergency Release manual disconnects,; latches and release cables.

2.5 ANCHORAGE AND ATTACHMENT

A. Necessary brackets and anchor bolts to adopt door assembly to structural surround indicated to resist wind force specified. Anchor tracks to jambs with minimum 3/8-inch bolts 12 inches on center and as required by wind Performance Requirements.

2.6 WEATHERSTRIPPING

A. Nylon brush type or reinforced EPDM or Neoprene bulb resilient and suitable for service at minus twenty degrees F.

B. Metal clamp mounting with field replaceable adjustable slotted screw attachment.

C. Head and building jambs 3/4 inch minimum neoprene bulb or 1-1/4 inch brush: Zero No. 97 or equivalent Sealeze, or Pemko.

D. Door Section to Door Section: bulb type fabric reinforced EPDM or neoprene vertical seals on edges of each hinged door panel.

E. Door Bottoms: two layers 1/8 inch minimum thick reinforced EPDM or Nylon Sweep with screw attached field adjustable metal clamp mounting: 3 inch minimum high sweep.

F. Door Center Meeting Jambs: 1-3/4 inch minimum reinforced EPDM or neoprene bulb.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine DRAWINGS and verify field conditions that opening to receive door is properly sized to meet manufacturer's tolerances with header level, jambs plumb, backing and supports adequately sized and placed.

B. Field measure openings. Make required adjustments in fabrication or accomplish necessary corrections to supports before installing doors.

C. Beginning of installation means acceptance of existing conditions as capable of producing satisfactory installation.

3.2 INSTALLATION

A. Install doors in accordance with manufacturer's directions and approved Shop Drawings.

B. Secure all components against displacement. Fasten tracks 12 inches maximum to structure along opening to meet wind performance requirements.

C. Install doors free of warp, twist, or distortion.

D. Adjust completed door assembly to swing freely; close smoothly and latch easily with latched door in uniform continuous contact with weatherstrips

E. Touch-up any bare metal abrasions to match adjacent finish.

3.3 TOLERANCES

A. No warp out of horizontal or vertical plane of door opening more than 1/8 inch in 10 feet.

3.4 ADJUST AND CLEAN

A. Adjust moving parts to operate smoothly and freely.

B. Door in closed position shall rest against weather-strips all around.

C. Clean surfaces and surrounding areas of soil and debris resulting from door installation.

END OF SECTION

SECTION 13 34 19
METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Provide anchor bolts to be installed into steel skid foundation.

1.2 RELATED SECTIONS

A. Section 07 41 40 – Insulated Metal Roof Panels
B. Section 07 92 00 - Joint Sealants
C. Section 08 11 13 – Steel Doors and Frames
D. Section 08 35 20 – Folding Exterior Doors
E. Section 41 22 23 – Monorail Hoists

1.3 BUY AMERICAN PREFRENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.4 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this Specification. The publications may be referred to in the text by basic designation only. In case of conflict, the most stringent shall apply.

1. ASCE 7: Minimum Design Loads for Buildings and Other Structures – Latest Edition
2. American Institute of Steel Construction (AISC) - Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings.
3. AISC Manual of Steel Construction.
4. American Iron and Steel Institute (AISI) - Specification for the Design of Cold-formed Steel Structural Members.
5. American Society of Civil Engineers (ASCE) – ASCE 7: Minimum Design Loads for Buildings and Other Structures (latest edition)

6. ASTM A36 - Specification for Carbon Structural Steel.

7. ASTM A123 - Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

8. ASTM A153 - Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.

9. ASTM A307 - Specification for Carbon Steel Bolts and Studs, 60 000 psi Tensile Strength.

10. ASTM A325 - Specification for High Strength Bolts for Structural Steel Joints.

11. ASTM A1085, Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS).

12. ASTM A653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.

13. ASTM A792 - Specification for Steel Sheet, 55 Aluminum-Zinc Alloy-Coated by the Hot Dip Process.

14. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus.

15. American Welding Society (AWS) A2.0 - Standard Welding Symbols.

16. AWS D1.1 - Structural Welding Code-Steel.

17. International Building Code (IBC) – latest edition adopted by the State of Alaska including any amendments

18. Metal Building Manufacturers Association (MBMA) - 2006 Metal Building Systems Manual including 2010 Supplement

19. Steel Structures Painting Council (SSPC) - Systems and Specifications.

20. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal.

1.5 SYSTEM DESCRIPTION

A. The pre-engineered building shall include the following minimum requirements for purposes of this Specification and Submittals:

1. Primary Framing: Clear span rigid frame of roof beams and columns, intermediate columns, braced end frames, end wall columns, and lateral bracing. Drawings indicate minimum interior space dimensions and main structural bay spacing. Provide necessary lateral bracing without obstructing openings indicated on DRAWINGS.

2. Secondary Framing: Purlins, girts, eave struts, entry canopies, roof overhangs, flange bracing, sill supports, clips, and other items necessary for weathertight exterior walls and roof from top of structural foundation. Accommodate penetrations including doors, windows, louvers and ducts with framing completely around.

3. Wall System: Provided under Section 07 41 40.

4. Roof System: Provided under Section 07 41 40.

1.6 PERFORMANCE REQUIREMENTS

A. General: CONTRACTOR shall be responsible for:

1. Preparation of all engineering and certification by Alaska registered Civil-Structural engineer.

2. Complying with space limitations.

3. Coordinating with interfacing components.

4. Obtaining required permit approvals based on International Building Code, Occupancy Category: Standard.

B. Design Snow Load: As indicated in the structural drawings. Eave and overhangs: two times Roof Snow Load. Structural engineer shall compute design roof snow load including drifting as per ASCE 7.

C. Basic Wind Pressure: Wind load per IBC, using a design wind speed and exposure as indicated in the structural drawings, and an importance factor of 1.0.

D. Seismic: Design per IBC, Occupancy Importance Factor 1.0. Seismic loadings shall be based on full dead loads, full equipment loads, fifty percent of storage area loads, and 20% snow loads.

E. Live Loads: Live loads shall be as required by the IBC except as indicated otherwise on the DRAWINGS.

F. Equipment Loads: Equipment loads shall be as listed on the DRAWINGS or in these SPECIFICATIONS. Steel supporting members shall be designed for the maximum operating loads including vibration. Crane loads shall be considered dynamic live loads.

G. Collateral loads shall be lighting, electrical, mechanical, partitions, and suspended ceilings and shall be 5 PSF unless otherwise indicated.

H. Load Combinations: In addition to those load combinations required by MBMA, load combinations and factors of safety shall be in accord with IBC.

I. Exterior wall and roof system shall withstand imposed loads with maximum allowable deflection of span: L/180.

J. Allow movement of components without buckling, failure of joint seals, undue stress on fasteners or other detrimental effects, when subject to cycling temperature range of 145 degrees F. with a low of minus 45.

K. Size and fabricate wall and roof systems free of distortion or effects detrimental to appearance or performance.

L. Field connections shall be bolted, unless otherwise approved in writing by the ENGINEER.

1.7 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC - Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

B. Materials and Equipment: Provisioning to comply with Buy American Steel and Manufactured Products (Federal Aid Contracts), reference Specification GCP-60-09.

1.8 SUBMITTALS

A. Submit under provisions of GCP 60-08 – Submittal Procedures. If manufacturers standard product data is submitted mark out non-applicable items.

B. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy American Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

C. Shop Drawings:

1. Indicate assembly dimensions, locations of structural members, connections, attachments, openings, cambers and loads.

2. Structural Steel Shop Drawings shall conform to AISC instructions and specifications and shall show holes, reinforced penetration surrounds, etc., required for other attached work. Include complete details showing members and their connections, anchor bolt layouts.

3. Indicate framing anchor bolt settings, including sizes, scale-drawing templates, locations and foundation vertical and horizontal loads.

4. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.

5. Manufacturer's Installation Drawings and Instructions: Indicate preparation requirements and assembly sequence.

D. Structural Calculations: Calculations shall be prepared and sealed by a Professional Civil Engineer registered in Alaska. Indicate the design of the building components. Include sketches and load combinations with the design calculations indicating all forces imposed on the foundation. Provide certification that building design meets this Specification.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 5 years documented experience.

B. Design structural components, siding and roofing under direct supervision of a professional civil engineer experienced in design of this work and licensed in the State of Alaska.

C. Erector: Company approved by manufacturer and minimum 5 years documented experience in steel erection.

1.10 REGULATORY REQUIREMENTS

A. Conform to International Building Code (IBC).

B. Cooperate with regulatory agency or authority and provide verifying data as requested.

1.11 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this Section.

1.12 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.13 WARRANTY

A. Provide written 3-year warranty.

PART 2 - PRODUCTS

2.1 GENERAL

A. Conform to Performance Requirements listed in Part 1.

2.2 MATERIALS - FRAMING

A. Hot Rolled Structural Steel: ASTM A992, Grade 50.

B. Cold Rolled Structural Steel: ASTM A653, Galvanized G90 coating.

C. Structural Tubing: ASTM A1085.

D. Anchor Bolts: ASTM F1554, Grade 36 or as otherwise specified by building manufacturer, galvanized per ASTM A153.

E. Building Structural connections: Bolts, Nuts, and Washers: ASTM A325.

F. Welding Materials: AWS D1.1; type required for materials being welded.

2.3 EXTERIOR WALL SYSTEM

A. Wall panels are specified in Section 07 41 40 – Insulated Metal Wall and Roof Panels.

2.4 ROOFING SYSTEM

A. Roofing is specified in Section 07 41 40 – Insulated Metal Wall and Roof Panels.

2.5 SHOP FINISH FOR STRUCTURAL STEEL

A. Primary building framing and bracing shall be hot-dip galvanized per ASTM A123 after fabrication.

B. Cold rolled steel girts and purlins: Galvanized G90 coating.

2.6 WELDING PROCEDURES

A. Shop and field welds shall be in accordance with the AISC and AWS and be performed by qualified welders.

B. Fit of welded joints at contact surfaces shall be such that joints do not trap water in their erected position after painting. Vent closed cavities by providing 1/2 inch holes located to drain in erected position.

2.7 STEEL DOORS AND FRAMES

A. Specified in Section 08 11 13 - Steel Doors and Frames.

B. Provide structural rough-in frame surround as part of pre-engineered building.

2.8 FOLDING EXTERIOR DOORS

A. Specified in Section 08 35 20 – Folding Exterior Doors

B. Provide structural attachment frame surround as part of pre-engineered building.

2.9 FABRICATION - FRAMING

A. Fabricate members in accordance with AISC Specifications for plate, bar, tube or rolled structural shapes.

B. Metal Surfaces General: For fabrication of work which will be exposed to view, use only materials which are smooth and free of surface blemishes such as pitting, seam marks, roller marks, and roughness.

C. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. No welding allowed in field.

D. Properly mark materials for field assembly.

E. Assemble and weld built-up sections by methods, which will produce true alignment without warp. Provide 3/16 inch minimum continuous welds typical.

F. Anchor Bolts: Provide with template.

G. Provide clear open surround framing and openings indicated for doors, windows, and mechanical ducts.

2.10 HOIST MONORAIL BEAM

A. Furnish and install an overhead hoist system monorail with end stops, as shown on the plans. The beam shall be capable of sustaining a 4000 lb. load, and shall be located at a height above the floor to allow for the hoist plus a lift of 10’ minimum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine DRAWINGS and verify that field conditions are acceptable and are ready to receive work.

B. Beginning of installation means erector accepts existing conditions as capable of producing acceptable work.

3.2 ERECTION - FRAMING

A. Erect framing in accordance with manufacturer's instructions, AISC Specification and approved submittals.

B. Provide for erection and wind loads. Provide temporary bracing to maintain structure plumb and in alignment until completion of erection and installation of permanent bracing.

C. Assembly.

1. Clean steel bearing interfaces before assembly.

2. Align and adjust various members accurately before fastening.

3. Tighten anchor bolts after supported members are aligned and cut off projecting wedges.

D. Do not field cut or alter structural members without approval of the ENGINEER.

E. After erection clean, grind, or wire brush and prime, abrasions, and surfaces not shop primed and touch up with same primer as specified for shop primer; or zinc rich primer coat on galvanized surfaces.

3.3 TOLERANCES

A. Framing Members: 1/4 inch from level; 1/8 inch from plumb.

B. Siding and Roofing: 1/8 inch from true position.

3.4 CLEANING AND TOUCH-UP

A. Leave pre-engineered building surfaces clean and free from damage.

B. Factory Painted Panel Surfaces:

1. Paint field cut edges, minor scratches with panel manufacturer approved paint immediately after cutting using smallest brush practical. Spray touch-up not permitted.

C. Galvanized Surfaces:

1. Touch-up scratches using SSPC Paint 20: inorganic zinc-rich paint.

END OF SECTION

SECTION 22 05 29
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Inserts.
4. Sleeves.
5. Formed steel channel.
6. Equipment bases and supports.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of concrete housekeeping pads specified by this section.
2. Section 07 92 00 - Joint Sealants: Product requirements for sealant materials for placement by this section.
3. Section 22 15 00 - General Service Compressed-Air Systems: Execution requirements for placement of hangers and supports specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B31.9 - Building Services Piping.

B. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

D. IAPMO:

1. UPC - Uniform Plumbing Code.

E. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

D. Product Data:

1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

E. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

1.5 QUALITY ASSURANCE

A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

B. Perform Work in accordance with AWS D1.1 for welding hanger and support attachments to building structure.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

1.8 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:

1. Grinnell, Michigan, Elcen, Super Strut, Tolco Inc.

2. Substitutions: Division 01 - Product Requirements.

B. Plumbing Piping:

1. Conform to ASME B31.9, ASTM F708, MSS SP58, MSS SP69, and MSS SP89.

2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

4. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hook, steel channel.

5. Vertical Support: Steel riser clamp.

2.2 ACCESSORIES AND CONCRETE ANCHORS

A. Hanger Rods: Mild steel with electroplated zinc coating, threaded both ends, threaded on one end, or continuous threaded.

2.3 INSERTS AND CONCRET ANCHORS

A. Manufacturers:

1. Cooper Industries, Eaton, Hilti USA, Unistrut.

2. Substitutions: Division 01 - Product Requirements.

B. Expansion Anchors: Carbon steel with electroplated zinc coating, Hilti Kwik Bolt TZ or equal.

C. Adhesive Set Anchors: Hilti HAS anchor rods with Hilti HIT-HY 200 for concrete or equal.

2.4 SLEEVES

A. Sleeves for Pipes Through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 22 gage thick galvanized steel.

B. Sealant: Acrylic; refer to Section 07 92 00.

2.5 FORMED STEEL CHANNEL

A. Manufacturers:

1. B-line; Unistrut.

2. Substitutions: Division 01 - Product Requirements.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

3.2 PREPARATION

A. Obtain permission from Structural Engineer before drilling, cutting, or welding to structural members.

3.3 INSTALLATION - GENERAL

A. Install piping and equipment in accordance with manufacturer's installation instructions.

B. Support piping to prevent sag, undue play and swing.

C. Provide earthquake bumpers, snubbers and anchors per Section 23 05 46.

D. Where support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

3.4 INSTALLATION - INSERTS AND CONCRETE ANCHORS

A. Drill hole with appropriate masonry bit, clear hole with compressed air, and install anchor.

3.5 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install in accordance with ASME 31.9, ASTM F708, MSS SP 58, MSS SP 69 or MSS SP 89.

B. Support horizontal piping as scheduled for plumbing piping in UPC Table 3-2.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor and as scheduled for plumbing piping in UPC Table 3-2.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Design hangers for pipe movement without disengagement of supported pipe.

J. Prime coat exposed steel hangers and supports.

K. Provide clearance in hangers and from structure and other equipment for installation of insulation. Refer to Section 22 07 00.

3.6 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Provide housekeeping pads of concrete, thickness as indicated on drawings and extending 6 inches beyond supported equipment. Refer to Division 03.

B. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

C. Construct supports of steel members, formed steel channel, or steel pipe and fittings. Brace and fasten with flanges bolted to structure.

3.7 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with mechanical sleeve seals.

B. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

C. Where piping penetrates floor, ceiling, or wall, close off space between pipe and adjacent work with insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

D. Install chrome plated steel escutcheons at finished surfaces.

3.8 FIELD QUALITY CONTROL

A. Division 01 - Quality Control: Requirements for inspecting, testing.

3.9 CLEANING

A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

3.10 PROTECTION OF FINISHED WORK

A. Division 01 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 22 05 53
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nameplates.
2. Tags.
3. Pipe markers.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Submit with Section 23 05 53.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.6 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 EXTRA MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two containers of spray-on adhesive.

PART 2 - PRODUCTS

2.1 REFER TO SECTION 23 05 53.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install Identification of Plumbing Piping and Equipment in accordance with Section 23 05 53.

END OF SECTION

SECTION 22 08 00
COMMISSIONING OF PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plumbing commissioning description.

2. Plumbing commissioning responsibilities.

B. Related Sections:

1. Section 01 91 00 - Commissioning.

2. Section 23 08 00 - Commissioning of HVAC: HVAC systems commissioning requirements.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Guideline 1 - The HVAC Commissioning Process.

B. Building Commissioning Association:

1. BCA - Commissioning Handbook.

C. National Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Building Systems Commissioning.

D. Testing Adjusting and Balancing Bureau:

1. TABB - Commissioning Manual.

1.4 COMMISSIONING DESCRIPTION

A. Plumbing commissioning process includes the following tasks:

1. Testing and startup of plumbing equipment and systems.

2. Equipment and system verification checks.

3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.

4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.

5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.

6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.

7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.

8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.

9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to be Commissioned:

1. New plumbing systems that were installed under this Contract.

C. The following is a partial list of equipment that may be included in this Plumbing Commissioning:

1. Compressed air system.

1.5 COMMISSIONING SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 01 91 00 - Commissioning: Requirements for commissioning submittals.

C. Draft Forms: Submit draft of system verification form and functional performance test checklist.

D. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified.

E. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.6 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.

C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with Section 01 91 00.

1.8 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Ensure controls installer performs assigned commissioning responsibilities as specified below.

3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.

4. Provide instructions and demonstrations for Owner's personnel.

5. Ensure subcontractors perform assigned commissioning responsibilities.

6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.

7. Develop startup and initial checkout plan using manufacturer’s startup procedures and functional performance checklists for equipment and systems to be commissioned. If manufacturer’s startup procedures are not available, provide in accordance with accepted industry practice.

8. During verification check and startup process, execute plumbing related portions of checklists for equipment and systems to be commissioned.

9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.

10. Provide representatives experienced with operation of equipment to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.

11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.

12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.

13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.

14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.

15. Perform verification checks and startup on equipment and systems as specified.

16. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.

17. Perform operation and maintenance training sessions scheduled by Commissioning Authority.

18. Conduct plumbing system orientation and inspection.

1.9 COMMISSIONING MEETINGS

A. Section 01 91 00 - Commissioning: Requirements for commissioning meetings.

B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.10 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Place plumbing systems and equipment into full operation and continue operation during each working day of commissioning.

END OF SECTION

SECTION 22 15 00

GENERAL SERVICE COMPRESSED-AIR SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Compressed air piping.
2. Unions and flanges.
3. Valves.
4. Strainers.
5. Flexible connectors.
6. Relief valves.
7. Compressed air outlets.
8. Air compressor.
9. Air receiver.
10. Pressure regulators.
11. Compressed air filters.
12. Hose connectors.

B. Related Sections:

1. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment: Product requirements for pipe hangers and supports for placement by this section.
2. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Product requirements for pipe and valve identification for placement by this section.
3. Section 23 05 48 - Vibration Isolation: Product requirements for vibration isolators for placement by this section.
4. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B31.1 - Power Piping.
3. ASME B31.3 – Process Piping.
4. ASME Section VIII - Boiler and Pressure Vessel Code - Pressure Vessels.

B. ASTM International:

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings.

C. IAPMO:

1. Uniform Plumbing Code: Latest Locally Adopted Edition.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.
2. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

E. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request

prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Requirements for submittals.

C. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories.

2. Valves: Submit manufacturers catalog information with valve data and ratings for each service.

3. System Components: Submit manufacturers catalog information including capacity, component sizes, rough-in requirements, and service sizes. When applicable, include electrical characteristics and connection requirements.

4. Compressors: Submit type, capacity, and performance characteristics. Include electrical characteristics and connection requirements.

D. Product Data: Submit manufacturers catalog literature with capacity, weight, and electrical characteristics and connection requirements.

E. Manufacturer's Installation Instructions: Submit hoisting and setting requirements, starting procedures.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of equipment piping, valves, outlets and components.

C. Operation and Maintenance Data: Submit assembly views, lubrication instructions, replacement part numbers and availability.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ASME B31.3 code for installation of piping systems.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum three years experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept equipment on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.

C. Protect piping and equipment from weather and construction traffic. Maintain factory packaging and caps in place until installation.

D. Deliver each length of piping with manufacturer's plugged or capped ends and keep sealed until installation.

E. Deliver fittings, valves, and other components in sealed containers and keep sealed until installation.

1.9 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Requirements for warranties.

B. Furnish two year manufacturer warranty for valves excluding packing.

C. Furnish five year manufacturers warranty for compressor pump.

1.10 MAINTENANCE MATERIALS

A. Division 01 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Furnish containers of compressor oil for two complete oil changes.

PART 2 - PRODUCTS

2.1 COMPRESSED AIR PIPING

A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.

1. Fittings: ASME B16.3, malleable iron.

2. Joints: Threaded for pipe 2 inch and smaller.

2.2 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.

2.3 VALVES

A. Manufacturers:

1. Apollo, Nibco, Milwaukee, Hammond, Watts, Stockham.

2. Substitutions: Division 01 – Product Requirements.

B. Ball Valves

1. 2 inches and Smaller: MSS SP 110, Class 150, bronze, two piece body, type 316 stainless steel ball, full port, Teflon seats, blow-out proof stem, threaded ends, lever handle.

2.4 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Flex-Hose Co., Flex-Weld, Hyspan, Twin City Hose, US Hose Corp.

2. Substitutions: Division 01 - Product Requirements.

B. 2 inches and Smaller: Corrugated stainless steel hose with single layer of stainless steel exterior braiding, maximum working pressure 190 psig, threaded connections.

2.5 RELIEF VALVES

A. Manufacturers:

1. Watts, Apollo, Zurn.

2. Substitutions: Division 01 - Product Requirements.

B. Bronze body, Teflon seat, stainless steel stem and springs, automatic, direct pressure actuated capacities ASME certified and labeled.

2.6 COMPRESSED AIR OUTLETS

A. Manufacturers:

1. Amflo, Chicago Pneumatic, Devilbiss, Ingersoll-Rand, Rapid Air.

2. Substitutions: Division 01 - Product Requirements.

B. Quick Connector: 3/8 inch brass, snap on connector with self-closing valve. Style: Verify type with Owner.

C. Standardize all outlets throughout project.

2.7 AIR COMPRESSOR

A. Manufacturers:

1. Ingersoll-Rand, Atlas Copco, Quincy.

2. Substitutions: Division 01 - Product Requirements.

B. Packaged units consisting of compressor, controls, and receiver etc. shall be listed as a complete unit by Underwriters Laboratories, Inc., or a testing

firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

C. Air Compressor: Simplex tank mounted compressor unit consisting of air-cooled compressor, air receiver, after cooler, and operating controls.

D. Reciprocating Compressors:

1. Unit: Two-stage Reciprocating compressor with positive displacement oil pump lubrication system, suction inlet screen, discharge service valves, on cast iron or welded steel base for motor and compressor with provision for V-belt adjustment, belt guard.

2. Automatic Capacity Reduction Equipment: Furnish unloaded compressor start.

3. Motor: Constant speed 1050 rpm with electronic overheating protection in each phase with full voltage starting.

4. Control Panel: Factory mounted and wired, NEMA 250 Type 1 enclosure, steel construction, with power and control wiring, factory wired for single point power connection.

a. Safety Controls: Manually reset low oil pressure cutout.

E. Accessories and Options: Air-cooled aftercooler, low oil level switch, electric auto drain, magnetic starter factory mounted and wired, and start-up kit and install kit.

2.8 AIR RECEIVER

A. Manufacturers:

1. Atlas Copco, Ingersoll Rand, Quincy.

2. Substitutions: Division 01 - Product Requirements.

B. Provide with compressor as packaged unit.

2.9 PRESSURE REGULATORS

A. Manufacturers:

1. Fisher, Parker Hannifin, RapidAir, Spirax Sarco.

2. Substitutions: Division 01 - Product Requirements.

B. Pressure Regulators: Aluminum alloy or plastic body, manual pressure setting adjustment, and rated for 250 psig inlet pressure.

2.10 COMPRESSED AIR FILTERS

A. Manufacturers:

1. Air/Tak, Curtis-Toledo, Kaeser Compressors, Parker Airtek, Zeks Compressed Air Solution.

2. Substitutions: Division 01 - Product Requirements.

B. As scheduled on drawings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.

3.2 INSTALLATION - INSERTS, HANGERS AND SUPPORTS

A. Install inserts, pipe hangers and supports in accordance with Section 22 05 29.

3.3 INSTALLATION - ABOVE GROUND PIPING - COMPRESSED AIR SYSTEMS

A. Install drip connections with valves at low points of piping system.

B. Install take-off to outlets from top of main, with shut off valve after take-off. Slope take-off piping to outlets.

C. Install compressed air couplings, female quick connectors, where outlets are indicated.

D. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.

E. Cut pipe and tubing accurately and install without springing or forcing.

F. Slope piping in direction of flow.

G. Install pipe identification in accordance with Section 22 05 53.

H. Except where indicated install manual shut off valves with stem vertical and accessible for operation and maintenance.

3.4 INSTALLATION - EQUIPMENT

A. Install equipment in accordance with manufacturer's instruction.

B. Install air compressor unit on vibration isolators. Level and bolt in place. Refer to Section 23 05 48.

C. Install air valve and drain connection on horizontal casing.

D. Install line size shut-off valve and check valve on compressor discharge.

E. Install replaceable cartridge type filter silencer for each compressor.

F. Install condensate drain piping as indicated on drawings.

3.5 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Compressed Air Piping Leak Test: Prior to initial operation, clean and test compressed air piping in accordance with ASME B31.3.

C. Verify for atmospheric pressure in piping systems, other than system under test.

D. Check each station outlet of every piping system to determine test gas is dispensed only from outlet of system under investigation. Measure pressure with gage attached to specific adapter. Do not use universal adapter.

E. Install service outlet valves, subject system to test pressure of 200 psi with nitrogen or dry compressed air. Check with soapy water. Provide 24-hour standing pressure test.

3.6 CLEANING

A. Division 01 - Execution Requirements: Requirements for cleaning.

B. Blow systems clear of free moisture and foreign matter.

END OF SECTION

SECTION 23 05 01
BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Divisions 22 and 23 Sections, in addition to Division 01 - General Requirements.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 WORK INCLUDED

A. The work of Divisions 22 and 23 consists of providing labor, products, and in performing all operations required for the complete operating installation of all mechanical systems as shown and specified, in strict accordance with this and all sections of these specifications, applicable drawings, terms, and conditions of the contract and all applicable codes and ordinances governing installation of the various mechanical systems. Correlate all work fully with the work of other crafts. Provide all systems complete and in proper operating order. This section of Division 23 is part of all other sections of Divisions 22 and 23.

B. The organization of the specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among sub-contractors or in establishing the extent of Work to be performed by any trade. The division of work shall be the sole responsibility of the General Contractor.

1.4 SPECIFICATION TERMINOLOGY

A. Streamlining: In many instances, the products, reference standards, and other itemized specifications have been listed without verbiage. In these cases, it is implied that the Contractor shall provide the products and perform in accordance with the references listed.

B. "Furnish" means to purchase a product as shown and specified, and deliver the product to an approved location at the site or elsewhere as noted or agreed, to be installed by others.

C. "Install" means to set in place and connect, ready for use and in complete, operating, finished condition, material that has been furnished.

D. "Provide" means furnish all material, labor, sub-contracts, and appurtenances required, and install to a complete, operating, finished condition.

E. "Rough-in and Connect Only" means provide appropriate system connections such as supplies with stops, continuous wastes with traps, shut-off valves as shown and required, and all piping connections, and testing for proper operation, and to connect equipment furnished. Equipment furnished is received, uncrated, assembled and set in place by others.

F. "Accessible" means arranged so that an average sized man may complete any servicing required, without disassembly or damage to the surrounding installation.

G. "Serviceable" means arranged so that the component or product in question may be properly serviced without disassembly, destruction or damage to the surrounding installation or piece being serviced.

H. "Product" is a generic term which includes materials, equipment, fixtures and any physical item used on the project.

I. "Shop Drawings" are to-scale, completely dimensioned working construction drawings prepared for or by the Contractor to demonstrate proper planning for the installation and arrangement of all work specified and indicated in the contract documents. Shop drawings for building systems shall be done on sheet sizes no smaller than that used for the contract drawings, and, after being approved, shall be marked-up and maintained on the job site in accordance with the requirements for record drawings.

J. “Contracting Agency" is the Owner’s Representative as defined in the General Conditions of the Contract.

1.5 DIAGRAMMATIC DRAWINGS

A. The contract drawings and specifications are complementary, each to the other; what is shown on one is as binding as if called for in both. The contract drawings are partly diagrammatic and do not show all offsets in piping or exact location of piping, ducts, etc. Also, the contract drawings do not necessarily show in detail all features of the installation; however, provide a complete and satisfactorily working installation. Refer to shop drawing requirements described elsewhere in this section. Provide all work shown on the contract drawings and called for in these contract specifications, unless otherwise stated or directed.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. General: Procedures and requirements for submittals are addressed in Division 01. In addition, comply with specific requirements of the individual sections and as noted herein.

C. Revise and resubmit submittal data as directed. Identify all changes made since the previous submittal on the submittal literature and summarize those changes in a cover letter. All costs associated with the review of more than one resubmittal, where additional review is required due to incomplete, inaccurate, or inadequate submittals, are the responsibility of the Contractor.

1.7 SUBMITTALS FOR REVIEW

A. Provide submittals for all products and systems described in Divisions 22 and 23 shown on the contract drawings to demonstrate compliance with the requirements of the project. Furnish equipment submittals in the manner described elsewhere in these specifications. In addition, include data for review, and organize data as noted below. NO WORK SHALL BEGIN OR PRODUCTS ORDERED UNTIL SUBMITTALS, SAMPLES AND SHOP DRAWINGS ARE APPROVED.

B. Substitutions: Refer to requirements stated in Division 01 and as described in other sections of Divisions 22 and 23.

1. Acceptable Manufacturers: Manufacturer's names, trade names, and model numbers of products, systems, or installations specified in the contract documents are the "Basis of Specification" (also designated as "Design Basis Product" on the contract drawings). Unless noted as "No Substitution", Contractor may submit for consideration a substitution of a manufacturer, product, system, or installation under provisions of Division 01. If such submittal is made, written certification is required from the Contractor that the substitution meets or exceeds characteristics of the "Basis of Specification" and that changes in work, including but not limited to changes in dimensions, access openings, clearances, tolerances, utility requirements, characteristics, and connections, will not adversely affect the cost, design, function, performance or

operation of other components or of the building. The Owner's Representative review and/or approval of such substitution will not relieve the Contractor of his responsibilities to perform the work and pay the costs of additional Architectural/Engineering design services and construction costs attributed to the use of the substitution.

C. Data Required for Review: Mark submittal literature and shop drawings clearly, bind 8-1/2 x 11 literature in three-hole, hard-backed, loose-leaf binders by individual sets, and include all equipment and material shown and specified in the contract documents. Submittals not organized and prepared as follows WILL BE RETURNED for organization, compliance and numbering prior to any detailed review. Indicate the following:

1. Table of Contents listed by specification section number, title, and items submitted under that section number. See example below.

MECHANICAL SUBMITTAL

TABLE OF CONTENTS

Section	Mfr/Description
22 05 03 Pipes and Tubes for Plumbing Piping and Equipment:	
2.1 Sanitary Sewer, Buried Joints	Tyler No-Hub C.I. MG Coupling
2.3 Sanitary Sewer, Aboveground Joints	Tyler No-Hub C.I. St. Stl. No-Hub
2.7 Floor Drains	J.R. Smith #2010-A

2. Individual tabs numbered by specification section and assembled in sequential order. Include tabs for all specification sections even if some sections will be submitted under separate cover in accordance with the provisions for partial submittals.

3. Specification reference and/or drawing reference noted on first page of literature for each item submitted.

4. Manufacturer's name and address, AND supplier's name, address and phone number noted on first page of literature for each item submitted.

5. Mark out all non-applicable items or "highlight" all applicable items.

6. Underline or highlight construction standards, materials and performance required to be met by specifications and drawings.

7. Catalog designation or model number.

8. Rough-in data and dimensions.

9. Performance curves and rated capacities.

10. Motor characteristics and wiring diagrams.

11. Operation characteristics.

12. Wiring diagrams for the specific system operation.

13. Fabrication drawings and shop drawings.

14. The terminology "As Specified" means that the item is the same manufacturer, model and size as listed in the specifications and/or as shown on the drawings. A manufacturer selected from the list of acceptable manufacturers is not considered "As Specified". The intent of acceptable manufacturers is to set a standard. This does not exclude others submitted under "Substitutions."

D. Submit fabrication drawings of all equipment bases and supports, and all pipe and duct hangers and supports.

E. Submit fabrication drawings of any product which is not the standard catalog product of an established manufacturer and is fabricated for or by the Contractor.

F. Partial Submittals: If other than a complete submittal is made, the Contractor may make partial submittals separated into COMPLETE specification section classifications. Submittals made with items omitted from a given specification section (or sections) are considered piece-meal, and, as such, are not acceptable. Piece-meal submittals WILL BE RETURNED without review.

G. Partial Resubmittals: As in partial submittals above; if other than a complete resubmittal is made, the Contractor may make partial submittals separated into COMPLETE specification section classifications. Piece-meal re-submittals WILL BE RETURNED without review. Resubmittals shall address all items associated with the original submittal that were noted as requiring further action.

H. Comments made on the shop drawings or review comments made during the submittal review do not relieve the Contractor from compliance with requirements of the drawings and specifications. Review is only for general conformance with the contract documents. Approval does not constitute acceptance of any material or equipment which does not fulfill the functional or performance characteristics specified. The Contractor is responsible for: correlating and confirming dimensions; choice of fabricating processes and techniques of construction; coordination of his

work with other trades; performing the work in a safe and satisfactory manner; and providing a complete and properly operating system.

1.8 SUBMITTALS AT PROJECT CLOSEOUT (CLOSEOUT SUBMITTALS)

A. General: Reference requirements stated in Division 01.

B. Record Drawings: In addition to other record drawing requirements, mark up a clean set of contract drawings and approved shop drawings daily as the work progresses, to show the dimensioned location and routing of all mechanical work. These marked-up sets shall be maintained on the job site and be readily available for inspection. Show the location of all access doors and valves and their appropriate tag identification.

C. Operating Instructions: Provide operation instructions prior to final inspection. Instruct an authorized representative of the Owner for 8 hours on the proper operation and maintenance of all mechanical systems and equipment installed under this contract. Make available a qualified technician for each component of the installation for this instruction. The qualifications of the selected technicians shall be submitted to the Contracting Agency for approval prior to scheduling operating instructions. Give these operating instructions after the operation and maintenance manuals have been furnished to the Owner. Submit written certification, signed by the Contractor and an authorized representative of the Owner, that this has been completed.

D. O&M Manuals (General): Provide Operation and Maintenance (O&M) Manuals for training of, and future reference by, Owner's personnel in operation and maintenance of systems and related equipment in the manner described elsewhere in these specifications. In addition, organize manual, and include data and narrative, as noted in "O&M Manuals (Specific)" below.

1. Submit one copy of the final assembled Operation and Maintenance Manual for review 14 days prior to the substantial completion date. Submit required copies prior to the final inspection date and prior to the operating instructions.

2. Install one copy of the corrected O & M Manual(s) in a permanently mounted sheet metal box on the wall.

E. O&M Manuals (Specific): Provide Operations and Maintenance Manuals with a separate chapter for each section of the mechanical specifications with subchapters for each class of equipment or system. Provide an overall table of contents, as well as a table of contents for each chapter, and each major item in each chapter, to indicate the page number of each.

1. Contents: In each chapter, describe the procedures necessary for personnel to operate and maintain the system and equipment covered in that chapter. Also include a copy of the final system

balancing report.

2. Operating Procedures: Write procedures for start-up, operation, emergency operation and shutdown.

   a. Start-up: Give complete step-by-step instructions for energizing equipment and making initial settings and adjustments whenever applicable.

   b. Shutdown Procedure: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.

3. Maintenance Instructions: Write procedures for periodic and preventive maintenance.

   a. Provide a schedule of preventive maintenance for each product. Recommend frequency of performance for each preventive maintenance task; i.e., cleaning, inspection, lubrication, etc.

   b. Provide instructions and schedules for all routine cleaning, lubrication and inspection with recommended lubricants for all equipment and systems. Schedule times of the year that inspection and maintenance should be performed.

   c. Provide instructions for minor repair or adjustments required for preventive maintenance routines, limited to repairs and adjustments which may be performed without special tools or test equipment, and which require no extensive special training or skills.

   d. Special Maintenance: Provide all information of a maintenance nature covering warranty items, etc., which have not been discussed elsewhere.

4. Manufacturers' Brochures: Include manufacturers' descriptive literature covering all appurtenances used in each system, together with illustrations, exploded views and parts lists.

5. Shop Drawings: Provide a copy of all corrected, approved shop and/or fabrication drawings covering equipment for the project either with the manufacturers' brochures or properly identified in a separate subsection.

6. Spare Parts Lists: Include a list of all equipment furnished for project, with a tabulation of descriptive data of all the spare parts proposed for each type of equipment or system. Properly identify each part by part number and manufacturer.

7. Other Items:

a. Valve Directory: Indicate valve number, size, location, function and normal position for each numbered valve. See example below:

Valve Directory

Valve Tag #	Location	Function	Size	Position
Heating System Valves				
H-1	1st Floor W/Wing	Isolate Room 101	½"	N.O. Hall
H-2	1st Floor E/Wing	Isolate Room 102	½"	N.O. Hall
Plumbing Valves				
P-1	Boiler Room	Isolate Boiler Room	2"	N.O.
P-2	Boiler Room	Isolate Pump 6	¾"	N.O.
P-3	Boiler Room	Isolate Pump 7	¾"	N.O.

b. Name Plate Directory: Provide list of fans, pumps, boilers, furnaces, compressors, air supply units, heating and cooling coils, concealed automatic dampers, and all other major equipment name plates, giving manufacturer's name plate data, name plate designation, location of equipment, area served, switch location, normal position of switch, and equipment label designations specified. Use format similar to the valve directory.

c. Label all pages to assure correct placement in the manual.

d. Mark out all non-applicable items, or "Highlight" all applicable items.

F. Certificate of Readiness for Final Inspection: At the time of request for final inspection, submit a Certificate of Readiness for Final Inspection to the Contracting Agency. A blank certificate immediately follows this specification Section. Each line-item listed on the Certificate shall be initialed and dated by the Contractor and the Owner's Representative.

1.9 PROJECT/SITE CONDITIONS

A. Generally, install Work in locations indicated on the contract drawings, unless prevented by Project conditions.

B. Prepare drawings (e.g., shop drawings) showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of the Owner before proceeding.

C. Verify field measurements prior to fabrication of products and installation of equipment and systems.

1.10 QUALITY ASSURANCE

A. Comply with the applicable local, state and national codes, ordinances and regulations in existence at bid date affecting materials and methods of installation of the mechanical systems of the Project location. Follow recommended practices as set down by ASME, SMACNA, ASHRAE, NFPA, International Building Code, International Mechanical Code, International Fire Code, Uniform Plumbing Code, National Electrical Code, and OSHA, as they apply to this project, except in cases where statutes govern.

1.11 REGULATORY REQUIREMENTS

A. Reference requirements stated in Division 01.

B. Conform to NFPA 70.

C. Products requiring electrical connection: Listed and classified by UL, or other testing firm acceptable to the authority having jurisdiction, as suitable for the purpose specified and indicated.

1.12 MANUFACTURER'S WARRANTIES

A. In the event of equipment or component failure, it is the Contractor's responsibility to repair or replace such defective equipment or components and bear all associated costs. The Contractor shall pursue manufacturer's written or implied warranties to the extent necessary to obtain replacement equipment or components prior to any other action being initiated. Provide proof of action taken upon request.

1.13 ELECTRICAL WORK

A. Related Work Specified Elsewhere.

1. Electrical Specifications: Division 26.

B. Unless otherwise indicated on the electrical drawings, provide all mechanical equipment motors, control relays, time clocks, thermostats, motor valves, float controls, damper motors, electric-pneumatic and pneumatic electric switches, electrical control components, control wiring, and any other miscellaneous Division 22 and 23 controls. Provide motor starters and disconnects for packaged equipment such as rooftop units, pre-assembled compressors and chillers.

C. Carefully coordinate all work with the electrical work shown and specified elsewhere in the contract documents.

D. When motor starters are furnished under Divisions 22 or 23, they must meet the requirements of Division 26.

1.14 TESTS AND INSPECTION

A. Schedule, obtain, and pay all fees and/or services required by local authorities and by these specifications, to test the mechanical systems as specified.

B. Request for Tests: Notify the Contracting Agency a minimum of 24 hours in advance of tests. In the event the Contracting Agency does not witness the test, certify in writing that all specified tests have been made.

C. Deficiencies: Immediately correct all deficiencies which are evidenced during the tests and repeat tests until system is approved. Do not cover or conceal piping, equipment, or other portions of the mechanical installations until satisfactory tests are made and approved.

D. Operating Tests: Upon request from the Contracting Agency, place the entire mechanical installation, and/or any portion thereof, in operation to demonstrate satisfactory operation.

E. Completion: Upon completion of the mechanical installation, demonstrate to the Contracting Agency's satisfaction that the systems have been installed in a satisfactory manner in accordance with the plans, specifications, and applicable codes. Demonstrate dynamic operation of all systems. Show that all controls are operable and are properly adjusted in accordance with the requirements of the final systems balance, that all systems are properly balanced, that all equipment operates properly, that filters and strainers are clean, and that all components of all systems are installed and adjusted for proper operation.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

NOT USED

END OF SECTION

(Except for “Certificate of Readiness for Final Inspection”)

CERTIFICATE OF READINESS FOR FINAL INSPECTION

MECHANICAL

1. I, (Print Name)_____, of (Firm)_____, certify that the mechanical work is complete in accordance with the Contract Plans and Specifications, and authorized change orders (copies attached), and will be ready for substantial completion as of (Date)_____. Accordingly, I further certify that the following specification requirements have been fulfilled:

2. As-built record drawings are up-to-date and ready to deliver to the Contracting Agency.

   (Print Name, Initial, and Date)

3. Instruction of operating personnel has been performed for all mechanical systems, including automatic control systems.

   (Print Name, Initial, and Date)

4. Operation and maintenance manual(s), including valve tag directory, equipment nameplate directory and final balance report have been completed, approved and turned over to the Owner.

   (Print Name, Initial, and Date)

5. One copy of approved operation and maintenance manual(s) has been mounted permanently on wall of main mechanical room.

   (Print Name, Initial, and Date)

6. Fuel oil system piping has been pressure tested. (Certificate of Final Inspection from the Administrative Authority enclosed.)

   (Print Name, Initial, and Date)

7. Air distribution systems have been balanced and are in proper operating order. (Balance Report included in operation and maintenance manual.)

   (Print Name, Initial, and Date)

8. Automatic controls systems adjusted, validated, and in proper operating order to perform sequences of operation specified.

   (Print Name, Initial, and Date)

9. Building accepted and control systems warranty period begins as of_____(Date)

(Signature, Owner's Representative) _____

All systems are fully and properly operational.

Signed and dated: _____

(General Contractor)

SECTION 23 05 13

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes single-phase motors for application on equipment provided under other sections.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

2. Section 26 05 53 - Identification for Electrical Systems.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.

C. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit catalog data for each motor furnished loose. Indicate nameplate data, standard compliance, electrical ratings and characteristics, and physical dimensions, weights, mechanical performance data, and support points.

D. Test Reports: Indicate procedures and results for specified factory and field testing and inspection.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Testing Agency: Company member of International Electrical Testing Association and specializing in testing products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

C. Protect products from weather and moisture by covering with plastic or canvas and by maintaining heating within enclosure.

D. For extended outdoor storage, remove motors from equipment and store separately.

PART 2 - PRODUCTS

2.1 PRODUCT REQUIREMENTS FOR MOTORS FURNISHED WITH EQUIPMENT

A. Motors Smaller Than 3/4 hp: Single-phase motor as specified below, except motors less than 250 watts or 1/4 hp may be equipment manufacturer’s standard.

B. Single Phase Motors:

1. Permanent split-capacitor type where available, otherwise use split-phase start/capacitor run or capacitor start/capacitor run motor.

2. Voltage: As indicated on drawings.

C. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated.

2.2 MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.

2.3 SOURCE QUALITY CONTROL

A. Test motors in accordance with NEMA MG 1, including winding resistance, no-load speed and current, locked rotor current, insulation high-potential test, and mechanical alignment tests.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install securely on firm foundation. Mount ball bearing motors in accordance with motor manufacturer's requirements.

B. Install engraved plastic nameplates in accordance with Section 26 05 53.

C. Ground and bond motors in accordance with Section 26 05 26.

3.2 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.15.

END OF SECTION

SECTION 23 05 29
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe hangers and supports.
2. Hanger rods.
3. Ductwork hangers and supports.
4. Flashing.
5. Sleeves.
6. Mechanical sleeve seals.
7. Formed steel channel.
8. Equipment bases and supports.

B. Related Sections:

1. Section 07 92 00 - Joint Sealants: Product requirements for sealant materials for placement by this section.
2. Section 23 05 46 - Seismic Restraint: Product and execution requirements for installation of anchors.
3. Section 23 05 48 - Vibration Isolation: Product and execution requirements for vibration isolators.
4. Section 23 11 13 - Facility Fuel-Oil Piping: Execution requirements for placement of hangers and supports specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B31.9 - Building Services Piping.

B. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

3. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

D. International Association of Plumbing and Mechanical Officials:

1. Uniform Plumbing Code (UPC) - Latest Locally Adopted Edition

E. International Code Council:

1. International Building Code (IBC) - Latest Locally Adopted Edition.

2. International Mechanical Code (IMC) - Latest Locally Adopted Edition.

F. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

2. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.

3. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.

G. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standards - Metal and Flexible

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Shop Drawings: Indicate system layout with location including critical dimensions, sizes, and pipe hanger and support locations and detail of trapeze hangers.

D. Product Data:

1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

E. Design Data: Indicate load carrying capacity of trapeze, multiple pipe, and riser support hangers. Indicate calculations used to determine load carrying capacity of trapeze, multiple pipe, and riser support hangers.

F. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

1.5 QUALITY ASSURANCE

A. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

B. Perform Work in accordance with applicable authority and AWS D1.1 for welding hanger and support attachments to building structure.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and damage, by storing in original packaging.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

A. Manufacturers:

1. Grinnell, Michigan, Elcen, Super Strut, Tolco Inc.

2. Substitutions: Division 01 - Product Requirements.

B. Conform to ASME B31.9, ASTM 708, MSS SP58, MSS SP69, and MSS SP89.

C. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron or Carbon steel, adjustable swivel, split ring.

D. Hangers for Pipe Sizes 2 inches and Larger Carbon steel, adjustable, clevis. Light Duty not acceptable.

E. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods

F. Wall Support for Pipe Sizes 3 inches and Smaller: Cast iron hooks, steel channel.

G. Vertical Support: Steel riser clamp.

H. For piping seismic restraint, refer to Section 23 05 46.

2.2 HANGER RODS

A. Hanger Rods: Mild steel with electroplated zinc coating, threaded both ends, threaded on one end, or continuous threaded.

2.3 DUCTWORK HANGERS AND SUPPORTS

A. Provide duct hangers and supports in accordance with SMACNA HVAC Duct Construction standard.

B. For seismic restraint, refer to Section 23 05 46.

2.4 FLASHING

A. Metal Flashing: 26 gage thick galvanized steel.

B. Metal Counterflashing: 22 gage thick galvanized steel.

C. Flexible Flashing: 47 mil thick sheet butyl.

D. Caps: Steel, 22 gage minimum; 16 gage at fire resistant elements.

2.5 SLEEVES

A. Sleeves for Pipes Through Non-fire/smoke Rated Floors, Walls, Beams: 22 gage thick galvanized steel.

B. Sleeves for Rectangular Ductwork: Galvanized steel.

C. Sealant: Acrylic; refer to Section 07 92 00.

2.6 MECHANICAL SLEEVE SEALS

A. Manufacturers:

1. GPT Industries, Pipeline Seal and Insulator Inc., Roxtec.

2. Substitutions: Division 01 - Product Requirements.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.7 FORMED STEEL CHANNEL

A. Manufacturers:

1. B-Line, Hilti, Super Strut, Unistrut.

2. Substitutions: Division 01 - Product Requirements.

B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

3.2 PREPARATION

A. Obtain permission from Structural Engineer before drilling, cutting, or welding to structural members.

3.3 INSTALLATION - INSERTS AND CONCRETE ANCHORS

A. Provide inserts for placement in concrete forms.

B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab. An optional method is the use of expansion anchors or adhesive set anchors for missed, or not planned for, concrete inserts, or where required for anchoring to existing concrete.

3.4 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install piping in accordance with ASME 31.9, ASTM F708, MSS SP 58, MSS SP 69, and MSS SP 89.

B. Support horizontal piping as scheduled for mechanical piping in IMC Section 305.

C. Install hangers with minimum 1/2 inch space between finished covering and adjacent work.

D. Place hangers within 12 inches of each horizontal elbow.

E. Use hangers with 1-1/2 inch minimum vertical adjustment.

F. Support vertical piping at every floor minimum, and as scheduled for mechanical piping in IMC Section 305.

G. Where piping is installed in parallel and at same elevation, provide multiple pipe or trapeze hangers.

H. Support riser piping independently of connected horizontal piping.

I. Design hangers for pipe movement without disengagement of supported pipe. Hangers to be removable without requiring removal of supported pipe.

J. Prime coat exposed steel hangers and supports.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

B. Provide rigid anchors for pipes after vibration isolation components are installed. Refer to Section 23 05 48.

3.6 INSTALLATION - FLASHING

A. Provide flexible flashing and metal Counterflashing where piping and ductwork penetrate weather or waterproofed walls, floors, and roofs.

3.7 INSTALLATION - SLEEVES

A. Provide pipe and duct sleeves at all exterior wall penetrations, and wall penetrations into exposed areas. Pipe and duct sleeves not required for penetrations through non-rated concealed partitions.

B. Exterior watertight entries: Seal with mechanical sleeve seals.

C. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

D. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

E. Where piping or ductwork penetrates ceilings or walls, close off space between pipe or duct and sleeve or adjacent work with stuffing insulation and caulk airtight. Provide close fitting metal collar both sides of penetration in unfinished areas.

F. Provide chrome plated steel escutcheons at penetrations in finished surfaces.

END OF SECTION

SECTION 23 05 46
SEISMIC RESTRAINT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes restraints for seismic loads on mechanical equipment, piping, and ductwork.

B. Related Sections:

1. Section 22 05 29 - Hangers and Supports for Plumbing Piping and Equipment.
2. Section 22 15 00 - General Service Compressed Air Systems.
3. Section 23 05 01 - Basic Mechanical Requirements.
4. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.
5. Section 23 11 13 - Facility Fuel Oil Piping.
6. Section 23 12 13 - Facility Fuel Oil Pumps.
7. Section 23 13 00 - Facility Fuel Storage Tanks.
8. Section 23 31 00 - HVAC Ducts and Casings.
9. Section 23 33 00 - Air Duct Accessories.
10. Section 23 34 00 - HVAC Fans.
11. Section 23 55 00 - Fuel Fired Heaters.
12. Division 26 - Equipment Connections.
13. Other sections referring to or affecting Work of this Section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. ASCE 7 – Minimum Design Loads for Buildings and Other Structures

B. International Building Code, Latest Locally Adopted Edition.

1.4 QUALITY ASSURANCE

A. Maintain International Building Code criteria for seismic restraints for mechanical systems and equipment.

1.5 SUBMITTALS FOR REVIEW

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittals: Procedures for submittals.

C. Indicate seismic restraints with static and dynamic loads, on shop drawings.

D. Seismic Restraint Calculations and Shop Drawings:

1. Contractor shall submit structural calculations and structurally engineered shop drawings for seismic restraint of all new mechanical components and equipment, including ductwork and piping. Calculations to be performed in accordance with the requirements of Chapter 16 of the 2012 International Building Code and drawings are to be stamped by a registered professional structural engineer licensed in the State of Alaska.

2. Seismic Restraint design to be based on Seismic Risk Category II Seismic Design Category D, and Importance Factor 1.0 for mechanical equipment. Refer to structural drawings and/or specifications for additional seismic criteria.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

A. Division 01 - Submittals: Procedure for submittals.

B. Submit manufacturer's certificate that earthquake restraints are properly installed and properly adjusted to meet or exceed specified requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. ISAT, Mason Industries, Vibration Mountings and Control, or approved equal.

B. Substitutions: Under provisions of Division 01.

2.2 EXPANSION ANCHORS

A. Stud or female wedge anchors, Hilti-Kwik Bolt TZ, Mason Type SAB, or equal.

PART 3 - EXECUTION

3.1 FABRICATION

A. Equipment manufacturer responsible to design equipment so that strength and anchorage of interior components exceeds force to restrain and anchor the equipment to support structure.

3.2 EXPANSION ANCHORS

A. Install expansion anchors with bridge bearing neoprene collars in bolt hole or fill gaps between anchor and bolt hole with air-cured epoxy.

3.3 EQUIPMENT REQUIREMENTS

A. Adequately anchor equipment not exempt per ASCE 7 to resist lateral earthquake forces. Tank weights shall include contents.

B. Use procedure specified in 2012 International Building Code under Chapter 16, for calculating forces acting on equipment anchors.

C. Provide sway bracing on suspended equipment. For suspended equipment with vibration isolators, use steel cable sway braces to avoid short circuiting of isolators.

3.4 PIPING REQUIREMENTS

A. Provide braces on piping to preclude damage during earthquake activity. Brace piping grouped for support on trapeze-type hangers at the same intervals as determined by the smallest diameter pipe of the group. Do not fasten braces to two dissimilar parts of a building that may respond in a different mode during an earthquake, i.e., a wall and a roof.

B. Do not use bracing rigidly attached to pipe flanges, or similar, where it would interfere with thermal expansion of piping.

C. Do not use branch lines for bracing.

D. Brace vertical runs of piping at not more than 10-foot vertical intervals. Locate vertical braces above the center of gravity of the span being braced.

3.5 DUCT REQUIREMENTS

A. Brace ductwork as required by IBC.

END OF SECTION

SECTION 23 05 48
VIBRATION ISOLATION

PART 1 - GENERAL

1.1 WORK INCLUDED

A. Vibration isolators

B. Flexible connections.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 RELATED WORK

A. Section 22 15 00 - General Service Compressed Air Systems.

B. Section 23 05 01 - Basic Mechanical Requirements.

C. Section 23 31 00 - HVAC Ducts and Casings.

D. Section 23 34 00 - HVAC Fans.

E. Section 23 55 00 - Fuel Fired Unit Heaters.

F. Division 26 - Equipment Connections.

G. Other sections referring to or affecting Work of this Section.

1.4 REFERENCES

A. ASHRAE - Guide to Average Noise Criteria Curves.

B. SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.5 QUALITY ASSURANCE

A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.

1.6 DELIVERY, STORAGE, AND PROTECTION

A. Division 01 – Material and Equipment: Transport, handle, store, and protect products.

B. Accept material on site in factory containers and packing. Inspect for damage.

C. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

1.7 SUBMITTALS FOR REVIEW

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittals Procedures for submittals.

C. Indicate vibration isolator locations, with static and dynamic load on each, on shop drawings and described on product data.

D. Flexible pipe connector shop drawing data to include maximum allowable temperature and pressure rating, overall face-to-face length, live length, hose wall thickness.

E. Manufacturer's Instructions: Indicate installation requirements for equipment.

1.8 SUBMITTALS AT PROJECT CLOSEOUT

A. Division 01 - Contract Closeout: Procedures for submittals.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS, VIBRATION ISOLATORS

A. Amber/Booth Co., Mason Industries Inc., Peabody Noise Control, Inc., N.W. Sausse and Co.

B. Substitutions: Under provisions of Division 01.

2.2 VIBRATION ISOLATORS

A. Type 1: Closed spring hanger with one inch thick acoustic isolator.

B. Type 3: Rubber waffle pads, 30 Durometer, minimum ½ inch thick maximum loading 40 PSI. Use neoprene in oily exterior locations.

2.3 ACCEPTABLE MANUFACTURERS, FLEXIBLE PIPE CONNECTIONS

A. Metraflex, Keflex, Hyspan, Mason Industries, Wheatley.

B. Substitutions: Under provisions of Division 01.

2.4 FLEXIBLE PIPE CONNECTIONS, METALLIC HOSE

A. Use hose suitable for minimum 125 psi WSP and 450 degrees F and 200 psi WPG and 250 degrees F. Threaded ends for pipes sizes under 3 inches.

B. For steel piping construct with stainless steel inner hose and braided stainless steel exterior sleeve.

C. Construct spool pieces to exact size for insertion of flexible connection.

D. Maximum Offset: 1/2 inch on each side of installed centerline.

2.5 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with HVAC Duct Construction Standards – Metal and flexible, and as indicated.

B. Flexible duct connection material shall be suitable to withstand the pressure encountered and shall be "Durolon", as manufactured by Durodyne Corporation, or approved.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install vibration isolators for motor driven equipment.

B. Suspended Motor Driven Equipment, Not Internally Isolated:

1. Includes unit heaters and in-line fans.

2. Support with hanger rods with Type 1 vibration isolators.

3. Install line-sized metallic hose type flexible pipe connections on piping connected to equipment. Install one end immediately adjacent to isolated equipment and anchor other end. Install at right angles to equipment displacement.

C. Large Motor Driven Equipment, Not Internally Isolated:

1. Includes air compressors.

2. Install with Type 3 vibration isolators between unit base and concrete floor.

3. Install line-sized metallic hose type flexible pipe connections on equipment pipe connections. Install as specified for suspended motor driven equipment.

D. Install flexible conduit on all wiring connections to externally isolated equipment. Install conduit in a slack, shallow "U" form. Minimum flexible conduit length 3 feet or 20 diameters, which ever is longer.

E. Provide flexible duct connections immediately adjacent to inlets and outlets for externally isolated or non-isolated fans.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nameplates.
2. Tags.
3. Pipe markers.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit manufacturers catalog literature for each product required.

D. Shop Drawings: Submit list of wording, symbols, letter size, and color coding for mechanical identification and valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

E. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of tagged valves; include valve tag numbers.

1.6 QUALITY ASSURANCE

A. Conform to ASME A13.1 for color scheme for identification of piping systems and accessories.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.9 EXTRA MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two containers of spray-on adhesive.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Nameplates

1. Manufacturers:

a. Craftmark Pipe Markers; Kolbi Pipe Marker Co.; Pipemarker.com; Seton Identification.

b. Substitutions: Division 01 - Product Requirements.

B. Product Description: Laminated three-layer plastic with engraved black letters on light contrasting background color.

2.2 TAGS

A. Metal Tags

1. Manufacturers:

   a. Brady ID; Craftmark Pipe Markers; Kolbi Pipe Marker Co.; Marking Services, Inc.; Pipemarker.com; R&R Identification Co.; Seton Identification.

   b. Substitutions: Division 01 - Product Requirements.

   c. Brass with stamped letters; tag size minimum 1-1/2 inches diameter with finished edges.

B. Information Tags

1. Manufacturers:

   a. Brady ID; Seton Identification.

   b. Substitutions: Division 01 - Product Requirements.

   c. Clear plastic with printed "Danger," "Caution," or "Warning" and message; size 3-1/4 x 5-5/8 inches with grommet and self-locking nylon ties.

C. Tag Chart: Typewritten letter size list of applied tags and location in anodized aluminum frame.

2.3 PIPE MARKERS

A. Color and Lettering: Conform to ASME A13.1.

B. Plastic Pipe Markers

1. Manufacturers:

   a. Brady ID; Craftmark Pipe Markers; Marking Services, Inc.; R&R Identification Co.; Seton Identification.

   b. Substitutions: Division 01 - Product Requirements.

2. Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering. Larger sizes may have maximum sheet size with spring fastener.

C. Plastic Tape Pipe Markers

1. Manufacturers:

   a. Brady ID; Craftmark Pipe Markers; Kolbi Pipe Marker Co.; Marking Services, Inc.; Pipemarker.com; Seton Identification.

   b. Substitutions: Division 01 - Product Requirements.

2. Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 LABELS

A. Labels:

1. Manufacturers:

a. Brady ID; Seton Identification.

b. Substitutions: Division 01 - Product Requirements.

B. Description: Polyester size 1.9 x 0.75 inches, adhesive backed with printed identification.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install identifying devices after completion of coverings and painting.

B. Install plastic nameplates with corrosive-resistant mechanical fasteners.

C. Install labels with sufficient adhesive for permanent adhesion and seal with clear lacquer.

D. Install tags using corrosion resistant chain. Number tags consecutively by location.

E. Identify mechanical equipment with plastic nameplates. Identify small devices with tags. Identify large storage tanks with stencil painting.

F. Identify control panels and major control components outside panels with plastic nameplates.

G. Identify valves in main and branch piping with tags.

H. Tag automatic controls, instruments, and relays. Key to control schematic.

I. Identify piping, concealed or exposed, with plastic pipe markers or plastic tape pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, and at each obstruction.

END OF SECTION

SECTION 23 05 93
TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Testing, adjusting, and balancing of air systems.

2. Measurement of final operating condition of HVAC systems.

B. Related Sections:

1. Section 23 09 33 - Electric and Electronic Control System for HVAC: Requirements for coordination between DDC system and testing, adjusting, and balancing work.

2. Section 23 09 93 - Sequence of Operations for HVAC Controls: Sequences of operation for HVAC equipment.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. Associated Air Balance Council:

1. AABC MN-1 - National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems.

B. Natural Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems.

C. Testing Adjusting and Balancing Bureau:

1. TABB - International Standards for Environmental Systems Balance.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Prior to commencing Work, submit proof of latest calibration date of each instrument.

D. Test Reports: Indicate data on NEBB Report forms.

E. Submit a complete, blank, project-specific balancing report with the initial mechanical submittals for approval. The blank report shall include all forms required to record all data listed in Part 3 of this specification for each device to be balanced. Include equipment tag numbers or room numbers on all forms. Include detailed procedures, and agenda.

F. Furnish reports in soft cover, letter size, 3-ring binder manuals, complete with table of contents page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of equipment.

C. Field Reports: Indicate deficiencies preventing proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.

D. Submit draft copies of report for review prior to final acceptance of Project.

E. Operation and Maintenance Data: Furnish final copy of testing, adjusting, and balancing report inclusion in operating and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with NEBB Procedural Standards for Testing, Balancing, and Adjusting of Environmental Systems.

B. Prior to commencing Work, calibrate each instrument to be used.

1.7 QUALIFICATIONS

A. Agency: Company specializing in testing, adjusting, and balancing of systems specified in this section with minimum three years experience Certified by NEBB.

B. Perform Work under supervision of AABC Certified Test and Balance Engineer, NEBB Certified Testing, Balancing and Adjusting Supervisor, or registered professional engineer experienced in performance of this Work and licensed in State of Alaska.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify systems are complete and operable before commencing work. Verify the following:

1. Systems are started and operating in safe and normal condition.
2. HVAC control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Duct systems are clean of debris.
5. Fans are rotating correctly.
6. Access doors are closed and duct end caps are in place.
7. Air outlets are installed and connected.
8. Duct system leakage is minimized.

3.2 PREPARATION

A. Furnish instruments required for testing, adjusting, and balancing operations.

B. Make instruments available to Architect/Engineer to facilitate spot checks during testing.

3.3 INSTALLATION TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 10 percent of design.

3.4 ADJUSTING

A. Division 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Verify recorded data represents actual measured or observed conditions.

C. Permanently mark settings of dampers and other adjustment devices allowing settings to be restored. Set and lock memory stops.

D. After adjustment, take measurements to verify balance has not been disrupted. If disrupted, verify correcting adjustments have been made.

E. Report defects and deficiencies noted during performance of services, preventing system balance.

F. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

G. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by Owner.

3.5 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to obtain required or design supply, return, and exhaust air quantities.

B. Make air flow rate measurements in main ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Vary total system air quantities by adjustment of fan speeds. Provide sheave drive changes to vary fan speed. Vary branch air quantities by damper regulation.

E. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

F. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.

G. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

3.6 SCHEDULES

A. Partial list of Equipment Requiring Testing, Adjusting, and Balancing:

1. Fans.

B. Report Forms

1. Title Page:
    a. Name of Testing, Adjusting, and Balancing Agency
    b. Address of Testing, Adjusting, and Balancing Agency
    c. Telephone and facsimile numbers of Testing, Adjusting, and Balancing Agency
    d. Project name
    e. Project location
    f. Project Architect
    g. Project Engineer
    h. Project Contractor
    i. Project altitude
    j. Report date
2. Summary Comments:
    a. Design versus final performance
    b. Notable characteristics of system
    c. Description of systems operation sequence
    d. Summary of outdoor and exhaust flows to indicate building pressurization
    e. Nomenclature used throughout report
    f. Test conditions
3. Instrument List:
    a. Instrument
    b. Manufacturer
    c. Model number
    d. Serial number
    e. Range
    f. Calibration date
4. Electric Motors:
    a. Manufacturer

b. Model/Frame

c. HP/BHP and kW

d. Phase, voltage, amperage; nameplate, actual, no load

e. RPM

f. Service factor

g. Starter size, rating, heater elements

h. Sheave Make/Size/Bore

5. Combustion Test:

a. Manufacturer

b. Model number

c. Serial number

d. Firing rate

e. Overfire draft

f. Heat input

g. Burner manifold gas pressure

h. Percent carbon monoxide (CO)

i. Percent carbon dioxide (CO2)

j. Percent oxygen (O2)

k. Percent excess air

l. Flue gas temperature at outlet

m. Ambient temperature

n. Net stack temperature

o. Percent stack loss

p. Percent combustion efficiency

q. Heat output

6. Air Moving Equipment:

a. Location

b. Manufacturer

c. Model number

d. Serial number

e. Arrangement/Class/Discharge

f. Air flow, specified and actual

g. Return air flow, specified and actual

h. Outside air flow, specified and actual

i. Total static pressure (total external), specified and actual

j. Inlet pressure

k. Discharge pressure

l. Sheave Make/Size/Bore

m. Number of Belts/Make/Size

n. Fan RPM

7. Exhaust Fan Data:

a. Location

b. Manufacturer

c. Model number

d. Serial number

e. Air flow, specified and actual

f. Total static pressure (total external), specified and actual

g. Inlet pressure

h. Discharge pressure

i. Sheave Make/Size/Bore

j. Number of Belts/Make/Size

k. Fan RPM

END OF SECTION

SECTION 23 07 00
HVAC INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. HVAC ductwork insulation, jackets, and accessories.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. ASTM International:

1. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
2. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
3. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts.
4. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
5. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
6. ASTM E162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source.
7. ASTM E2231 – Standard Practice for Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics.

B. Sheet Metal and Air Conditioning Contractors’:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit product description, thermal characteristics and list of materials and thickness for each service, and location.

D. Manufacturer's Installation Instructions: Submit manufacturers published literature indicating proper installation procedures.

1.5 QUALITY ASSURANCE

A. Duct insulation, Coverings, and Linings: Maximum 25/50 flame spread/smoke developed index, when tested in accordance with ASTM E84, using specimen procedures and mounting procedures of ASTM E 2231.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer’s identification, including product density and thickness.

C. Protect insulation from weather and construction traffic, dirt, water, chemical, and damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements: Environmental conditions affecting products on site.

B. Install insulation only when ambient temperature and humidity conditions are within range recommended by manufacturer.

C. Maintain temperature before, during, and after installation for minimum period of 24 hours.

1.9 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Glass Fiber and Mineral Fiber Insulation

1. Manufacturers:

a. CertainTeed Corporation; Johns Manville; Knauf Insulation; Manson Insulation Inc.; Owens Corning.

b. Substitutions: Division 01 - Product Requirements.

2.2 DUCTWORK INSULATION

A. TYPE D-2: ASTM C612, Type IA or IB, rigid glass fiber, with factory applied metalized polypropylene scrim kraft facing meeting ASTM C1136, Type II.

1. Thermal Conductivity: 0.24 at 75 degrees F.

2. Density: 2.25 pound per cubic foot.

2.3 DUCTWORK INSULATION JACKETS

A. Vapor Retarder Jacket:

1. Kraft paper with glass fiber yarn and bonded to aluminized film.

2. Water Vapor Permeance: ASTM E96/E96M; 0.02 perms.

3. Secure with pressure sensitive tape.

B. Canvas Duct Jacket: UL listed, 6 oz/sq yd, plain weave cotton fabric with fire retardant lagging adhesive compatible with insulation.

2.4 DUCTWORK INSULATION ACCESSORIES

A. Vapor Retarder Tape:

1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

B. Vapor Retarder Lap Adhesive: Compatible with insulation.

C. Adhesive: Waterproof, ASTM E162 fire-retardant type.

D. Lagging Adhesive: Fire retardant type with maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

E. Impale Anchors: Galvanized steel, 12 gage self-adhesive pad.

F. Adhesives: Compatible with insulation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify ductwork has been tested before applying insulation materials.

C. Verify surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION - DUCTWORK SYSTEMS

A. Duct dimensions indicated on Drawings are finished inside dimensions.

B. Insulated ductwork conveying air below ambient temperature:

1. Provide insulation with vapor retarder jackets.
2. Finish with tape and vapor retarder jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

C. Ductwork Exposed in Mechanical Equipment Rooms or Finished Spaces below 10 feet above finished floor: Finish with canvas jacket sized for finish painting.

3.3 SCHEDULES

A. Ductwork Insulation Schedule:

DUCTWORK SYSTEM	INSULATION TYPE	INSULATION THICKNESS inches
Outside Air Intake	D-2	2.0
Exhaust Ducts Within 10 feet of Exterior Openings	D-2	1.0
Exhaust Ducts Exposed to Outdoor Air	D-2	1.0

END OF SECTION

SECTION 23 08 00
COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. HVAC commissioning description.
2. HVAC commissioning responsibilities.

B. Related Sections:

1. Section 01 91 00 - Commissioning.
2. Section 22 08 00 - Commissioning of Plumbing: Plumbing systems commissioning requirements.
3. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC: For requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.
4. Section 23 09 33 - Electric and Electronic Control System for HVAC: Submittal, training, and programming requirements.
5. Section 23 33 00 - Air Duct Accessories: Product requirements for ductwork test holes.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE Guideline 1 - The HVAC Commissioning Process.

B. Building Commissioning Association:

1. BCA - Commissioning Handbook.

C. National Environmental Balancing Bureau:

1. NEBB - Procedural Standards for Building Systems Commissioning.

D. Testing Adjusting and Balancing Bureau:

1. TABB - Commissioning Manual.

1.4 COMMISSIONING DESCRIPTION

A. HVAC commissioning process includes the following tasks:

1. Testing and startup of HVAC equipment and systems.

2. Equipment and system verification checks.

3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.

4. Provide qualified personnel to assist in commissioning tests, including seasonal testing.

5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.

6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.

7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.

8. Provide assistance to Commissioning Authority to develop, edit, and document system operation descriptions.

9. Provide training for systems specified in this Section with coordination by Commissioning Authority.

B. Equipment and Systems to Be Commissioned:

1. New HVAC systems that were installed under this Contract.

C. The following is a partial list of equipment that may be included in this HVAC Commissioning:

1. Fuel oil systems.

2. Fuel fired heaters.

3. Piping systems.

4. Ductwork.

5. Fans.

6. Automatic HVAC control system.

7. Testing, Adjusting and Balancing work.

D. Special considerations, specific functional test requirements:

1. In addition to functional test of the equipment listed above, and tests in accordance with industry standards, include the following:

2. Test of fuel oil return piping flow with fuel oil supply pump running after day tank full level is reached (overflow test). **TAKE PRECAUTIONS TO AVOID A SPILL OF FUEL OIL.**

1.5 COMMISSIONING SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 01 91 00 - Commissioning: Requirements for commissioning submittals.

C. Draft Forms: Submit draft of system verification form and functional performance test checklist.

D. Test Reports: Indicate data on system verification form for each piece of equipment and system as specified.

E. Field Reports: Indicate deficiencies preventing completion of equipment or system verification checks equipment or system to achieve specified performance.

1.6 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record revisions to equipment and system documentation necessitated by commissioning.

C. Operation and Maintenance Data: Submit revisions to operation and maintenance manuals when necessary revisions are discovered during commissioning.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with Section 01 91 00.

1.8 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:

1. Attend commissioning meetings.
2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
4. Provide instructions and demonstrations for Owner's personnel.
5. Ensure subcontractors perform assigned commissioning responsibilities.
6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
7. Develop startup and initial checkout plan using manufacturer’s startup procedures and functional performance checklists for equipment and systems to be commissioned. If manufacturer’s startup procedures are not available, provide in accordance with accepted industry practice.
8. During verification check and startup process, execute HVAC related portions of checklists for equipment and systems to be commissioned.
9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
10. Provide representatives experienced with operation of equipment to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and are in attendance for duration to complete tests, adjustments and problem-solving.
11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during tests.

14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan. When deficient or incomplete work is discovered, ensure corrective action is taken and re-check until equipment or system is ready for startup.

15. Perform verification checks and startup on equipment and systems as specified.

16. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.

17. Perform operation and maintenance training sessions scheduled by Commissioning Authority.

18. Conduct HVAC system orientation and inspection.

B. Temperature Controls Installer Commissioning Responsibilities:

1. Attend commissioning meetings.

2. Review design for ability of systems to be controlled including the following:

a. Confirm proper hardware requirements exists to perform functional performance testing.

b. Confirm proper safeties and interlocks are included in design.

c. Confirm proper sizing of system control valves and actuators and control valve operation will result capacity control identified in Contract Documents.

d. Confirm proper sizing of system control dampers and actuators and damper operation will result in proper damper positioning.

e. Confirm sensors selected are within device ranges.

f. Review sequences of operation and obtain clarification from Architect/Engineer.

g. Provide written sequences of operation for packaged controlled equipment. Equipment manufacturers' stock sequences may be included, when accompanied by additional narrative to reflect Project conditions.

3. Inspect, check, and confirm proper operation and performance of control hardware and software provided in other HVAC sections.

4. Submit proposed procedures for performing automatic temperature control system point-to-point checks to Commissioning Authority and Architect/Engineer.

5. Inspect check and confirm correct installation and operation of automatic temperature control system input and output device operation through point-to-point checks.

6. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements of Section 23 05 01.

7. Demonstrate system performance and operation to Commissioning Authority during functional performance tests including each mode of operation.

8. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.

9. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.

10. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.9 COMMISSIONING MEETINGS

A. Section 01 91 00 - Commissioning: Requirements for commissioning meetings.

B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.10 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install additional balancing dampers, balancing valves, access doors, test ports, and pressure and temperature taps required to meet performance requirements.

B. Place HVAC systems and equipment into full operation and continue operation during each working day of commissioning.

C. Install replacement sheaves and belts to obtain system performance, as requested by Commissioning Authority.

D. Install test holes in ductwork and plenums as requested by Commissioning Authority for taking air measurements. Refer to Section 23 33 00.

E. Prior to start of functional performance test, install replacement filters in equipment.

END OF SECTION

SECTION 23 09 33

ELECTRIC AND ELECTRONIC CONTROL SYSTEM FOR HVAC

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Thermostats.

B. Automatic dampers.

C. Damper operators.

D. Miscellaneous accessories.

E. Control panel.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

A. Section 23 33 00 - Air Duct Accessories: Installation of automatic dampers.

1.4 RELATED SECTIONS

A. Section 26 05 03 - Equipment Wiring Connections.

B. Other sections referring to or affecting Work of this Section.

1.5 REFERENCES

A. AMCA 500 - Test Methods for Louvers, Dampers and Shutters.

B. ANSI/NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

C. ANSI/NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

D. NEMA DC 3 - Low-Voltage Room Thermostats.

1.6 SYSTEM DESCRIPTION

A. Provide control systems consisting of thermostats, control valves, dampers and operators, indicating devices, interface equipment and other apparatus and accessories required to operate mechanical systems, and to perform functions specified.

B. Provide automatic temperature control systems with electric accessories.

1.7 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Submit under provisions of Division 01.

C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.

D. Product Data: Include description and engineering data for each control system component. Include sizing as requested.

E. Submit manufacturer's installation instructions.

F. Submit field reports indicating operating conditions after detailed check out of systems at Date of Substantial Completion.

1.8 PROJECT RECORD DOCUMENTS

A. Accurately record actual location of control components, including panels, thermostats, and sensors.

B. Revise shop drawings to reflect actual installation and operating sequences.

1.9 OPERATION AND MAINTENANCE DATA

A. Include systems descriptions, set points, and controls settings and adjustments.

B. Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

1.10 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.

B. Installer: Company specializing in installing the work of this Section with minimum three years experience.

PART 2 - PRODUCTS

2.1 THERMOSTATS

A. Electric Room Thermostats: Heating only, low-voltage type. Refer to schedule on mechanical drawings and Section 23 55 00.

B. Room Thermostat Accessories:

1. Insulating Bases: For thermostats located on exterior walls.

2. Thermostat Guards: Metal.

2.2 DAMPERS

A. Performance: Test in accordance with AMCA 500.

B. Frames: Galvanized steel, welded or riveted with corner reinforcement.

C. Blades: Thermally insulated galvanized steel, maximum blade size 6 inches wide, 48 inches long, attached to minimum 1/2 inch shafts with set screws.

D. Blade Seals: Neoprene, mechanically attached, field replaceable.

E. Jamb Seals: Stainless steel.

F. Shaft Bearings: Synthetic or lubricant free, stainless steel, single row, unground, flanged, radial, anti-friction type with extended inner race.

G. Linkage Bearings: Oil impregnated sintered bronze.

H. Leakage: AMCA Class 1A at 1.0 inch water gauge.

I. Maximum Pressure Differential: 10 inches wg.

J. Temperature Limits: -40 to 200 degrees F.

K. Ruskin TED 50 or equal.

2.3 DAMPER OPERATORS

A. General: Provide control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.

B. Electric Operators: Electrical overload protection and equipped with manual override.

C. Number: Sufficient to achieve unrestricted movement throughout damper range.

D. Warranty: 5 years.

E. Belimo AFBUP or equal.

2.4 CARBON MONOXIDE DETECTOR

A. Carbon Monoxide Detectors: Single or multi-channel, dual-level detectors, using solid-state sensors with 10 year minimum life, maximum 15 minute sensor replacement, suitable over a temperature range of -4 to 130 degrees F, calibrated for 50 and 100 ppm (50 and 100 mg/kg), with maximum 120 second response time to 100 ppm (100 mg/kg) carbon monoxide.

2.5 CONTROL PANELS

A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, pushbuttons and switches flush on cabinet panel face.

B. ANSI/NEMA 250, general purpose utility enclosures with enameled finished face panel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that systems are ready to receive work.

B. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check and verify location of thermostats and other exposed control sensors with plans and room details before installation. Locate room thermostats 48 inches above floor. Align with lighting switches. Refer to Section 26 27 26.

C. Provide guards on thermostats.

D. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved lamicoid nameplates on cabinet face.

E. Install "hand/off/auto" selector switches to over-ride automatic interlock controls when switch is in "hand" position.

F. Provide conduit and electrical wiring where required. Refer to Section 26 05 03.

G. After completion of installation, test and adjust control equipment. Submit data showing set points and final adjustments of controls.

3.3 DEMONSTRATION

A. Provide systems demonstration under provisions of Division 01.

B. Demonstrate complete operation of systems, including sequence of operation.

END OF SECTION

SECTION 23 11 13
FACILITY FUEL-OIL PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fuel oil piping - above ground.
2. Unions and flanges.
3. Valves.
4. Flexible connectors.

B. Related Sections:

1. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for pipe hangers and supports for placement by this section.
2. Section 23 05 53 - Identification for HVAC Piping and Equipment: Product requirements for valve and pipe identification for placement by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Society of Mechanical Engineers:

1. ASME B16.3 - Malleable Iron Threaded Fittings.
2. ASME B31.9 - Building Services Piping.
3. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.
4. ASME Section IX - Boiler and Pressure Vessel Code - Welding and Brazing Qualifications.

B. ASTM International:

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

D. Manufacturers Standardization Society of the Valve and Fittings Industry:

1. MSS SP 80 - Bronze Gate, Globe, Angle and Check Valves.

2. MSS SP 110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

E. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. National Fire Protection Association:

1. NFPA 30 - Flammable and Combustible Liquids Code.

2. NFPA 31 - Standard for the Installation of Oil-Burning Equipment.

G. Underwriters Laboratories Inc.:

1. UL 842 - Valves for Flammable Fluids.

2. UL 2039 - Flexible Connector Piping for Fuels

1.4 SYSTEM DESCRIPTION

A. Provide piping of material as specified in PART 2.

B. Where more than one piping system material is specified, provide compatible system components and joints. Use non-conducting dielectric connections when joining dissimilar metals in systems.

C. Provide flanges, unions, or couplings at locations requiring servicing. Use unions, flanges, or couplings downstream of valves and at equipment connections. Do not use direct welded connections to valves, equipment.

D. Provide pipe hangers and supports in accordance with Section 23 05 29.

E. Use ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

F. Use spring loaded check valves on discharge of pumps.

G. Flexible Connectors: Use where indicated on drawings.

1.5 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data:

1. Piping: Submit data on pipe materials, fittings, and accessories. Submit manufacturers catalog information.

2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.

3. Fuel Piping Specialties: Submit manufacturer's catalog information including capacity, rough-in requirements, and service sizes.

D. Manufacturer's Installation Instructions: Submit piping system, piping accessories and leak detection and location system data.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.6 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of valves, piping system, and system components.

C. Project Record Documents: Record actual locations of piping mains and valves.

D. Test Reports: Submit written test results for piping system pressure test.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 30 and NFPA 31.

B. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

C. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.11 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

B. Coordinate trenching, excavating, bedding and backfilling of buried piping systems with requirements of Section 31 20 00.

1.12 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

1.13 EXTRA MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two packing kits for each type and size valve.

PART 2 - PRODUCTS

2.1 FUEL OIL PIPING - ABOVE GROUND

A. Steel Pipe: ASTM A53/A53M or ASME B36.10M Schedule 40 black.

1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M wrought carbon steel and alloy steel welding type.

2. Joints: NFPA 31 threaded or welded.

2.2 UNIONS AND FLANGES

A. Unions for Pipe 2 inches and Smaller:

1. Ferrous Piping: Class 150, malleable iron, threaded.

2.3 BALL VALVES

A. Manufacturers:

1. Apollo Flow Controls; Crane; DynaQuip Controls; Flow-Tek, Inc.; FNW; Hammond Valve; Jamesbury; Jenkins Valves; Jomar Valve; KITZ Corporation; Legend Valve & Fitting, Inc.; Marwin Valve; Milwaukee Valve Company; NIBCO INC.; Red White Valve Corp. Stockham; Zurn Industries, LLC.

2. Substitutions: Division 01 - Product Requirements.

B. 1/4 inch to 1 inch: MSS SP 110, Class 125, two piece, threaded ends, bronze body, chrome plated bronze ball, reinforced teflon seats, blow-out proof stem, lever handle, UL 842 listed for flammable liquid, full port.

2.4 CHECK VALVES

A. Spring Loaded Check Valves:

1. Manufacturers:

a. Crispin Valve; Hammond Valve; Krombach; NIBCO INC.

b. Substitutions: Division 01 - Product Requirements.

2. 2 inches and Smaller: MSS SP 80, Class 250, bronze body, in-line spring lift check, silent closing, Buna-N disc, integral seat, threaded ends.

2.5 ANTI-SIPHON VALVES

A. Manufacturers:

1. OPW

2. Substitutions: Division 01 – Product Requirements.

B. Aluminum body compatible with diesel. Stainless steel spring, nitrile poppet seat, UL Listed. OPW Model 199ASV or equal.

2.6 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Flex-Hose Co., Inc.; Flex-Weld, Inc.; Hyspan Precision Products, Inc.; Twin City Hose, Inc.; US Hose Corporation.

2. Substitutions: Division 01 - Product Requirements.

B. 2 inches and Smaller: Corrugated bronze inner hose with single layer of Type 304 stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure 200 psig.

C. List and label flexible connectors and hoses in accordance with UL 2039.

2.7 FILTERS

A. Tigerloop Combi, combination oil de-aerator and filter, Model Combi 3, or approved equal.

B. Provide filter at each fuel burning apparatus.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

3.2 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt, on inside and outside, before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION - PIPE HANGERS AND SUPPORTS

A. Install pipe hangers and supports in accordance with Section 23 05 29.

3.4 INSTALLATION - ABOVEGROUND PIPING

A. Install fuel oil piping in accordance with NFPA 31.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient.

D. Install piping to conserve building space and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Sleeve pipe passing through partitions, walls and floors. Refer to Section 23 05 29.

H. Provide access where valves and fittings are not exposed.

I. Prepare pipe, fittings, supports, and accessories not pre-finished, ready for finish painting.

J. Install identification on piping systems. Refer to Section 23 05 53.

K. Install valves with stems upright or horizontal, not inverted.

L. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the Work, and isolating parts of completed system.

3.5 PAINTING

A. Paint exterior black iron pipe and fittings with one coat of red iron oxide primer and one coat of enamel based exterior paint.

3.6 CONNECTION TO EQUIPMENT

A. Provide the final operating connection to fuel oil burning equipment on the project. Provide piping specialties shown, in addition to those specified.

B. Provide an oiltight 18 gauge sheet metal drip pan with six inch high sides under all fuel oil pumps, day tanks, filter assemblies, and all fuel oil products subject to leakage. Not required at suspended unit heater burners.

3.7 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Pressure test fuel oil piping in accordance with NFPA 31.

3.8 MANUFACTURER'S FIELD SERVICES

A. Division 01 - Quality Requirements: Requirements for manufacturer’s field services.

END OF SECTION

SECTION 23 12 13
FACILITY FUEL-OIL PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Transfer system and day tank.

B. Related Sections:

1. Section 23 05 13 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.

2. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electric connections specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

B. National Fire Protection Association:

1. NFPA 30 - Flammable and Combustible Liquids Code.

2. NFPA 31 - Standard for the Installation of Oil-Burning Equipment.

C. Underwriters Laboratories Inc.:

1. UL 343 - Pumps for Oil-Burning Appliances.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference

requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data:

1. Pumps: Submit certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements. Submit also, manufacturer model number, dimensions, service sizes, and finishes.

D. Manufacturer's Installation Instructions: Submit data for each type of pump.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of pumps.

C. Operation and Maintenance Data: Submit spare parts lists for pumps.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 30**.**

B. List and label pumps in accordance with UL 343.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Accept pumps on site in shipping containers with labeling in place. Inspect for damage.

PART 2 - PRODUCTS

2.1 TRANSFER SYSTEM AND DAY TANK

A. Wall mounted, 10 gallon tank, gravity feed to unit heaters. Remote duplex fuel pumps. 1/3 horsepower, 115V/60 HZ/1PH, Simplex SST Series with PCB-1 controls or approved equal. Provide vent, Simplex 063 or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION - PUMPS

A. Provide pumps to operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

B. Install long radius reducing elbows or reducers between pump and piping. Support piping adjacent to pump so no weight is carried on pump casings. For close coupled or base mounted pumps, install supports under elbows on pump suction and discharge line sizes 4 inches and over.

C. Install piping accessories and pressure gages furnished loose with pump package.

D. Provide line sized shut-off valve on pump suction, and line sized check valve, and shut-off valve on pump discharge.

E. Lubricate pumps before start-up.

END OF SECTION

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Duct materials.

2. Ductwork fabrication.

B. Related Requirements:

1. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers, supports and sleeves for placement by this Section.

2. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this Section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCE STANDARDS

A. American Society of Heating, Refrigeration and Air-Conditioning Engineers, Inc.:

1. ASHRAE Handbook - Fundamentals.

B. ASTM International:

1. ASTM A90 - Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.

2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.

D. Underwriters Laboratories Inc.:

1. UL 181 - Factory-Made Air Ducts and Connectors.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Requirements for submittals.

C. Product Data: Submit manufacturer's product information for duct materials.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for closeout procedures.

B. Project Record Documents:

1. Record actual locations of ducts and duct fittings.

2. Record changes in fitting location and type.

3. Show additional fittings used.

1.6 QUALITY ASSURANCE

A. Perform Work according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. Construct ductwork to NFPA 90A standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience.

B. Installer: Company specializing in performing Work of this Section with minimum three years experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site in manufacturer's original packaging and inspect for damage.

C. Store and protect materials according to manufacturer's instructions.

1.9 AMBIENT CONDITIONS

A. Division 01 - Temporary Facilities and Controls: Requirements for ambient condition control facilities for product storage and installation.

B. Minimum Conditions: Do not install duct sealant when temperatures are below those recommended by sealant manufacturers.

C. Subsequent Conditions: Maintain temperatures during and after installation of duct sealant.

PART 2 - PRODUCTS

2.1 DUCT MATERIALS

A. Galvanized-Steel Ducts:

1. Description: Galvanized-steel sheet, lock-forming quality.
2. Comply with ASTM A653.
3. Zinc Coating: G90.
4. Comply with ASTM A90.

B. Aluminum Ducts:

1. Material: Aluminum sheet, alloy 3003-H14.
2. Comply with ASTM B209.
3. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or equivalent strength.

C. Fasteners: Rivets, bolts, or sheet metal screws.

2.2 FABRICATION

A. Ductwork:

1. Rectangular Ducts:

a. Fabricate and support rectangular ducts according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.

b. Provide duct material, thicknesses, reinforcing, and sealing for indicated operating pressures.

2. Minimum Radius:

a. Construct tees, bends, and elbows with minimum radius 1-1/2 times centerline duct width.

b. If not possible or if rectangular elbows are used, provide turning vanes.

3. Divergence:

a. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible.

b. Furnish maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

4. Sealing:

a. Seal joints between duct sections and duct seams with welds, gaskets, mastic adhesives, mastic plus embedded fabric systems, or tape.

b. Sealants, Mastics, and Tapes: Comply with UL 181A, and provide products bearing appropriate UL 181A markings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Execution and Closeout Requirements: Requirements for installation examination.

B. Verify sizes of equipment connections before fabricating transitions.

3.2 INSTALLATION

A. Install and seal ducts according to SMACNA HVAC Duct Construction Standards - Metal and Flexible.

B. Welded seams prohibited on ductwork exterior to building.

C. Install duct hangers and supports as specified in Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment.

D. Use double nuts and lock washers on threaded rod supports.

E. Painting and Coating:

1. Paint exposed ductwork exterior to the building.

2. Provide seams and joints with additional coat.

3. For galvanized steel ductwork; prepare with wire brush; apply rust inhibiting acrylic primer Sherwin Williams B66 or equal; apply 2 coats corrosion resistant enamel; Sherwin Williams DTM B66 or equal. Color as selected by Architect.

3.3 FIELD QUALITY CONTROL

A. Division 01 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

3.4 PROTECTION

A. Division 01 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect ductwork, ductwork supports, linings, and coverings from weather.

C. Install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

3.5 ATTACHMENTS

A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
General Exhaust	Galvanized Steel, Aluminum
Outside Air Intake	Galvanized Steel

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Return & Relief	1/2 inch wg regardless of velocity
General Exhaust	1/2 inch wg regardless of velocity

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Louvers
2. Duct test holes.
3. Control dampers.

B. Related Sections:

1. Section 23 31 00 - HVAC Ducts and Casings: Requirements for duct construction and pressure classifications.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. Air Movement and Control Association International, Inc.:

1. AMCA 500 - Test Methods for Louvers, Dampers, and Shutters.

B. ASTM International:

1. ASTM E1 - Standard Specification for ASTM Thermometers.

C. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

D. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit data for shop fabricated assemblies and hardware used.

D. Product Data: Submit for the following. Include where applicable electrical characteristics and connection requirements.

1. Backdraft dampers.

2. Flexible duct connections.

3. Duct test holes.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit for Combination Smoke and Fire Dampers.

1.6 QUALITY ASSURANCE

A. Dampers tested, rated and labeled in accordance with the latest UL requirements.

B. Damper pressure drop ratings based on tests and procedures performed in accordance with AMCA 500.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Protect dampers from damage to operating linkages and blades.

C. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.

D. Storage: Store materials in a dry area indoor, protected from damage.

E. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

PART 2 - PRODUCTS

2.1 LOUVERS

A. Manufacturers:

1. Greenheck, Ruskin
2. Substitutions: Division 01 - Product Requirements.

B. Provide 6 inch deep louvers with vertical wind driven rain resistant blades, heavy channel frame, birdscreen with ½ inch square mesh for exhaust and ¾ inch for intake; Model EME6625 manufactured by Ruskin or equal.

C. Fabricate of 0.081 inch extruded aluminum blades, 0.125 inch frame, color anodized finish. Color as selected by Architect.

D. Furnish with exterior angle flange for installations.

2.2 DUCT TEST HOLES

A. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Furnish extended neck fittings to clear insulation.

2.3 CONTROL DAMPERS

A. Refer to Section 23 09 33.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify ducts and equipment installations are ready for accessories.

C. Check location of air outlets and inlets and make necessary adjustments in position to conform to architectural features, symmetry, and lighting arrangement.

3.2 INSTALLATION.

A. Install in accordance with NFPA 90A and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 31 00 for duct construction and pressure class.

B. Install temporary duct test holes and required for testing and balancing purposes. Cut or drill in ducts. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

C. Outside air ductwork transitions and their connections to intake louvers shall be welded or soldered watertight, and shall be arranged to allow any water inside the duct to drain out through the louver.

END OF SECTION

SECTION 23 34 00
HVAC FANS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Propeller fans.
2. Destratification fans.

B. Related Sections:

1. Section 23 05 13 - Common Motor Requirements for HVAC Equipment: Product requirements for motors for placement by this section.
2. Section 23 07 00 - HVAC Insulation: Product requirements for power ventilators for placement by this section.
3. Section 23 09 33 - Electric and Electronic Control System for HVAC: Controls remote from unit.
4. Section 23 31 00 - HVAC Ducts and Casings: Product requirements for hangers for placement by this section.
5. Section 23 33 00 - Air Duct Accessories: Product requirements for duct accessories for placement by this section.
6. Section 26 05 03 - Equipment Wiring Connections: Execution and product requirements for connecting equipment specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American Bearing Manufacturers Association:

1. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
2. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.

B. Air Movement and Control Association International, Inc.:

1. AMCA 99 - Standards Handbook.

2. AMCA 204 - Balance Quality and Vibration Levels for Fans.

3. AMCA 210 - Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

4. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

5. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

C. American Refrigeration Institute:

1. ARI 1060 - Air-to-Air Energy Recovery Ventilation Equipment Certification Equipment Program.

D. ASTM International:

1. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.

E. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.

2. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

F. Underwriters Laboratories Inc.:

1. UL 705 - Power Ventilators.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittal procedures.

C. Shop Drawings: Indicate size and configuration of fan assembly, mountings, weights, ductwork and accessory connections.

D. Product Data: Submit data on each type of fan and include accessories, fan curves with specified operating point plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, electrical characteristics and connection requirements.

E. Manufacturer's Installation Instructions: Submit fan manufacturers instructions.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.6 QUALITY ASSURANCE

A. Performance Ratings: Conform to AMCA 210 and bear AMCA Certified Rating Seal.

B. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.

C. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.

D. Balance Quality: Conform to AMCA 204.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Protect motors, shafts, and bearings from weather and construction dust.

PART 2 - PRODUCTS

2.1 PROPELLER FANS

A. Manufacturers:

1. Greenheck, Loren Cook Company.

2. Substitutions: Division 01 - Product Requirements.

B. Construction:

1. Impeller: Shaped steel or steel reinforced aluminum blade with hubs, statically and dynamically balanced, keyed and locked to shaft, directly connected to motor.

2. Frame: One piece, square steel with die formed venturi orifice, mounting flanges and supports.

C. Accessories:

1. Safety Screens: Expanded galvanized metal over inlet, motor, and drive; to comply with OSHA regulations.

D. Electrical Characteristics and Components:

1. Electrical Characteristics: In accordance with Section 26 05 03.

2. Motors: In accordance with Section 23 05 13. Type: ECM.

3. Controls: Fan speed controller with permanent dial for balancing.

2.2 DESTRATIFICATION FANS

A. Manufacturers:

1. VES Environmental.

2. Substitutions: Division 01 - Product Requirements.

B. Construction:

1. Ceiling mount paddle fan, commercial grade, curved blades.

2. Poly blades.

3. Sealed, maintenance free bearings.

4. UL approved.

C. Accessories:

1. Stainless steel safety cables.

2. Speed control, see drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

A. Secure wall fans with cadmium plated steel lag screws to structure.

B. Install safety screen where inlet or outlet is exposed.

3.3 CLEANING

A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

3.4 DEMONSTRATION

A. Division 01 - Execution and Closeout Requirements: Requirements for demonstration and training.

B. Demonstrate fan operation and maintenance procedures.

3.5 PROTECTION OF FINISHED WORK

A. Division 01 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Do not operate fans for until ductwork is clean, filters in place, bearings lubricated, and fan has been test run under observation.

END OF SECTION

SECTION 23 51 00

BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Double wall metal stacks.

B. Related Sections:

1. Section 23 55 00 - Fuel-Fired Heaters: Fuel fired heaters using breeching, chimneys, and stacks.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Fire Protection Association:

1. NFPA 31 - Standard for the Installation of Oil-Burning Equipment.

2. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances.

B. Underwriters Laboratories Inc.:

1. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances.

1.4 DEFINITIONS

A. Breeching: Vent Connector.

B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.

C. Smoke Pipe: Round, single wall vent connector.

D. Vent: Portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.

E. Vent Connector: Part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent and may include a draft control device.

1.5 DESIGN REQUIREMENTS

A. Design refractory lined metal stacks for wind loading of 160 mph and seismic loads as specified in Section 23 05 48.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittals procedures.

C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breeching. Submit layout drawings indicating plan view and elevations where factory built unit is used.

D. Product Data: Submit data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.

E. Manufacturer's Installation Instructions: Submit assembly, support details, and connection requirements.

1.7 QUALITY ASSURANCE

A. Provide factory built vents and chimneys used for venting natural draft appliances complying with NFPA and UL listed and labeled.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements.

B. Maintain water integrity of wall during and after installation of chimney or vent.

PART 2 - PRODUCTS

2.1 DOUBLE WALL METAL STACKS

A. Manufacturers:

1. Cleaver-Brooks; Drexel Metals; McGill AirFlow LLC; Selkirk Corporation; Simpson Dura-Vent Co., Inc.

2. Substitutions: Division 01 - Product Requirements.

B. Furnish double wall metal stacks, tested to UL 103 and UL listed, for use with building heating equipment, in compliance with NFPA 211.

C. Indoor: Fabricate with 1 inch minimum air space between walls. Construct inner jacket of 20 gage Type 304 stainless steel. Construct outer jacket of Type 304 24 gage for sizes 10 inches to 24 inches.

D. Outdoor: Fabricate with 2 inches insulation between walls. Construct inner jacket of 20 gauge Type 304 stainless steel. Construct outer jacket of Type 304 stainless steel.

E. Accessories, UL labeled:

1. Thru Wall Support: Provide 12-inch insulated pipe thru wall with finishing collar connected to insulated tee with plug. Vertical pipe to have wall support as recommended by manufacturer.

2. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

3. Type M field draft regulator barometric draft control.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NFPA 31.

B. Install breeching with minimum of joints. Align accurately at connections, with internal surfaces smooth.

C. Support breeching from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breeching, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA HVAC Duct Construction Standards - Metal and Flexible for equivalent duct support configuration and size.

D. Pitch breeching with positive slope up from fuel-fired equipment to chimney or stack.

E. Coordinate installation of dampers.

F. Install vent dampers, locating close to draft hood collar, and secured to breeching.

G. Level and plumb chimney and stacks.

H. Clean breeching, chimneys, and stacks during installation, removing dust and debris.

I. Install slip joints allowing removal of appliances without removal or dismantling of breeching, breeching insulation, chimneys, or stacks.

J. Provide minimum length of breeching to connect appliance to chimney.

K. Extend vent above roof in accordance with applicable code.

L. Maximum Vent Horizontal Distance: 75 percent of vent vertical distance.

M. Where appliance requires draft hood or barometric control device, install manufacturer furnished listed devices in accordance with manufacturer's instructions and applicable code.

END OF SECTION

SECTION 23 55 00
FUEL-FIRED HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Oil fired unit heaters.

B. Related Sections:

1. Section 23 05 13 - Common Motor Requirements for HVAC Equipment: Product requirements for electric motors for placement by this section.

2. Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment: Product requirements for hangers for placement by this section.

3. Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment: Product requirements for vibration isolators for placement by this section.

4. Section 23 11 13 - Facility Fuel-Oil Piping: Product requirements for fuel oil piping connected to oil-fired heaters.

5. Section 23 51 00 - Breechings, Chimneys, and Stacks: Product requirements for vents for placement by this section.

6. Section 26 05 03 - Equipment Wiring Connections: Execution requirements for electrical connections specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Fire Protection Association:

1. NFPA 31 - Standard for the Installation of Oil-Burning Equipment.

2. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Division 01 - Submittal Procedures: Submittals procedures.

C. Shop Drawings: Indicate assembly, required clearances, and locations and sizes of field connections.

D. Product Data: Submit manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of thermostats or other products not mounted on unit.

C. Operation and Maintenance Data: Submit manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing Work of this section with minimum three years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Accept heaters and controls on site in factory packaging. Inspect for damage.

1.8 WARRANTY

A. Division 01 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish one year manufacturer warranty for heat exchanger.

C. Furnish five year manufacturer warranty for burners.

PART 2 - PRODUCTS

2.1 OIL FIRED UNIT HEATERS

A. Manufacturers:

1. Modine Manufacturing Company; REZNOR; Sterline HVAC Products.

2. Substitutions: Division 01 - Product Requirements.

B. Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, and accessories:

1. Discharge Louvers: Individually adjustable horizontal louvers to match cabinet finish.

2. Control Voltage: 24 volt, 60 hertz.

3. Location: Suspended overhead.

C. Cabinet: Steel, baked enamel finish, easily removed and secured access panels.

D. Supply Fan: Propeller type with direct drive, motor with integral thermal overload protection and shall be permanently lubricated.

E. Combustion Chamber: UL listed.

F. Oil Burner: Flame retention type, rubber mounted, adjustable combustion air blower, integrated two-stage fuel pump, fuel filter, hinged flame inspection port, cadmium sulfide flame sensor, electrodes, ignition transformer, oil nozzle.

1. Barometric draft regulator in flue.

2. Non-corrosive combustion air blower with permanently lubricated motor.

G. Oil Burner Safety Controls:

1. Time delay relay limits time for establishment of main flame.

2. Flame sensor monitors flame continuously during burner operation and stops burner on flame failure with manual reset.

3. Limit Control: Fixed stop at maximum permissible setting, de-energizes burner on excessive bonnet temperature, automatic resets.

H. Controls:

1. Room Thermostat: Adjustable, low voltage, to control burner operation and supply fan to maintain temperature setting. See schedule on mechanical drawings, electrical drawings, and Section 23 09 33.

2. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with fixed timed on delay, with manual switch for continuous fan operation.

I. Accessories:

1. Nozzle line heater; “START HELPER” by Beckett, part number 51621.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify space is ready for installation of units and openings are as indicated on shop drawings.

3.2 INSTALLATION

A. Install units in accordance with fired units to NFPA 31.

B. Installation - Fuel Oil Piping:

1. Connect fuel oil piping in accordance with NFPA 31.

2. Connect fuel oil piping to unit, full size of unit connection. Arrange piping with clearances for burner service.

3. Install the following piping accessories on fuel oil piping connections. Refer to Section 23 11 13.

a. Shutoff valve.

C. Install vent connections in accordance with NFPA 211. Install vents and stacks. Refer to Section 23 51 00.

D. Provide hangers and supports for suspended units.

E. Provide connection to electrical power systems. Refer to Section 26 05 03.

END OF SECTION

SECTION 26 05 01
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Requirements specifically applicable to Division 26, 27, and 28 Sections and L (DOT) Sections, in addition to Division 01 - General Requirements.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 SPECIFICATION TERMINOLOGY

A. In many instances the words "has," "has been," "shall," "shall be," "will," and "will be" and so forth have been deliberately omitted. These words are inferred and considered a part of these specifications as if appearing in each instance.

B. Definitions:

1. "Provide": Includes all material, labor, sub-contracts, and appurtenances required for a complete, finished, satisfactory operating system. Furnish and Install.

2. "Furnish": Purchase and deliver to job site, products as shown and specified. Installation not required under Division 26, 27, or 28, unless otherwise indicated.

3. "Install": Set in place and connect ready for use, in a complete, finished, satisfactory operating condition products that have been furnished.

4. “Coordinate with Utility” means for the Contractor to coordinate with the Utility to have the Utility provide, furnish, or install the described action or result.

5. "Product" is a generic term which includes materials, equipment, fixtures and any physical item used on the project.

6. "As-Built Drawings": Drawings that reflect the electrical systems as actually constructed.

7. "Accessible Ceiling": Removable ceiling panels with supporting grid a maximum of 5' on center each way.

8. "Shop Drawings": To-scale, completely dimensioned working construction drawings prepared for or by the Contractor to demonstrate proper planning for the installation and arrangement of work indicated in the contract documents. Shop drawings for building systems shall be done on sheet sizes no smaller than that used for the contract drawings, and, after being approved, shall be marked-up and maintained on the job site in accordance with the requirements for record drawings.

1.4 WORK INCLUDED

A. Unless specifically stated elsewhere, all work shown, described, or otherwise indicated on the contract drawings and specifications is required under this contract.

B. Work is not complete until all systems are complete, finished, and in satisfactory operating condition.

C. Bring any questionable items or apparent conflicts to the attention of the Owner's Representative during the bidding period and request clarification.

1.5 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all permits, licenses, fees, inspections, approvals and other arrangements necessary to perform the electrical work. Request inspections from the authority having jurisdiction and submit copies of inspection reports to the Owner's Representative. Upon completion of the project, furnish the Owner's Representative the original final inspection certificate.

1.6 COORDINATION

A. Coordinate all work with the serving utilities and provide equipment and installation in accordance with the utility requirements.

B. Lay out all work in advance and coordinate with other trades to avoid conflicts. Coordinate and cooperate with all trades to complete the work within the project schedule. Make, at no additional cost, any changes necessary as a result of failure to properly coordinate, supervise, or schedule the work. Make such changes as directed by the Owner's Representative.

C. Prior to rough-in, verify locations for junction boxes, disconnect switches, stub-ups, etc., for connection to equipment furnished or installed by others. Prior to rough-in, verify information shown on electrical drawings with approved shop drawings of equipment furnished or installed by others. Notify Owner's Representative of any conflicts.

1.7 DRAWING PRESENTATION

A. Electrical drawings are diagrammatic and do not show all details of the work required. Locations of electrical items are approximate unless dimensioned. Review civil, architectural, structural, and mechanical drawings and adjust locations as directed to avoid conflict. Owner's Representative may direct minor adjustments in equipment locations. Make these adjustments at no extra cost providing direction is received prior to rough-in. Do not scale drawings; field verify dimensions and locations.

B. The drawings and specifications are complementary; what is shown on one is as binding as if called for on both.

1.8 ELECTRICAL REFERENCE SYMBOLS

A. Symbols are based on industry standards supplemented by special symbols for the particular project. Refer to the legend to identify symbols shown on plans.

1.9 PROJECT/SITE CONDITIONS

A. Become thoroughly familiar with the project, the site, and the local conditions under which the work is to be performed. Failure to do so does not relieve the Contractor from contract requirements.

B. Install work as shown on drawings, unless prevented by project conditions.

C. When proposing changes, submit proposal showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of Owner's Representative before proceeding.

1.10 REFERENCES

A. Furnish material and equipment which has been tested and conforms to the applicable referenced standards. Install material and equipment in accordance with the requirements and within the limits of the standards.

1. American Society for Testing and Material - ASTM.
2. American National Standards Institute - ANSI.
3. Insulated Cable Engineers Association - ICEA.
4. Institute of Electrical and Electronics Engineers - IEEE.
5. National Electrical Manufacturers' Association - NEMA.
6. National Fire Protection Association - NFPA.
7. Underwriters' Laboratories, Inc. - U.L.

8. Factory Mutual Systems - FM.

9. National Electrical Contractors Association - NECA "Standard Practices for Good Workmanship in Electrical Contracting."

10. International Electrical Testing Association, Acceptance Testing Specifications - NETA, ATS.

11. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

1.11 REGULATORY REQUIREMENTS

A. Perform all work in accordance with the edition of the following codes, including state and local amendments, statutes, and ordinances, in effect at the time of bid opening.

1. NFPA 70, National Electrical Code.

2. International Building Code.

3. International Fire Code.

4. International Mechanical Code.

5. Americans with Disabilities Act.

1.12 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Submit under the provisions of Division 01.

C. In the absence of specific Division 01 requirements, submit five (5) printed copies or one (1) electronic copy of submittal data to the Owner's Representative within 30 days of award of contract.

D. Submit complete data on all material and equipment to be incorporated into the project.

1. Include catalog numbers, wiring diagrams, dimensions and performance data.

2. Do not order product or begin work until submittals have been approved.

3. Clearly identify item being submitted.

E. Include project name, contractor's name, and Division 26, 27, 28, or L subcontractor's name, address and telephone number on each cover. Index and tab by specification section or drawing number and identify each item by name, number or designation used on drawings or specifications. Submittals not organized as described will be returned for reorganization without detailed review.

1. Submit hard copies in neatly bound, hard cover loose-leaf three ring binders.

2. Electronic submittal shall be organized as described above and in this section.

F. Partial submittals will be considered for review provided that they are complete for the categories listed below:

1. Raceways, fittings, wire and cable, miscellaneous materials.

2. Panels, motor controls and disconnects.

3. Lighting fixtures, lamps, and related equipment.

4. Individual specialty subsystems.

G. Submittal review is for general design and arrangement and does not relieve the Contractor from any contract document requirements. Where equipment is scheduled or specified by manufacturer's name and catalog designations, the manufacturer's published data and/or specification for that item, in effect on bid date, are considered part of specification. Approval of other manufacturer's item proposed is contingent upon compliance therewith. Where a substitute product or system causes additional work, provision of a complete and satisfactory working installation is the sole responsibility of the Contractor.

H. Where substitute material or equipment is proposed by Contractor, Owner's Representative may require letter from manufacturer of proposed substitute certifying and guaranteeing suitability for application and duty required prior to approval.

I. Revise and resubmit submittal data as required. Identify all changes made since previous submittal. All costs associated with the review of more than one resubmittal, where additional review is required due to incomplete, inaccurate, or inadequate submittals, are the responsibility of the Contractor.

1.13 SITE OBSERVATIONS

A. Request construction observation at least 48 hours prior to covering any buried or concealed work; pulling of wire or cable; installation of lighting fixtures; or placing covers on outlets, cabinets, panelboards, or switchgear.

B. Cooperate with the Owner's Representative during observations and demonstrate installation complies with contract requirements. Correct any deficiencies noted prior to proceeding with the work.

1.14 OPERATION AND MAINTENANCE MANUALS

A. Submit under the provisions of Division 01.

B. In the absence of specific Division 01 requirements, submit two copies of complete manuals 60 days prior to substantial completion.

C. Submit in neatly bound hard cover loose-leaf three ring binders. Include project name, Contractor's name, address and telephone number, Division 26, 27, 28 or L subcontractor's name, address, and telephone number on each cover.

D. Prepare data in the form of an instruction manual with a table of contents and a tabbed fly leaf for each section. Provide a separate section for each product or system installed.

E. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

F. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

G. Type Text: As required to supplement product data. Provide logical sequence of operations for each procedure, incorporating manufacturer's instructions.

H. For Each Item of Equipment and Each System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts. Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

I. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include any special operating instructions. Include reprogramming instructions for all programmable equipment.

J. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, and checking instructions.

K. Provide servicing and lubrication schedule, and list of lubricants required.

L. Provide a copy of all approved shop drawings.

M. Provide a copy of manufacturer's recommended spare parts list for applicable equipment.

N. Include copies of warranties and bonds.

O. Include logs of all tests performed.

P. After review, make corrections as noted. Unless otherwise noted in Division 01, resubmit six corrected copies 14 days prior to substantial completion inspection.

1.15 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the work:

1. Contract drawings.
2. Specifications.
3. Addenda.
4. Change orders and other modifications to the contract.
5. Reviewed shop drawings, product data, and samples.

B. Record revisions concurrent with construction progress.

C. Legibly mark and record product substitutions or alternates utilized, changes made by addendum or change order, changes made in conduit routing or circuiting, and changes in equipment locations. Accurately dimension locations of buried or concealed equipment.

D. Upon project completion, submit record documents to Owner's Representative.

E. Provide an "As-Built" print of the electrical one line diagram framed, with Plexiglas cover, located adjacent to the electrical panels in the SREB.

1.16 TESTING

A. Notify Owner's Representative at least 48 hours prior to conducting tests. Conduct the final test in the presence of the Owner's Representative. Have instruments available for measuring light intensities, voltage and current values, and for demonstration of continuity, grounds, or open circuit conditions. Provide personnel to take measurements and make tests. Test in accordance with appropriate sections of NETA ATS. The Contractor is responsible for all test requirements.

B. Before performing tests, check all components of the system for proper installation and operation.

C. Furnish necessary personnel, equipment, and instruments. Demonstrate

satisfactory operation of the entire installation in accordance with contract documents.

D. Perform tests required under other sections of specifications. Submit logs of all test results to the Owner's Representative.

E. Emergency systems must be operational at the time of substantial completion.

F. When specified in individual specification sections, provide authorized representative and trained technician to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

G. Repair, replace or adjust, as directed by the final observation report, all components of the installation that do not meet specified requirements.

H. Request observation of retesting after all corrections have been completed.

I. All costs associated with additional observation, which are required as a result of incomplete work, are the responsibility of the Contractor.

1.17 INSTRUCTION OF OWNER PERSONNEL

A. Before final completion, at a mutually agreeable time, instruct Owner's designated personnel in operation, adjustment, and maintenance of equipment and systems.

B. Instruction for fire alarm and intercommunications—systems shall be performed by qualified manufacturer's representative.

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

E. Demonstrate start-up, operation, control, adjustment, reprogramming, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.

F. Provide the number of hours of instruction as indicated for each system.

System or Equipment	Hours of Instruction
Electrical Distribution Equipment	4
Alarm and Detection	2

G. Provide one-half of the specified instruction at time of substantial completion and other half at time of final completion. Each instruction

session shall cover all pertinent material. The first session is to cover all necessary material and provide "hands on" demonstrations. The second session is to review material previously covered, cover material in greater detail, and answer users' questions.

1.18 CERTIFICATE OF COMPLETION

A. Submit, at time of request for substantial completion observation, a completed letter in the following format:

I, _____(Name)_____, of _____(Firm)_____, certify that the electrical work is complete in accordance with Contract Plans and Specifications, and authorized change orders (copies attached) and will be ready for final inspection as of (Date) . I further certify that the following specification requirements have been fulfilled:

1. Megger readings performed _____ copies of logs attached.
2. Ground tests performed, _____ copies of method used and results attached.
3. Operating manuals completed and instructions of operating personnel performed for all systems, (Date), (Signature, Owner's Representative).
4. As-Built drawings up-to-date and ready to deliver to Owner's Representative.
5. Emergency system tested and fully operational.
6. All other tests required by Specifications have been performed.
7. All spare parts turned over to Owner.
8. All systems are fully operational.

Signed:_____

1.19 FINAL COMPLETION

A. Clean all fixtures and equipment. Repair any damaged surfaces.

B. Adjust all equipment to straight, plumb and level condition. Adjust all equipment to operate within manufacturer's recommended tolerances and as specified.

C. Turn over to Owner's Representative all operation and maintenance manuals and record drawings.

1.20 WARRANTIES

A. Provide warranty as required by Division 01.

B. In the absence of specific Division 01 requirements, provide warranty certifying that the Contractor shall promptly repair or replace all defective material and workmanship to the satisfaction of the Owner.

C. Unless otherwise stated, the warranty begins on the date of written final acceptance of the project by the Owner's Representative and extends for a period of one year.

D. In the event of equipment or component failure during the warranty period, it is the Contractor's responsibility to repair or replace such defective equipment or components and bear all associated costs.

E. The Contractor shall pursue manufacturer's written or implied warranties to the extent necessary to obtain replacement equipment or components prior to any other action being initiated. Provide proof of action taken upon request. Inform Owner in writing of the cause of failure.

PART 2 - PRODUCTS

2.1 ALL MATERIAL AND EQUIPMENT

A. Unless otherwise indicated, new and unused; currently manufactured model, standard product. Products specified are based upon nationally recognized manufacturers who have adequate replacement stock and service personnel locally available. Use only products that meet these requirements.

B. Similar Items: By the same manufacturer throughout the project.

C. Comply with referenced standards, listed by U.L. or other testing agency acceptable to the authority having jurisdiction. Listed specifically for the application where used.

D. Unless Otherwise Indicated, All Outdoor Equipment: NEMA 3R enclosures, stainless steel hardware, corrosion resistant, compatible with -40ºF temperature.

E. Transport, handle and store in accordance with manufacturer's instructions. Store in original containers with seals and labels intact.

F. Cover and protect all items against dirt, water, chemical, and mechanical damage.

G. Store in dry, heated enclosure all items subject to thermal or moisture damage.

H. Suitable for use in Seismic Design Category D.

2.2 ACCEPTABLE MANUFACTURERS

A. Unless otherwise stated in Division 01: Manufacturer's names, trade names, and model numbers of products, systems, or installations

specified are the "Basis of Specification". Unless noted as "No Substitution", Contractor may submit for consideration a substitution of a manufacturer, product, system, or installation under provisions of Division 01. If such submittal is made, written certification is required from the Contractor that the substitution meets or exceeds characteristics of the "Basis of Specification" and that changes in work, including but not limited to changes in dimensions, access openings, clearances, tolerances, utility requirements, characteristics, and connections, will not adversely affect the cost, design, function, performance or operation of other components of the building. The Architect/Engineer's and/or Owner's Representative review and/or approval of such substitution will not relieve the Contractor of his responsibilities to perform the work and pay costs of additional Architectural/Engineering design services and construction costs attributed to the use of the substitution.

PART 3 - EXECUTION

3.1 ALL MATERIALS AND EQUIPMENT

A. Install in accordance with referenced standards and regulatory requirements.

B. Install in accordance with manufacturer's instructions and recommendations.

C. Install in accordance with National Electrical Contractors Association "Standard Practices for Good Workmanship in Electrical Contracting."

D. Install using experienced craftsmen skilled in the trade and in the particular section of work involved.

E. All workmanship is subject to approval.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement caused by Seismic Design Category D activity. Provide adequate backing, blocking and reinforcement at attachment points to accept the forces involved.

G. Obtain written permission of Owner's Representative before cutting, welding or piercing any structural members.

H. Repair any damage caused by installation of electrical products to original condition.

I. Keep the work area neat, clean, and orderly. Clean up periodically.

END OF SECTION

SECTION 26 05 03
EQUIPMENT WIRING CONNECTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electrical connections to equipment.

B. Related Sections:

1. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.

2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA WD 1 - General Requirements for Wiring Devices.

2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit wiring device manufacturer's catalog information showing dimensions, configurations, and construction.

D. Manufacturer's installation instructions.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Submittal procedures.

B. Project Record Documents: Record actual locations, sizes, and configurations of equipment connections.

1.6 COORDINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

C. Determine connection locations and requirements.

D. Sequence rough-in of electrical connections to coordinate with installation of equipment.

E. Sequence electrical connections to coordinate with start-up of equipment.

PART 2 - PRODUCTS

2.1 CORD AND PLUGS

A. Attachment Plug Construction: Conform to NEMA WD 1.

B. Configuration: NEMA WD 6; match receptacle configuration at outlet furnished for equipment.

C. Cord Construction: Type SOW or STW multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

D. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify equipment is ready for electrical connection, for wiring, and to be energized.

3.2 INSTALLATION

A. Make electrical connections.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Install receptacle outlet to accommodate connection with attachment plug.

E. Install cord and cap for field-supplied attachment plug.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

J. Unless otherwise indicated, heating, ventilating and plumbing equipment motors and controls are furnished, set in place, and wired in accordance with the following schedule: (Coordinate all work with Mechanical Contractor)

(MC = Mechanical Contractor)
(EC = Electrical Contractor)

ITEM	FURNISHED BY	SET IN PLACE BY	WIRED POWER	WIRED CONTROL
Equipment Motors	MC	MC	EC	MC
Magnetic Motor Starters:				
a) Automatically controlled with or without HOA switches	EC	EC	EC	MC
b) Manually controlled	EC	EC	EC	EC
c) In packaged equipment	MC	MC	EC	MC

Disconnect Switches, Manual Motor Starters, Thermal Overload Switches	EC	EC	EC	--
Control Relays, Transformers, Time Clocks, Thermostats, Valves, Float Controls, Damper Motors, EP and PE Switches, Other Miscellaneous Division 15 Controls	MC	MC	MC	MC

K. Appliance and Miscellaneous Equipment Connections.

1. Provide and make all final electrical connections in accordance with manufacturer's recommendations and shop drawings for equipment furnished by others. Provide flexible conduit; Type SOW or STW rubber cords with grounding conductor; pigtails, caps, etc., as required for an operating system.

2. Provide outlets at locations to conveniently serve equipment. Provide receptacles as required to match cord caps on equipment furnished. Provide direct wiring or receptacles for final connection to equipment as required for particular equipment furnished.

3.3 ADJUSTING

A. Division 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Cooperate with utilization equipment installers and field service personnel during checkout and starting of equipment to allow testing and balancing and other startup operations. Provide personnel to operate electrical system and checkout wiring connection components and configurations.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes building wire and cable; nonmetallic-sheathed cable; direct burial cable; service entrance cable; armored cable; metal clad cable; and wiring connectors and connections.

B. Related Sections:

1. Section 26 05 53 - Identification for Electrical Systems: Product requirements for wire identification.

2. Section 26 05 33- Raceway and Boxes for Electrical Systems: Execution requirements for trenching and backfill required by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

2. NFPA 262 - Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-Handling Spaces.

C. Underwriters Laboratories, Inc.:

1. UL 1277 - Standard for Safety for Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.

1.4 SYSTEM DESCRIPTION

A. Product Requirements: Provide products as follows:

1. Solid conductor for feeders and branch circuits 10 AWG and smaller.

2. Stranded conductors for control circuits.

3. Conductor not smaller than 12 AWG for power and lighting circuits.

4. Conductor not smaller than 16 AWG for control circuits.

5. Increase wire size in branch circuits to limit voltage drop to a maximum of 3 percent.

B. Wiring Methods: Provide the following wiring methods:

1. Concealed Dry Interior Locations: Use only building wire, Type THHN/THWN-2, 90C XHHW or XHHW-2 insulation, in raceway.

2. Exposed Dry Interior Locations: Use only building wire, Type THHN/THWN-2, 90C XHHW or XHHW insulation, in raceway.

3. Wet or Damp Interior Locations: Use only building wire, Type THHN/THWN-2, 90C XHHW or XHHW insulation, in raceway.

4. Exterior Locations: Use only building wire, Type 90C XHHW or XHHW-2 insulation, in raceway.

5. Underground Locations: Use only building wire, Type 90C XHHW or XHHW-2 in raceway.

6. Cable Tray Locations: Use only Tray cable Type TC.

1.5 DESIGN REQUIREMENTS

A. Conductor sizes are based on copper.

B. Use copper conductors. Substitution of aluminum conductors is not allowed.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01- Submittal Procedures: Requirements for submittals.

C. Product Data: Submit for building wire and [each cable assembly type.

D. Test Reports: Indicate procedures and values obtained.

1.7 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and circuits.

1.8 QUALITY ASSURANCE

A. Perform Work in accordance with Alaska DOT standard.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

1.10 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on Drawings.

1.11 COORDINATION

A. Division 01 - Administrative Requirements: Requirements for coordination.

B. Where wire and cable destination is indicated and routing is not shown, determine routing and lengths required.

C. Wire and cable routing indicated is approximate unless dimensioned.

PART 2 - PRODUCTS

2.1 BUILDING WIRE

A. Product Description: Single conductor insulated wire.

B. Conductor: Copper.

C. Insulation Voltage Rating: 600 volts.

D. Insulation Temperature Rating: 90 degrees C.

E. Insulation Material: Thermoplastic or Thermosetting per para 1.3B above.

2.2 TERMINATIONS

A. Terminal Lugs for Wires 6 AWG and Smaller: Solderless, compression type copper.

B. Lugs for Wires 4 AWG and Larger: Color keyed, compression type copper, with insulating sealing collars.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01- Administrative Requirements: Coordination and project conditions.

B. Verify interior of building has been protected from weather.

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

D. Verify raceway installation is complete and supported.

3.2 PREPARATION

A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

A. Route wire and cable to meet Project conditions.

B. Neatly train and lace wiring inside boxes, equipment, and panelboards.

C. Identify and color code wire and cable under provisions of Section 26 05 53. Identify each conductor with its circuit number or other designation indicated.

D. Special Techniques--Building Wire in Raceway:

1. Pull conductors into raceway at same time.

2. Install building wire 4 AWG and larger with pulling equipment.

E. Special Techniques - Cable:

1. Protect exposed cable from damage.

2. Support cables above accessible ceiling, using spring metal clips or plastic cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.

3. Use suitable cable fittings and connectors.

F. Special Techniques - Wiring Connections:

1. Clean conductor surfaces before installing lugs and connectors.

2. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

3. Tape uninsulated conductors and connectors with electrical tape to 150 percent of insulation rating of conductor.

4. Install split bolt connectors for copper conductor splices and taps, 6 AWG and larger.

5. Install solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

6. Install insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

G. For stranded conductors for branch circuits 10 AWG and smaller. Install crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under screws.

H. Install terminal lugs on ends of 600 volt wires unless lugs are furnished on connected device, such as circuit breakers.

I. Size lugs in accordance with manufacturer's recommendations terminating wire sizes. Install 2-hole type lugs to connect wires 4 AWG and larger to copper bus bars.

J. For terminal lugs fastened together such as on motors, transformers, and other apparatus, or when space between studs is small enough that lugs can turn and touch each other, insulate for dielectric strength of 2-1/2 times normal potential of circuit.

3.4 WIRE COLOR

A. General:

1. For wire sizes 10 AWG and smaller, install wire colors in accordance with the following:

   a. Black and red for single phase circuits at 120/240 volts.

2. For wire sizes 8 AWG and larger, identify wire with colored tape at terminals, splices and boxes. Colors are as follows:

   a. Black and red for single phase circuits at 120/240 volts.

B. Neutral Conductors: White. When two or more neutrals are located in one conduit, individually identify each with proper circuit number.

C. Branch Circuit Conductors: Install three or four wire home runs with each phase uniquely color coded.

D. Feeder Circuit Conductors: Uniquely color code each phase as noted above.

E. Ground Conductors:

1. For 6 AWG and smaller: Green.

2. For 4 AWG and larger: Identify with green tape at both ends and visible points including junction boxes.

3.5 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.3.1.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rod electrodes.
2. Wire.
3. Mechanical connectors.
4. Exothermic connections.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. Institute of Electrical and Electronics Engineers:

1. IEEE 142 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
2. IEEE 1100 - Recommended Practice for Powering and Grounding Electronic Equipment.

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

1.4 SYSTEM DESCRIPTION

A. Grounding systems use the following elements as grounding electrodes:

1. Metal building frame.
2. Ground Ring.

3. Rod electrode.

1.5 PERFORMANCE REQUIREMENTS

A. Grounding System Resistance: 25 ohms maximum.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Requirements for submittals.

C. Product Data: Submit data on grounding electrodes and connections and conductors.

D. Submit ground resistance test method.

E. Test Reports: Indicate overall resistance to ground.

1.7 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of components and grounding electrodes.

1.8 QUALITY ASSURANCE

A. Provide grounding materials conforming to requirements of NEC, IEEE 142, and UL labeled.

B. Perform Work in accordance with Alaska DOT standard.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.10 PRE-INSTALLATION MEETINGS

A. Division 01 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

D. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

1.12 COORDINATION

A. Division 01- Administrative Requirements: Requirements for coordination.

B. Complete grounding and bonding of foundation electrode prior concrete placement.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

A. Product Description:

1. Material: Copper-clad steel.
2. Diameter: 3/4 inch.
3. Length: 10 feet.

B. Connector: Connector for exothermic welded connection.

2.2 WIRE

A. Material: Stranded copper.

B. Ground Ring: #3/0 AWG bare copper conductor.

C. Grounding Electrode Conductor: Copper conductor bare.

D. Bonding Conductor: Copper conductor bare.

2.3 MECHANICAL CONNECTORS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description: Bronze connectors, suitable for grounding and bonding applications, in configurations required for particular installation.

2.4 EXOTHERMIC CONNECTIONS

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description: Exothermic materials, accessories, and tools for preparing and making permanent field connections between grounding system components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify final backfill and compaction has been completed before driving rod electrodes.

3.2 PREPARATION

A. Remove paint, rust, mill oils, and other surface contaminants at connection points.

3.3 INSTALLATION

A. Install in accordance with IEEE 142.

B. Install rod electrodes at locations as indicated on Drawings. Install additional rod electrodes to achieve specified resistance to ground.

C. Install grounding and bonding conductors concealed from view.

D. Install #3/0 AWG bare copper wire in foundation footing as indicated on Drawings.

E. Bond together metal siding not attached to grounded structure; bond to ground.

F. Equipment Grounding Conductor: Install separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

G. Install grounding connections to building steel.

H. Permanently ground entire light and power system in accordance with NEC, including service equipment, distribution panels, lighting

panelboards, switch and starter enclosures, motor frames, grounding type receptacles, and other exposed non-current carrying metal parts of electrical equipment.

I. Accomplish grounding of electrical system by using insulated grounding conductor installed with feeders and branch circuit conductors in conduits. Size grounding conductors in accordance with NEC. Install from grounding bus of serving panel to ground bus of served panel, grounding screw of receptacles, lighting fixture housing, light switch outlet boxes or metal enclosures of service equipment. Ground conduits by means of grounding bushings on terminations at panelboards with installed number 12 conductor to grounding bus.

J. Grounding electrical system using continuous metal raceway system enclosing circuit conductors in accordance with NEC.

K. Permanently attach equipment and grounding conductors prior to energizing equipment.

3.4 FIELD QUALITY CONTROL

A. Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Grounding and Bonding: Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground resistance testing in accordance with IEEE 142.

E. Perform continuity testing in accordance with IEEE 142.

F. When improper grounding is found on receptacles, check receptacles in entire project and correct. Perform retest.

END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Conduit supports.
2. Formed steel channel.
3. Spring steel clips.
4. Sleeves.
5. Mechanical sleeve seals.
6. Firestopping relating to electrical work.
7. Firestopping accessories.
8. Equipment bases and supports.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.

B. FM Global:

1. FM - Approval Guide, A Guide to Equipment, Materials & Services Approved by Factory Mutual Research for Property Conservation.

C. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

D. Underwriters Laboratories Inc.:

1. UL 263 - Fire Tests of Building Construction and Materials.

2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.

3. UL 1479 - Fire Tests of Through-Penetration Firestops.

4. UL 2079 - Tests for Fire Resistance of Building Joint Systems.

5. UL - Fire Resistance Directory.

E. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

1.4 DEFINITIONS

A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.5 SYSTEM DESCRIPTION

A. Firestopping Materials: ASTM E119 or UL 1479 to achieve fire ratings as noted on Drawings for adjacent construction, but not less than 1 hour fire rating.

B. Firestop interruptions to fire rated assemblies, materials, and components.

1.6 PERFORMANCE REQUIREMENTS

A. Firestopping: Conform to applicable code for fire resistance ratings and surface burning characteristics.

1.7 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request

prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01- Submittal Procedures: Requirements for submittals.

C. Shop Drawings: Indicate system layout with location and detail of trapeze hangers.

D. Product Data:

1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

2. Firestopping: Submit data on product characteristics, performance and limitation criteria.

E. Firestopping Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.

F. Design Data: Indicate load carrying capacity of trapeze hangers and hangers and supports.

G. Manufacturer's Installation Instructions:

1. Hangers and Supports: Submit special procedures and assembly of components.

2. Firestopping: Submit preparation and installation instructions.

H. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

I. Firestopping Engineering Judgments: For conditions not covered by UL or WH listed designs, submit judgments by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

1.8 QUALITY ASSURANCE

A. Through Penetration Firestopping of Fire Rated Assemblies: ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.

1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.

2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.

a. Floor Penetrations Within Wall Cavities: T-Rating is not required.

B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.

1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.

2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.

C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.

D. Fire Resistant Joints Between Floor Slabs and Exterior Walls: ASTM E119 with 0.10 inch water gage minimum positive pressure differential to achieve fire resistant rating as indicated on Drawings for floor assembly.

E. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

F. Perform Work in accordance with standard.

1.9 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.

B. Installer: Company specializing in performing work of this section with minimum years documented experience

1.10 PRE-INSTALLATION MEETINGS

A. Division 01 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept materials on site in original factory packaging, labeled with manufacturer's identification.

C. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.

1.12 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements: Environmental conditions affecting products on site.

B. Do not apply firestopping materials when temperature of substrate material and ambient air is below 60 degrees F.

C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of firestopping materials.

D. Provide ventilation in areas to receive solvent cured materials.

PART 2 - PRODUCTS

2.1 CONDUIT SUPPORTS

A. Furnish materials in accordance with Alaska DOT standards.

B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.

C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.

D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.

E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.

F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self locking.

2.2 FORMED STEEL CHANNEL

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description:

1. Dry/interior - Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2. Wet/Exterior – Hot Dip Galvanized or Stainless Steel Strut. Use stainless steel hardware.

2.3 SPRING STEEL CLIPS

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description: Mounting hole and screw closure.

2.4 SLEEVES

A. Furnish materials in accordance with Alaska DOT standards.

B. Sleeves through Non-Fire Rated Floors: 18 gage thick galvanized steel.

C. Sleeves through Non-Fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage thick galvanized steel.

D. Sleeves through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL listed.

E. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.5 MECHANICAL SLEEVE SEALS

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FIRESTOPPING

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.

1. Silicone Firestopping Elastomeric Firestopping: Single or Multiple component silicone elastomeric compound and compatible silicone sealant.

2. Foam Firestopping Compounds: Single or Multiple component foam compound.

3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.

4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.

5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.

6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.

7. Firestop Pillows: Formed mineral fiber pillows.

2.7 FIRESTOPPING ACCESSORIES

A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.

B. Dam Material: Permanent:

1. Mineral fiberboard.

2. Mineral fiber matting.

3. Sheet metal.

4. Plywood or particle board.

5. Alumina silicate fire board.

C. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

D. General:

1. Furnish UL listed products.

2. Select products with rating not less than rating of wall or floor being penetrated.

E. Non-Rated Surfaces:

1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.

2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify openings are ready to receive sleeves.

C. Verify openings are ready to receive firestopping.

3.2 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.

B. Remove incompatible materials affecting bond.

C. Install backing or damming materials to arrest liquid material leakage.

D. Obtain permission from Owner's Representative before using powder-actuated anchors.

E. Do not drill or cut structural members.

3.3 INSTALLATION - HANGERS AND SUPPORTS

A. Anchors and Fasteners:

1. Concrete Structural Elements: Provide precast inserts, expansion anchors, and preset inserts.

2. Steel Structural Elements: Provide beam clamps, and spring steel clips

3. Concrete Surfaces: Provide expansion anchors.

4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts and hollow wall fasteners.

5. Solid Masonry Walls: Provide expansion anchors and preset inserts.

6. Sheet Metal: Provide sheet metal screws.

7. Wood Elements: Provide wood screws.

B. Inserts:

1. Install inserts for placement in concrete forms.

2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

C. Install conduit and raceway support and spacing in accordance with NEC.

D. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

E. Install multiple conduit runs on common hangers.

F. Supports:

1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.

2. Install surface mounted cabinets and panelboards with minimum of four anchors.

3. In wet and damp locations install steel channel supports to stand cabinets and panelboards 1 inch off wall.

4. Support vertical conduit at every floor.

3.4 INSTALLATION - FIRESTOPPING

A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.

B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.

C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.

D. Compress fibered material to maximum 40 percent of its uncompressed size.

E. Place foamed material in layers to ensure homogenous density, filling cavities and spaces. Place sealant to completely seal junctions with adjacent dissimilar materials.

F. Place intumescent coating in sufficient coats to achieve rating required.

G. Remove dam material after firestopping material has cured.

H. Fire Rated Surface:

1. Seal opening at floor, wall, partition, ceiling, and roof as follows:

a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.

b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.

c. Pack void with backing material.

d. Seal ends of sleeve with UL listed fire resistive silicone compound to meet fire rating of structure penetrated.

2. Where cable tray, bus, cable bus, conduit, wireway, trough, and penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.

I. Non-Rated Surfaces:

1. Seal opening through non-fire rated wall, partition floor, ceiling, and roof opening as follows:

a. Install sleeve through opening and extending beyond minimum of 1 inch on both sides of building element.

b. Size sleeve allowing minimum of 1 inch void between sleeve and building element.

c. Install type of firestopping material recommended by manufacturer.

2. Install escutcheons floor plates or ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.

3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.

4. Interior partitions: Seal pipe penetrations. Apply sealant to both sides of penetration to completely fill annular space between sleeve and conduit.

3.5 INSTALLATION - EQUIPMENT BASES AND SUPPORTS

A. Using templates furnished with equipment, install anchor bolts, and accessories for mounting and anchoring equipment.

B. Construct supports of steel members or formed steel channel. Brace and fasten with flanges bolted to structure.

3.6 INSTALLATION - SLEEVES

A. Exterior watertight entries: Seal with adjustable interlocking rubber links.

B. Conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.

C. Set sleeves in position in forms. Provide reinforcing around sleeves.

D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.

E. Extend sleeves through floors 1 inch above finished floor level. Caulk sleeves.

F. Where conduit or raceway penetrates floor, ceiling, or wall, close off space between conduit or raceway and adjacent work with stuffing insulation and caulk airtight. Provide close fitting metal collar or escutcheon covers at both sides of penetration.

G. Install chrome plated steel plastic or stainless steel escutcheons at finished surfaces.

3.7 FIELD QUALITY CONTROL

A. Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect installed firestopping for compliance with specifications and submitted schedule.

3.8 CLEANING

A. Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

B. Clean adjacent surfaces of firestopping materials.

3.9 PROTECTION OF FINISHED WORK

A. Division 01 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Protect adjacent surfaces from damage by material installation.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes conduit and tubing, surface raceways, wireways, outlet boxes, pull and junction boxes, and handholes.

B. Related Sections:

1. Section 26 05 03 - Equipment Wiring Connections.
2. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
3. Section 26 05 29 - Hangers and Supports for Electrical Systems.
4. Section 26 05 53 - Identification for Electrical Systems.
5. Section 26 27 16 - Electrical Cabinets and Enclosures.
6. Section 26 27 26 - Wiring Devices.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. American National Standards Institute:

1. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
2. ANSI C80.3 - Specification for Electrical Metallic Tubing, Zinc Coated.
3. ANSI C80.5 - Aluminum Rigid Conduit - (ARC).

B. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

3. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports.

4. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

5. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.

1.4 SYSTEM DESCRIPTION

A. Raceway and boxes located as indicated on Drawings, and at other locations required for splices, taps, wire pulling, equipment connections, and compliance with regulatory requirements. Raceway and boxes are shown in approximate locations unless dimensioned. Provide raceway to complete wiring system.

B. Underground More than 5 feet outside Foundation Wall: Provide rigid steel conduit or thickwall nonmetallic conduit as indicated on drawings. Provide cast metal boxes or nonmetallic handhole.

C. Underground subject to vehicular traffic: Provide rigid steel conduit or plastic coated rigid steel conduit.

D. Underground Within 5 feet from Foundation Wall: Provide plastic coated rigid steel conduit. Provide cast metal boxes.

E. In or Under Slab on Grade: Provide plastic coated rigid steel conduit, intermediate metal conduit, plastic coated conduit, thickwall nonmetallic conduit and thin-wall nonmetallic conduit. Provide cast metal boxes.

F. Outdoor Locations, Above Grade: Provide rigid steel conduit. Provide cast metal outlet, pull, and junction boxes.

G. Wet and Damp Locations: Provide rigid steel conduit or intermediate metal conduit. Provide cast metal outlet, junction, and pull boxes. Provide flush mounting outlet box in finished areas.

H. Concealed Dry Locations: Provide rigid steel, intermediate metal conduit, or electrical metallic tubing. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

I. Exposed Dry Locations: Provide rigid steel or intermediate metal conduit. Provide sheet-metal boxes. Provide flush mounting outlet box in finished areas. Provide hinged enclosure for large pull boxes.

1.5 DESIGN REQUIREMENTS

A. Minimum Raceway Size: 1/2-inch unless otherwise specified.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit for the following:

1. Metal conduit.
2. PVC Coated metal conduit.
3. Flexible metal conduit.
4. Liquidtight flexible metal conduit.
5. EMT.
6. Nonmetallic conduit.
7. Flexible nonmetallic conduit.
8. Raceway fittings.
9. Conduit bodies.
10. Surface raceway.
11. Wireway.
12. Pull and junction boxes.

D. Manufacturer's Installation Instructions: Submit application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.7 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents:

1. Record actual routing of conduits larger than 2 inches.

2. Record actual locations and mounting heights of outlet, pull, and junction boxes.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Product storage and handling requirements.

B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

1.9 COORDINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Coordinate installation of outlet boxes for equipment connected under Section 26 05 03.

C. Coordinate mounting heights, orientation and locations of outlets mounted above counters, benches, and backsplashes.

PART 2 - PRODUCTS

2.1 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel.

C. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.

2.2 PVC COATED METAL CONDUIT

A. Product Description: NEMA RN 1; rigid steel conduit with external PVC coating, 40 mil thick.

B. Fittings and Conduit Bodies: NEMA FB 1; steel fittings with external PVC coating to match conduit.

2.3 FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction.

B. Fittings: NEMA FB 1.

2.4 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

A. Product Description: Interlocked steel construction with PVC jacket. Rated for direct burial, -60F.

B. Fittings: NEMA FB 1.

2.5 ELECTRICAL METALLIC TUBING (EMT)

A. Product Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron, compression type.

2.6 NONMETALLIC CONDUIT

A. Product Description: NEMA TC 7; Schedule 40.

B. Fittings and Conduit Bodies: HDPE.

2.7 SURFACE METAL RACEWAY

A. Product Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

B. Finish: Gray enamel.

C. Fittings, Boxes, and Extension Rings: Furnish manufacturer's standard accessories; match finish on raceway.

2.8 WIREWAY

A. Product Description: Oiltight and dust-tight type wireway.

B. Knockouts: Manufacturer's standard.

C. Size: As indicated on Drawings.

D. Cover: Screw cover with full gaskets.

E. Connector: Flanged.

F. Fittings: Lay-in type.

G. Finish: Rust inhibiting primer coating with gray enamel finish.

2.9 OUTLET BOXES

A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.

1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; furnish 1/2-inch male fixture studs where required.

B. Cast Boxes: NEMA FB 1, Type FD, cast feralloy. Furnish gasketed cover by box manufacturer. Furnish threaded hubs.

C. Wall Plates for Finished Areas: As specified in Section 26 27 26.

D. Wall Plates for Unfinished Areas: Furnish gasketed cover.

2.10 PULL AND JUNCTION BOXES

A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.

B. Hinged Enclosures: As specified in Section 26 27 16.

C. Surface Mounted Cast Metal Box: NEMA 250, 4X; flat-flanged, surface mounted junction box:

1. Material: Galvanized cast iron.

2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.

D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:

1. Material: Galvanized cast iron

2. Cover: Nonskid cover with neoprene gasket and stainless steel cover screws.

3. Cover Legend: "ELECTRIC".

E. Hand hole: Pre-Cast Concrete Handholes: Type 1-A Junction Box:

1. Cable Entrance: Two knockouts (3 inch x 7 inch x 1-1/2 inch) cable entrance at center of one side.

2. Cover: Cast Iron, weatherproof cover with nonskid finish. Label “ELECTRIC” unless noted otherwise on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet locations and routing and termination locations of raceway prior to rough-in.

3.2 EXISTING WORK

A. Remove exposed abandoned raceway, including abandoned raceway above accessible ceiling finishes. Cut raceway flush with walls and floors, and patch surfaces.

B. Remove concealed abandoned raceway to its source.

C. Disconnect abandoned outlets and remove devices. Remove abandoned outlets when raceway is abandoned and removed. Install blank cover for abandoned outlets not removed.

D. Maintain access to existing boxes and other installations remaining active and requiring access. Modify installation or provide access panel.

E. Extend existing raceway and box installations using materials and methods compatible with existing electrical installations, or as specified.

F. Clean and repair existing raceway and boxes to remain or to be reinstalled.

3.3 INSTALLATION

A. Ground and bond raceway and boxes in accordance with Section 26 05 26.

B. Fasten raceway and box supports to structure and finishes in accordance with Section 26 05 29.

C. Identify raceway and boxes in accordance with Section 26 05 53.

D. Arrange raceway and boxes to maintain headroom and present neat appearance.

3.4 INSTALLATION - RACEWAY

A. Raceway routing is shown in approximate locations unless dimensioned. Route to complete wiring system.

B. Arrange raceway supports to prevent misalignment during wiring installation.

C. Support raceway using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

D. Group related raceway; support using conduit rack. Construct rack using steel channel specified in Section 26 05 29; provide space on each for 25 percent additional raceways.

E. Do not support raceway with wire or perforated pipe straps. Remove wire used for temporary supports

F. Do not attach raceway to ceiling support wires or other piping systems.

G. Construct wireway supports from steel channel specified in Section 26 05 29.

H. Route exposed raceway parallel and perpendicular to walls.

I. Route raceway installed above accessible ceilings parallel and perpendicular to walls.

J. Route conduit in and under slab from point-to-point.

K. Maintain clearance between raceway and piping for maintenance purposes.

L. Maintain 12 inch clearance between raceway and surfaces with temperatures exceeding 104 degrees F.

M. Cut conduit square using saw or pipe cutter; de-burr cut ends.

N. Bring conduit to shoulder of fittings; fasten securely.

O. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for minimum 20 minutes.

P. Install conduit hubs to fasten conduit to cast boxes.

Q. Install no more than equivalent of three 90 degree bends between boxes. Install conduit bodies to make sharp changes in direction, as around beams. Install factory elbows for bends in metal conduit larger than 2 inch size.

R. Avoid moisture traps; install junction box with drain fitting at low points in conduit system.

S. Install fittings to accommodate expansion and deflection where raceway crosses expansion joints.

T. Install suitable pull string or cord in each empty raceway except sleeves and nipples.

U. Install suitable caps to protect installed conduit against entrance of dirt and moisture.

V. Surface Raceway: Install flat-head screws, clips, and straps to fasten raceway channel to surfaces; mount plumb and level. Install insulating bushings and inserts at connections to outlets and corner fittings.

W. Close ends and unused openings in wireway.

3.5 INSTALLATION - BOXES

A. Install wall mounted boxes at elevations to accommodate mounting heights as indicated on Drawings or as specified in section for outlet device.

B. Adjust box location up to 10 feet prior to rough-in to accommodate intended purpose.

C. Orient boxes to accommodate wiring devices oriented as specified in Section 26 27 26.

D. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

E. In Accessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.

F. Do not install flush mounting box back-to-back in walls; install with minimum 6 inches separation. Install with minimum 24 inches separation in acoustic rated walls.

G. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.

H. Install stamped steel bridges to fasten flush mounting outlet box between studs.

I. Install flush mounting box without damaging wall insulation or reducing its effectiveness.

J. Install adjustable steel channel fasteners for hung ceiling outlet box.

K. Do not fasten boxes to ceiling support wires or other piping systems.

L. Support boxes independently of conduit.

M. Install gang box where more than one device is mounted together. Do not use sectional box.

N. Install gang box with plaster ring for single device outlets.

3.6 PRECAST HANDHOLES:

A. Excavate for handhole installation.

B. Install and seal precast sections according to ASTM C891.

C. Install handholes plumb.

D. Backfill handhole excavations as specified in this Section Bedding and Backfill.

3.7 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods in accordance with Section 26 05 29.

B. Route conduit through roof openings for piping and ductwork or through suitable roof jack with pitch pocket.

C. Locate outlet boxes to allow luminaires positioned as indicated on Drawings.

D. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.

3.8 ADJUSTING

A. Division 01 - Execution and Closeout Requirements: Testing, adjusting, and balancing.

B. Adjust flush-mounting outlets to make front flush with finished wall material.

C. Install knockout closures in unused openings in boxes.

3.9 CLEANING

A. Division 01 - Execution and Closeout Requirements: Final cleaning.

B. Clean interior of boxes to remove dust, debris, and other material.

C. Clean exposed surfaces and restore finish.

3.10 TRENCHING AND BACKFILL

A. Duct Markers.

1. Place marker tape 0.5 foot below final grade or at bottom of Crushed Aggregate Base Course for the full length of the trenches above all ducts installed as indicated on the Plans.

2. Marker tape shall be APWA-ULCC compliant, red polyethylene plastic, detectable, printed "Caution - Buried Electric Line Below".

B. Bedding.

1. Place the conduit on a layer of bedding material that is not less than 6 inches in depth and backfill around the conduit with bedding material. Use bedding material that meets requirements for the applicable lift of material as specified in Specification Section 31 20 00 – EARTHWORK, except that 100% of the bedding material will pass a 1 inch sieve.

2. Bedding material shall be placed around the conduits and carefully tamped around and over them with hand tampers. Bedding material shall be placed to provide a minimum of 4 inches of cover when compacted over and to the sides of the duct

C. Backfilling.

1. Backfill only after the duct has been placed, inspected and accepted by the Engineer.

2. Trenches shall not be excessively wet and shall not contain pools of water during backfilling operations.

3. After bedding the conduit, the remaining trench may be filled with regular run of excavated material.

4. The trench shall be completely backfilled and tamped level with the adjacent surface: except that, when sod is to be placed over the trench, the backfilling shall be stopped at a depth equal to the thickness of the sod to be used, with proper allowance for settlement.

5. Any excess excavated material shall be removed and disposed of according to instructions issued by the Engineer.

D. Restoration. Where sod has been removed, it shall be replaced as soon as possible after the backfilling is completed. All areas disturbed by the trenching, storing of dirt, cable laying, pad construction and other work shall be restored to its original condition. The restoration shall include any necessary topsoil, fertilizing, liming, seeding, sprigging, or mulching. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

END OF SECTION

SECTION 26 05 48
VIBRATION AND SEISMIC CONTROLS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Seismic restraint for electrical fixtures, equipment, and raceways.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 RELATED SECTIONS

A. Section 26 05 01 - Basic Electrical Requirements.

B. Section 26 05 33 – Raceway and Boxes.

C. Section 26 05 29 – Hangers and Supporting Devices.

D. Section 26 24 16 - Panelboards.

E. Section 26 51 00 - Interior Lighting.

F. Other sections relating to or affecting Work of this Section.

1.4 REFERENCES

A. Section 26 05 01 - Basic Electrical Requirements.

B. IBC Section 1613 – Earthquake Loads.

1.5 SYSTEM DESCRIPTION

A. Provide seismic restraints for all electrical equipment to withstand Seismic Design Category D forces.

B. Standard fastening methods are considered adequate restraint for the following equipment: -unless additional support is required by IBC 1613.

1. Buried and concealed conduit.

2. Conduit fastened directly to the structure.

3. Flush mounted boxes, cabinets, and panelboards.

C. Provide other electrical equipment with seismic restraints specifically designed for the equipment installed as required by IBC 1613.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Submit product data, details, installation instructions, and calculations stamped by a registered professional engineer certifying that installation will withstand Seismic Design Category D forces.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Mason Industries, Consolidated Kinetics Corporation, Vibration Mountings and Control.

2.2 SWAYBRACING

A. Structural steel or steel channel for rigid bracing.

B. Cable for flexible mounting of suspended equipment.

2.3 ANCHORS

A. Wedge anchors in concrete; Hilti Kwik Bolt, Mason Industries, or equal.

2.4 VIBRATION EQUIPMENT

A. All directional double deflection neoprene or spring seismic rated isolators. Provide horizontal and vertical restraints as required by IBC 1613.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that supporting surfaces are adequate and ready to receive work.

B. Verify that manufacturers' installation instructions and shop drawings are available to installer.

3.2 INSTALLATION

A. Install in accordance with manufacturers instructions.

B. Provide adequate backing. Install restraints to avoid damage to surface where mounted.

C. Provide flexible conduit connections with adequate slack to absorb equipment movement without damage to equipment or conduit system.

D. Provide flexible conduit across seismic joints with adequate slack to absorb building movement without damage.

E. Provide liquidtight flexible conduit between structure and grade for exposed exterior conduit installations. Install to absorb 6" movement in any direction.

3.3 ADJUSTMENT

A. After installation is complete, adjust all adjustable mounts to achieve manufacturer's recommendation clearance.

END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nameplates.
2. Labels.
3. Wire markers.
4. Conduit markers.
5. Stencils.
6. Underground Warning Tape.
7. Lockout Devices.

B. Related Sections:

1. Division 01 - Painting and Coating: Execution requirements for painting specified by this section.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data:

1. Submit manufacturer’s catalog literature for each product required.

2. Submit electrical identification schedule including list of wording, symbols, letter size, color coding, tag number, location, and function.

D. Manufacturer's Installation Instructions: Indicate installation instructions, special procedures, and installation.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of tagged devices; include tag numbers.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with Alaska DOT standard.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Division 01 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Accept identification products on site in original containers. Inspect for damage.

C. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

D. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Division 01 - Product Requirements: Environmental conditions affecting products on site.

B. Install labels and nameplates only when ambient temperature and humidity conditions for adhesive are within range recommended by manufacturer.

PART 2 - PRODUCTS

2.1 NAMEPLATES

A. Furnish materials in accordance with Alaska DOT standards.

B. Product Description: Laminated three-layer plastic with engraved black letters on white background color.

C. Letter Size:

1. 1/8 inch high letters for identifying individual equipment and loads.

2. 1/4 inch high letters for identifying grouped equipment and loads.

3. 1/2 inch high letters for identifying cabinets and panelboards.

D. Minimum nameplate thickness: 1/8inch.

2.2 LABELS

A. Furnish materials in accordance with Alaska DOT standards.

B. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background.

2.3 WIRE MARKERS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description: Cloth tape, split sleeve, or tubing type wire markers.

C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number as indicated on Drawings.

2. Control Circuits: Control wire number as indicated on shop drawings.

2.4 CONDUIT AND RACEWAY MARKERS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description: Nameplate fastened with straps.

C. Color: Black lettering on white background.

D. Legend: 120/240 Volt System: 120/240 VOLTS.

2.5 UNDERGROUND WARNING TAPE

A. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

2.6 LOCKOUT DEVICES

A. Lockout Hasps:

1. Anodized aluminum or Reinforced nylon hasp with erasable label surface; size minimum 7-1/4 x 3 inches.

PART 3 - EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install identifying devices after completion of painting.

B. Nameplate Installation:

1. Install nameplate parallel to equipment lines.

2. Install nameplate for each electrical distribution and control equipment enclosure with corrosive-resistant mechanical fasteners, or adhesive.

3. Install nameplates for each control panel and major control components located outside panel with corrosive-resistant mechanical fasteners, or adhesive.

4. Secure nameplate to equipment front using screws, rivets, or adhesive.

5. Install nameplates for the following:

a. Panelboards.

b. Contactors.

c. Service Disconnects.

C. Label Installation:

1. Install label parallel to equipment lines.

2. Install label for identification of individual control device stations.

3. Install labels for permanent adhesion and seal with clear lacquer.

D. Wire Marker Installation:

1. Install wire marker for each conductor at panelboard gutters, pull boxes, outlet and junction boxes and each load connection.

2. Mark data cabling at each end. Install additional marking at accessible locations along the cable run.

3. Install labels at data outlets identifying patch panel and port designation.

E. Conduit Marker Installation:

1. Install conduit marker for each conduit longer than 6 feet.

2. Conduit Marker Spacing: 20 feet on center.

3. Raceway Painting: Identify conduit using field painting.

a. Paint colored band on each conduit longer than 6 feet.

b. Paint bands 20 feet on center.

c. Color:

1) Fire Alarm System: Red.

2) Telephone/Data System: Blue.

F. Underground Warning Tape Installation:

1. Install underground warning tape along length of each underground conduit, raceway, or cable 6 to 8 inches below finished grade, directly above buried conduit, raceway, or cable.

END OF SECTION

SECTION 26 24 12
SERVICE ENTRANCE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Arrangement with Utility Company for permanent electric service as indicated on the drawings.

B. Service entrance.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 RELATED SECTIONS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems

B. Section 26 05 48 – Vibration and Seismic Restraint.

C. Other sections referring to or affecting Work of this Section.

1.4 REFERENCES

A. Section 26 05 01 - Basic Electrical Requirements.

B. General Contract Provisions: GCP 50-06-Utilities.

1.5 QUALITY ASSURANCE

A. Provide service entrance in accordance with Utility Company's rules and regulations.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Submit shop drawings and product data under provisions of Section 26 05 01 and Division 01.

PART 2 - PRODUCTS

2.1 METERING EQUIPMENT

A. Provide enclosure and appropriate meter base as required by the serving utility.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Coordinate with the Utility Company as specified in GCP 50-06.

B. Provide service entrance conduits to building service entrance equipment as indicated on drawings and as required by utility company.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Distribution and branch circuit panelboards.

B. Related Requirements:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

2. Section 26 05 53 - Identification for Electrical Systems.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCE STANDARDS

A. Institute of Electrical and Electronics Engineers:

1. IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association:

1. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

2. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.

3. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

4. NEMA PB 1 - Panelboards.

5. NEMA PB 1.1 - General Instructions for Proper Installation, Operation, and Maintenance of Panelboards Rated 600 Volts or Less.

C. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

D. National Fire Protection Association:

1. NFPA 70 - National Electrical Code.

2. NFPA 70E – Standard for Safety in the Workplace.

E. Underwriters Laboratories Inc.:

1. UL 50 - Cabinets and Boxes

2. UL 67 - Safety for Panelboards.

3. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

4. UL 1449 - Transient Voltage Surge Suppressors.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Requirements for submittals.

C. Product Data: Submit catalog data showing specified features of standard products.

D. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

E. Source Quality control submittals: Indicate results of factory tests and inspections.

F. Field Quality Control Submittals: Indicate results of Contractor furnished tests and inspections.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations of panelboards and record actual circuiting arrangements.

1. Provide updated typed panel schedule.

C. Operation and Maintenance Data: Submit spare parts listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Division 01- Requirements for maintenance products.

B. Extra Stock Materials:

1. Furnish two of each panelboard key. Panelboards keyed alike.

1.7 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.

C. Materials:

1. Panelboard Bus: Copper, current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.

2. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; or as indicated on Drawings.

3. Molded Case Circuit Breakers: UL 489, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.

4. Enclosure: NEMA PB 1, Type 12.

5. Cabinet Box: 6 inches deep, 20 inches wide for 240 volt panelboards.

D. Cabinet Front: Surface cabinet front with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finishes:

1. Finish in manufacturer's standard gray enamel.

2.2 SOURCE QUALITY CONTROL

A. Division 01 - Quality Requirements: Testing, inspection and analysis requirements.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Disconnect abandoned panelboards and load centers. Remove abandoned panelboards and load centers.

3.2 INSTALLATION

A. Install panelboards in accordance with NEMA PB 1.1.

B. Install panelboards plumb.

C. Height: 6 feet to top of panelboard.

D. Install filler plates for unused spaces in panelboards.

E. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes to balance phase loads. Identify each circuit as to its clear, evident and specific purpose of use.

F. Install engraved plastic nameplates in accordance with Section 26 05 53.

G. Provide Arc Flash Warning Label in accordance with NFPA 70E.

H. Ground and bond panelboard enclosure according to Section 26 05 26. Connect equipment ground bars of panels in accordance with NFPA 70.

3.3 FIELD QUALITY CONTROL

A. Division 01 - Quality Requirements: Requirements for inspecting, testing.

B. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

C. Inspect and test in accordance with NETA ATS, except Section 4.

D. Perform circuit breaker inspections and tests listed in NETA ATS, Section 7.6.

3.4 ADJUSTING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for starting and adjusting.

B. Measure steady state load currents at each panelboard feeder; rearrange circuits in panelboard to balance phase loads to within **20** percent of each other. Maintain proper phasing for multi-wire branch circuits.

3.5 CLEANING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

END OF SECTION

SECTION 26 27 16
ELECTRICAL CABINETS AND ENCLOSURES

PART 1 - GENERAL

1.1 SUMMARY

A. **Section Includes:**

1. Hinged cover enclosures.
2. Cabinets.
3. Terminal blocks.
4. Accessories.

B. Related Requirements:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
3. Section 26 05 33 - Raceway and Boxes.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA ICS 4 - Industrial Control and Systems: Terminal Blocks.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other

evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit manufacturer's standard data for enclosures, cabinets, and terminal blocks.

D. Manufacturer's Instructions: Submit application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Qualification Statements:

1. Submit manufacturer, experience qualifications.

2. Submit manufacturer's approval of installer.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for maintenance materials.

B. Extra Stock Materials:

1. Furnish two of each key.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.

PART 2 - PRODUCTS

2.1 HINGED COVER ENCLOSURES

A. Furnish materials in accordance with Alaska DOT standards.

B. Description: NEMA 250, Type 12 steel enclosure.

1. Covers: Continuous hinge, held closed by flush latch operable by key.

2. Furnish interior plywood panel for mounting terminal blocks and electrical components; finish with white enamel.

3. Enclosure Finish: Manufacturer's standard enamel.

2.2 CABINETS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description:

1. Boxes: Galvanized steel.

2. Box Size: As indicated on drawings.

3. Backboard: Furnish 3/4-inch thick plywood backboard for mounting terminal blocks. Paint matte white.

4. Fronts: Steel, surface type with door with concealed hinge, and flush lock keyed to match branch circuit panelboard.

C. Fabrication

1. Furnish metal barriers to form separate compartments wiring of different systems and voltages.

D. Finishes:

1. Finish with gray baked enamel.

2.3 TERMINAL BLOCKS

A. Furnish materials in accordance with Alaska DOT standards.

B. Description:

1. Terminal Blocks: NEMA ICS 4.

2. Power Terminals: Unit construction type with closed back and tubular pressure screw connectors, rated 600 volts.

3. Signal and Control Terminals: Modular construction type, suitable for channel mounting, with tubular pressure screw connectors, rated 300 volts.

4. Furnish ground bus terminal block, with each connector bonded to enclosure.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Remove abandoned cabinets and enclosures, including abandoned cabinets and enclosures above accessible ceiling finishes.

3.2 INSTALLATION

A. Install enclosures and boxes plumb. Anchor securely to wall and structural supports at each corner in accordance with Section 26 05 29.

B. Install cabinet fronts plumb.

3.3 CLEANING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Final cleaning.

B. Clean electrical parts to remove conductive and harmful materials.

C. Remove dirt and debris from enclosure.

D. Clean finishes and touch up damage.

END OF SECTION

SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes wall switches; wall dimmers; receptacles; multioutlet assembly; and device plates and decorative box covers.

B. Related Sections:

1. Section 26 05 33 - Raceway and Boxes: Outlet boxes for wiring devices.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA WD 1 - General Requirements for Wiring Devices.

2. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

B. Underwriters Laboratories:

1. UL 20 - General-Use Snap Switches.

2. UL 231 - Standard for Power Outlets.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit manufacturer's catalog information showing dimensions, colors, and configurations.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 WALL SWITCHES

A. Product Description: NEMA WD 1, Heavy-Duty, AC only general-use snap switch. Provide 3-way switches where indicated on drawings.

B. Body and Handle: Ivory plastic with toggle handle.

C. Locator Light: Lighted handle type switch.

D. Ratings: Match branch circuit and load characteristics.

2.2 RECEPTACLES

A. Product Description: NEMA WD 1, Heavy-duty general use receptacle.

B. Device Body: Gray plastic.

C. Configuration: NEMA WD 6, type as indicated on Drawings.

D. Convenience Receptacle: Type 5-20.

E. Screw terminal or screw clamp only.

F. Back wiring shall be screw clamp type terminals that will accept #10 wire.

G. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

H. Exterior receptacles: GFCI, listed as weather resistant, with spring loaded “while in use” covers with rubber gaskets. Mount in cast box.

I. Other receptacles: As indicated on drawings or as required for equipment connected.

2.3 WALL PLATES

A. Decorative Cover Plate: Stainless steel.

B. Jumbo Cover Plate: Stainless steel.

C. Weatherproof Cover Plate: “While in use” gasketed device cover.

2.4 MULTIOUTLET ASSEMBLY

A. Multi-outlet Assembly: Sheet metal channel with fitted cover, suitable for use as multi-outlet assembly.

B. Size: As indicated on Drawings.

C. Receptacles: Furnish covers and accessories to accept duplex convenience receptacles specified in this Section.

D. Receptacle Spacing: As indicated on Drawings.

E. Receptacle Color: Gray.

F. Channel Finish: Gray enamel.

G. Fittings: Furnish manufacturer's standard couplings, elbows, and connectors

2.5 PHOTOCELLS

A. Manufacturers:

1. Tork or approved equal.

B. Furnish materials in accordance with State of Alaska Department of Transportation standards.

C. General: Consist of sensor mounted as indicated on Drawings.

D. Sensor Devices: Each sensor employs photo diode technology to allow linear response to daylight within illuminance range.

1. Exterior Lighting: Hooded sensor, horizontally mounted, employing flat lens, and working range 1-10 footcandles in 10 percent increments. Entire sensor encased in optically clear epoxy resin.

2. Obstruction Lights: Hooded sensor, horizontally mounted, employing flat lens, and working range turn on when the north sky light intensity reaches a level of 35 foot-candles, and automatically turned off when the north sky light intensity reaches a level of 58 foot-candles. Entire sensor encased in optically clear epoxy resin.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Verify outlet boxes are installed at proper height.

C. Verify wall openings are neatly cut and completely covered by wall plates.

D. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

A. Clean debris from outlet boxes.

3.3 EXISTING WORK

A. Disconnect and remove abandoned wiring devices.

3.4 INSTALLATION

A. Install devices plumb and level.

B. Install switches with OFF position down.

C. Install receptacles with grounding pole on bottom.

D. Connect wiring device grounding terminal to outlet box with bonding jumper and branch circuit equipment grounding conductor.

E. Install wall plates on flush mounted switches, receptacles, and blank outlets.

F. Install decorative plates on switch, receptacle, and blank outlets in finished areas.

G. Connect wiring devices by wrapping solid conductor around screw terminal. When stranded conductors are used, use crimp on fork terminals for device terminations. Do not place bare stranded conductors directly under device screws.

H. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.5 INTERFACE WITH OTHER PRODUCTS

A. Coordinate locations of outlet boxes provided under Section 26 05 33 to obtain mounting heights as specified and as indicated on drawings.

B. Install wall switch 48 inches above finished floor.

C. Install convenience receptacle 24 inches above finished floor in office.

D. Install convenience receptacle 48 inches above finished floor in vehicle bays.

3.6 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect each wiring device for defects.

C. Operate each wall switch with circuit energized and verify proper operation.

D. Verify each receptacle device is energized.

E. Test each receptacle device for proper polarity.

F. Test each GFCI receptacle device for proper operation.

G. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Final cleaning.

B. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 28 13
FUSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes fuses and spare fuse cabinet.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.

1.4 DESIGN REQUIREMENTS

A. Select fuses to provide appropriate levels of short circuit and overcurrent protection for the following components: wire, cable, bus structures, and other equipment. Design system to maintain component damage within acceptable levels during faults.

B. Select fuses to coordinate with time current characteristics of other overcurrent protective elements, including other fuses, circuit breakers, and protective relays. Design system to maintain operation of device closest to fault operates.

1.5 FUSE PERFORMANCE REQUIREMENTS

A. General Purpose Branch Circuits: Class RK5.

B. Motor Branch Circuits: Class RK1 (time delay).

C. Lighting Branch Circuits: Class G.

1.6 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference

requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit data sheets showing electrical characteristics, including time-current curves.

1. If a specified product will not be used on this project then indicate on the product submittal that it will not be used.

1.7 CLOSEOUT SUBMITTALS

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual sizes, ratings, and locations of fuses.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.9 MAINTENANCE MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

B. Furnish two fuse pullers.

1.10 EXTRA MATERIALS

A. Section Division 01- Execution and Closeout Requirements: Requirements for extra materials.

B. Furnish three spare fuses of each Class, size, and rating installed.

PART 2 - PRODUCTS

2.1 FUSES

A. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.2 CLASS RK1 (TIME DELAY) FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.3 CLASS RK5 FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.4 CLASS G FUSES

A. Dimensions and Performance: NEMA FU 1.

B. Voltage: Rating suitable for circuit phase-to-phase voltage.

2.5 SPARE FUSE CABINET

A. Product Description: Wall-mounted sheet metal cabinet with shelves, suitably sized to store spare fuses and fuse pullers specified.

B. Doors: Hinged, with hasp for Owner's padlock.

C. Finish: Gray enamel.

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Remove fuses from abandoned circuits.

3.2 INSTALLATION

A. Install fuse with label oriented so manufacturer, type, and size are easily read.

B. Install spare fuse cabinet as directed.

END OF SECTION

SECTION 26 28 19
ENCLOSED SWITCHES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible.
2. Nonfusible switches.

B. Related Requirements:

1. Section 26 05 29 - Hangers and Supports for Electrical Systems.
2. Section 26 05 53 - Identification for Electrical Systems.
3. Section 26 28 13 - Fuses.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCE STANDARDS

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.
2. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product

was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit switch ratings and enclosure dimensions.

1.5 CLOSEOUT SUBMITTALS

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of enclosed switches and ratings of installed fuses.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD, enclosed load interrupter knife switch. Handle lockable in OFF position.

B. Operation:

1. Switch Ratings

a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.

b. Short Circuit Current Rating: UL listed for 200,000 rms symmetrical amperes when used with or protected by Class R or Class J fuses (30-600 ampere switches employing appropriate fuse rejection schemes).

C. Materials:

1. Fuse clips: Designed to accommodate NEMA FU 1, Class R fuses.

2. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

a. Interior Locations: Type 12.

b. Exterior Locations: Type 4x.

3. Furnish switches with entirely copper current carrying parts.

2.2 NONFUSIBLE SWITCH ASSEMBLIES

A. Description: NEMA KS 1, Type HD enclosed load interrupter knife switch. Handle lockable in OFF position.

B. Operation:

1. Switch Ratings

a. Switch Rating: Horsepower rated for AC or DC as indicated on Drawings.

C. Materials:

1. Enclosure: NEMA KS 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

a. Interior Locations: Type 12.

b. Exterior Locations: Type 4x.

2. Furnish switches with entirely copper current carrying parts.

PART 3 - EXECUTION

3.1 DEMOLITION

A. Disconnect and remove abandoned enclosed switches.

3.2 INSTALLATION

A. Install enclosed switches where indicated.

B. Install enclosed switches plumb. Provide supports in accordance with Section 26 05 29.

C. Height: 5 feet to operating handle.

D. Install fuses for fusible disconnect switches. Refer to Section 26 28 13 for product requirements.

E. Install engraved plastic nameplates in accordance with Section 26 05 53. Engrave nameplates with the equipment served and the panel and circuit number supplying the switch.

F. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.5.

3.4 CLEANING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Requirements for cleaning.

END OF SECTION

SECTION 26 28 23
ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes molded-case circuit breakers in individual enclosures.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 29 - Hangers and Supports for Electrical Systems.
3. Section 26 05 53 - Identification for Electrical Systems.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

B. Underwriters Laboratories Inc.:

1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and continuous current ratings of enclosed circuit breakers.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 MOLDED CASE CIRCUIT BREAKER

A. Product Description: Enclosed, molded-case circuit breaker conforming to UL 489.

B. Accessories: As indicated on Drawings. Conform to UL 489.

C. Enclosure: UL 489, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

1. Interior Locations: Type 12.

2. Exterior Locations: Type 4x.

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed circuit breakers.

3.2 INSTALLATION

A. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.

B. Height: 5 feet to operating handle.

C. Install grounding and bonding in accordance with requirements of Section 26 05 26.

D. Locate and install engraved plastic nameplates in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.6.1.1.

END OF SECTION

SECTION 26 29 13
ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes manual and magnetic motor controllers in individual enclosures.

B. Related Sections:

1. Section 26 28 13 - Fuses.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.

2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.

4. NEMA ICS 6 - Industrial Control and Systems: Enclosures.

5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. Underwriters Laboratories Inc.:

1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit catalog sheets showing voltage, controller size, ratings and size of switching and overcurrent protective devices, short circuit ratings, dimensions, and enclosure details.

D. Test Reports: Indicate field test and inspection procedures and test results.

1.5 CLOSEOUT SUBMITTALS

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and ratings of enclosed controllers.

C. Operation and Maintenance Data: Submit Replacement parts list for controllers.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 MANUAL MOTOR CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller with overload element, and toggle operator.

B. Enclosure: NEMA ICS 6, Type 4 or 12.

2.2 FRACTIONAL-HORSEPOWER MANUAL CONTROLLER

A. Product Description: NEMA ICS 2, AC general-purpose, Class A, manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, and toggle operator.

B. Enclosure: NEMA ICS 6, Type 4 or 12.

2.3 MOTOR STARTING SWITCH

A. Product Description: NEMA ICS 2, AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, without thermal overload unit, with toggle operator.

B. Enclosure: NEMA ICS 6, Type 4 or 12.

2.4 FULL-VOLTAGE NON-REVERSING CONTROLLERS

A. Product Description: NEMA ICS 2, AC general-purpose Class A magnetic or solid-state controller for induction motors rated in horsepower.

B. Control Voltage: 120 volts, 60 Hertz.

C. Overload Relay: NEMA ICS 2; bimetal.

D. Product Features:

1. Auxiliary Contacts: NEMA ICS 2, 2 each normally open and normally closed contacts in addition to seal-in contact.

2. Cover Mounted Pilot Devices: NEMA ICS 5, oiltight type.

3. Pilot Device Contacts: NEMA ICS 5, Form Z, rated A150

4. Indicating Lights: Green RUN light in front cover. LED type.

5. Selector Switches: HAND/OFF/AUTO in front cover. Rotary type.

E. Combination Controllers: Combine motor controllers with disconnect in common enclosure, using thermal magnetic circuit breaker conforming to UL 489, with integral thermal and instantaneous magnetic trip in each pole.

F. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

1. Interior Locations: Type 12.

2. Exterior Locations: Type 4x.

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned enclosed motor controllers.

3.2 INSTALLATION

A. Install enclosed controllers plumb. Provide supports in accordance with Section 26 05 29.

B. Height: 5 feet to operating handle.

C. Select and install overload heater elements in motor controllers to match installed motor characteristics.

D. Install engraved plastic nameplates. Refer to Section 26 05 53 for product requirements and location.

E. Neatly type label and place inside each motor controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

F. Coordinate all work with Mechanical Contractor. Unless otherwise indicated, heating, ventilating and plumbing equipment motors and controls are furnished, set in place, and wired in accordance with the schedule in Section 26 05 03 Paragraph 3.3J.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION

SECTION 26 29 16
ENCLOSED CONTACTORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes enclosed contactors for lighting and general purposes.

B. Related Sections:

1. Section 26 28 13 - Fuses.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA FU 1 - Low Voltage Cartridge Fuses.

2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.

3. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices.

4. NEMA ICS 6 - Industrial Control and Systems: Enclosures.

5. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).

B. International Electrical Testing Association:

1. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

C. Underwriters Laboratories Inc.:

1. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches, and Circuit-Breaker Enclosures.

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit dimensions, size, voltage ratings and current ratings.

1.5 CLOSEOUT SUBMITTALS

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations and ratings of enclosed contactors.

C. Operation and Maintenance Data: Submit instructions for replacing and maintaining coil and contacts.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 GENERAL PURPOSE CONTACTORS

A. Product Description: NEMA ICS 2, AC general purpose magnetic contactor.

B. Configuration: Mechanically held, 2 wire control

C. Coil operating voltage: 120 volts, 60 Hertz.

D. Poles: To match circuit configuration and control function.

E. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

1. Interior Dry Locations: Type 1.

2. Exterior Locations: Type 4x.

2.2 LIGHTING CONTACTORS

A. Product Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Electrically held, 2 wire control.

C. Coil operating voltage: 120 volts, 60 Hertz.

D. Poles: To match circuit configuration and control function.

E. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads. Minimum 30A rating.

F. Accessories:

1. Cover Mounted Pilot Devices: NEMA ICS 5, heavy-duty oiltight type with Form Z contacts, rated A150

2. Selector Switch: ON/OFF/AUTOMATIC function, with rotary.

G. Enclosure: NEMA ICS 6, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.

1. Interior Dry Locations: Type 1.

2. Exterior Locations: Type 4x.

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect abandoned enclosed contactors and remove abandoned enclosed contactors.

3.2 INSTALLATION

A. Install enclosed contactors as indicated on Drawings, in accordance with NECA "Standard of Installation."

B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 05 29.

C. Height: 5 ft to operating handle.

D. Install engraved plastic nameplates. Refer to Section 26 05 53 for product requirements and location.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.16.1.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes interior luminaires, lamps, ballasts, and accessories.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.
3. Section 26 52 00 - Emergency Lighting.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. ANSI C78.379 - Electric Lamps – Classification of the Beam Patterns of Reflector Lamps.

B. NEMA SSL1 and 6 Solid State Lighting.

C. IESNA LM-79-2008 - Approved Method for the Electrical and Photometric Testing of Solid-State Lighting Devices

D. IESNA LM-80-2008 - Lumen Depreciation of LED Light Sources

E. IESNA TM-21-2011 – Projecting Long Term Lumen Maintenance of LED Light Sources

F. ANSI C78.377-2009 – Electric Lamps – Specifications for the Chromaticity of Solid State Lighting Products

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request

prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Shop Drawings: Indicate dimensions and components for each luminaire not standard product of manufacturer.

C. Product Data: Submit dimensions, ratings, and performance data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

1.7 MAINTENANCE MATERIALS

A. Division 01 - Execution and Closeout Requirements: Spare parts and maintenance products.

PART 2 - PRODUCTS

2.1 INTERIOR LUMINAIRES

A. Product Description: Complete interior luminaire assemblies, with features, options, and accessories as scheduled.

B. Refer to Division 01 - Product Requirements for product options.

C. Provide products as specified in the Fixture Schedule. All products U.L. or other State of Alaska approved Nationally Recognized Testing Laboratory listed for the application. Provide complete with all accessories.

D. Install drivers and specified accessories at factory.

E. Verify type of ceiling where fixtures are installed. Provide trim that is compatible with ceiling. Provide bottom accessible fixtures in all inaccessible ceilings.

F. Unless otherwise scheduled, provide lenses of 100 percent virgin acrylic and minimum 0.125 inch overall thickness after manufacture.

G. Provide luminaires free of visible light leaks in body or lens frame. Replace all fixtures showing visible light leaks at no increase to contract amount.

2.2 SOLID STATE LAMPS, DRIVER, AND FIXTURE

A. SSL or LED fixture shall meet or exceed the following salient properties.

B. Lamps

1. Color Temperature – 4000 Kelvin
2. Color Rendering Index minimum 80 CRI
3. L80 Rated Life minimum 50,000 hours

C. Driver

1. Class 1
2. Sound Class A
3. 120 Vac, 60 Hz
4. Full Range Dimming – 1-10V control
5. Efficiency greater than 85% at full Load
6. Power Factor minimum 90%
7. THD maximum 20%
8. IEEE/ANSI C62.41.2 Surge Suppression. 10k

D. Fixture

1. UL Listed
2. 5 year Warranty
3. Delivered Lumens as shown on Fixture Schedule as tested per IESNA LM-79
4. Provide the energy efficiency as shown on Fixture Schedule (LER).

E. Emergency

1. Less than 20 Watts – Bodine ELI-S-20
2. Greater than 20 Watts – Bodine ELI-100-SD

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned luminaires, lamps, and accessories.

3.2 INSTALLATION

A. Install suspended luminaires using pendants supported from swivel hangers. Install pendant length required to suspend luminaire at indicated height.

B. Support luminaires larger than 2 x 4 foot size independent of ceiling framing.

C. Locate recessed ceiling luminaires as indicated on Drawings

D. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.

E. Install recessed luminaires to permit removal from below.

F. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

G. Install clips to secure recessed grid-supported luminaires in place.

H. Install wall-mounted luminaires at height as indicated on Drawings.

I. Install accessories furnished with each luminaire.

J. Connect luminaires to branch circuit outlets provided under Section 26 05 33 using flexible conduit.

K. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

L. Install specified lamps in each luminaire.

M. Ground and bond interior luminaires in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Aim and adjust luminaires.

3.5 CLEANING

A. Section 26 05 01 and Division 01 - Execution and Closeout Requirements: Final cleaning.

B. Remove dirt and debris from enclosures.

C. Clean photometric control surfaces as recommended by manufacturer.

D. Clean finishes and touch up damage.

3.6 PROTECTION OF FINISHED WORK

A. Section 26 05 01 and Division 01- Execution and Closeout Requirements: Protecting finished work.

B. Relamp luminaires having failed lamps at Substantial Completion.

END OF SECTION

SECTION 26 52 00
EMERGENCY LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes emergency lighting units and exit signs.

B. Related Sections:

1. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

2. Section 26 05 33 - Raceway and Boxes for Electrical Systems.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for "Total Facility". Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. National Electrical Manufacturers Association:

1. NEMA WD 6 - Wiring Devices-Dimensional Requirements.

1.4 SYSTEM DESCRIPTION

A. Emergency lighting to comply with requirements.

1.5 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Product Data: Submit dimensions, ratings, and performance data.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

PART 2 - PRODUCTS

2.1 EMERGENCY LIGHTING UNITS

A. Product Description: Wall mounted fixtures with twin lamp heads, connected to an integral inverter. See fixture schedule on drawings.

B. Inverter Battery: Nickel-cadmium type, with 1.5 hour capacity with all emergency lights and exit signs in operation.

C. Inverter Input Voltage: 120 volts.

2.2 EXIT SIGNS

A. Product Description: Exit sign fixture connected to an integral inverter. See fixture schedule on drawings.

B. Directional Arrows: As indicated on Drawings.

C. Mounting: As indicated on Drawings.

D. Lamps: LED.

PART 3 - EXECUTION

3.1 EXISTING WORK

A. Disconnect and remove abandoned emergency lighting units, exit signs, lamps, and accessories.

3.2 INSTALLATION

A. Install suspended exit signs using pendants supported from swivel hangers. Install pendant length required to suspend sign at indicated height.

B. Install surface-mounted emergency lighting units and exit signs plumb and adjust to align with building lines and with each other. Secure to prevent movement.

C. Install wall-mounted emergency lighting units and exit signs at height as indicated on Drawings.

D. Install accessories furnished with each emergency lighting unit and exit sign.

E. Connect emergency lighting units and exit signs to Inverter.

F. Make wiring connections to inverter using building wire with insulation suitable for temperature conditions within unit.

G. Install specified lamps in each emergency lighting unit and exit sign.

H. Ground and bond emergency lighting units and exit signs in accordance with Section 26 05 26.

3.3 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Operate each unit after installation and connection. Inspect for proper connection and operation.

3.4 ADJUSTING

A. Aim and adjust lamp fixtures.

3.5 PROTECTION OF FINISHED WORK

A. Division 01 - Execution and Closeout Requirements: Protecting finished work.

B. Relamp emergency lighting units and exit signs having failed lamps at Substantial Completion.

END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes exterior luminaries, poles, and accessories.

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 REFERENCES

A. NEMA SSL 1 and 6 solid state lighting.

B. ANSI/IES RP-20 - Lighting for Parking Facilities.

C. IESNA LM-79-08 - Approved Method for the Electrical and Photometric Testing of Solid-State Lighting Devices

D. IESNA LM-80-08 - Lumen Depreciation of LED Light Sources

E. IESNA TM-21-11 – Projecting Long Term Lumen Maintenance of LED Light Sources

F. ANSI C78.377-2009 – Electric Lamps – Specifications for the Chromaticity of Solid State Lighting Products

G. IESNA TM-15-07: Backlight, Uplight, and Glare (BUG) Ratings

1.4 SUBMITTALS

A. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy America Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

B. Section 26 05 01 and Division 01 - Submittal Procedures: Submittal procedures.

C. Shop Drawings: Indicate dimensions and components for each luminaire not standard Product of manufacturer.

D. Product Data: Submit dimensions, ratings, and performance data.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 26 05 01 and Division 01 - Product Requirements: Product storage and handling requirements.

1.7 COORDINATION

A. Division 01 - Administrative Requirements: Coordination and project conditions.

B. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

PART 2 - PRODUCTS

2.1 LUMINAIRES

A. Product Description: Complete exterior luminaire assemblies, with features, options, and accessories as scheduled.

B. Provide products as specified on Drawings. All products U.L. or other State of Alaska approved Nationally Recognized Testing Laboratory listed for the application. Provide complete with all accessories.

C. All Components Exposed to Weather: Galvanized, epoxy coated, or equally protected from corrosion.

D. All lenses impact resistant.

E. Provide all new lighting fixtures delivered to project in original manufacturers' cartons.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 26 05 01 and Division 01 - Administrative Requirements: Coordination and Project conditions.

3.2 EXISTING WORK

A. Disconnect and remove abandoned exterior luminaries.

3.3 INSTALLATION

A. Bond and ground luminaries, metal accessories and metal poles in accordance with Section 26 05 26.

3.4 FIELD QUALITY CONTROL

A. Section 26 05 01 and Division 01: Field inspecting, testing, adjusting, and balancing.

B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.

3.5 ADJUSTING

A. Aim and adjust luminaries as directed.

3.6 CLEANING

A. Clean photometric control surfaces as recommended by manufacturer.

B. Clean finishes and touch up damage.

3.7 PROTECTION OF FINISHED WORK

A. Division 01 - Execution and Closeout Requirements: Protecting finished work.

B. Relamp luminaries having failed lamps at Substantial Completion.

END OF SECTION

SECTION 41 22 23
MONORAIL HOIST

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. Section 13 34 19 – Metal Building Systems

1.2 BUY AMERICAN PREFERENCE

A. The SREB must meet Federal-Aid (FAA) Buy American Preference requirements for “Total Facility”. Reference GCP 60-09. The intent is for the Bidder to comply with 100% Buy American Preferences of 49 USC 50101(a). Items NOT meeting 100% Buy American requirements shall be identified by the apparent low Bidder to prepare a Type 3 or Type 4 Waiver request prior to Contract award.

1.3 SUBMITTALS

A. Submit under provisions of GCP 60-08 – Submittal Procedures. If manufacturers standard product data is submitted mark out non-applicable items.

B. Buy American Compliance

1. All submittals shall include a manufacturer or supplier certification or other evidence that products meet Buy American Preference requirements of the project. This may include evidence the product was submitted in an approved Type 3 or Type 4 waiver request prior to contract award. Submittals without the certification or other evidence indicating compliance will be rejected without further review.

C. Submit the following:

1. Manufacturer’s standard product data: mark out non-applicable items.
2. Manufacturer's Installation Drawings and Instructions: Indicate preparation requirements and assembly sequence.
3. Supplier’s Certification that product meets the requirements of this specification.

1.4 WARRANTY

A. Provide 1-year warranty.

PART 2 – PRODUCTS

2.1 TROLLEY AND HOIST

A. Provide overhead monorail hoist system with a hand operated chain hoist mounted on a push-type moveable trolley. The system shall conform to ANSI B30.11, ANSI B30.16 and HMI 200. The system shall have a minimum capacity of 2 tons, with a maximum chain pull of 80 pounds, and shall be designed for intermittent usage. Provide load brake, load limiter and lifetime lubricated gear train. Provide hoist chain with forged swivel hook (w/latch) of sufficient length to allow hook to reach the floor. Hoist shall allow lift of 13' minimum. Trolley wheels shall have anti-friction ball bearings. Paint with manufacturer's standard primer and finish coat.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Erect and install system as per manufacturer's recommendations and approved submittals.

END OF SECTION

APPENDIX L

MATERIAL SALES AGREEMENT

(Not Used)

APPENDIX M

ELECTRICAL UTILITY TECHNICAL SPECIFICATIONS

33 05 01 - BASIC ELECTRICAL UTILITY REQUIREMENTS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Basic Electrical Utility Requirements specifically applicable to Division 33 Sections, in addition to project Specifications General Contract Provisions (GCPs).

1.2 SPECIFICATION TERMINOLOGY

A. In many instances the words "has," "has been," "shall," "shall be," "will," and "will be" and so forth have been deliberately omitted. These words are inferred and considered a part of these specifications as if appearing in each instance.

B. Definitions:

1. "Provide": Includes all material, labor, sub-contracts, and appurtenances required for a complete, finished, satisfactory operating system. Furnish and Install.

2. "Furnish": Purchase and deliver to job site, products as shown and specified. Installation not required under Division 33, unless otherwise indicated.

3. "Install": Set in place and connect ready for use, in a complete, finished, satisfactory operating condition products that have been furnished.

4. "Product" is a generic term which includes materials, equipment, fixtures and any physical item used on the project.

5. "As-Built Drawings": Drawings that reflect the electrical systems as actually constructed.

1.3 WORK INCLUDED

A. Unless specifically stated elsewhere, provide all work shown, described, or otherwise indicated on the contract drawings and specifications are required under this contract.

B. Work is not complete until all systems are complete, finished, and in satisfactory operating condition.

C. Bring any questionable items or apparent conflicts to the attention of the Engineer during the bidding period and request clarification.

1.4 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all permits, licenses, fees, inspections, approvals and other arrangements necessary to perform the electrical work. Request inspections from the authority having jurisdiction and submit copies of inspection reports to the Engineer. Upon completion of the project, furnish the Engineer the original final

inspection certificate.

1.5 COORDINATION

A. Coordinate all work with the serving utilities and provide equipment and installation in accordance with the utility requirements.

B. Lay out all work in advance and coordinate with other trades to avoid conflicts. Coordinate and cooperate with all trades to complete the work within the project schedule. Make, at no additional cost, any changes necessary as a result of failure to properly coordinate, supervise, or schedule the work. Make such changes as directed by the Engineer.

C. Prior to start of construction, verify locations for connection to equipment furnished or installed by others. Prior to rough-in, verify information shown on electrical drawings with approved shop drawings of equipment furnished or installed by others. Notify the Engineer of any conflicts.

1.6 DRAWING PRESENTATION

A. Electrical drawings are diagrammatic and do not show all details of the work required. Locations of electrical items are approximate unless dimensioned. The Engineer may direct minor adjustments in equipment locations. Make these adjustments at no extra cost providing direction is received prior to start of construction. Do not scale drawings; field verify dimensions and locations.

B. The drawings and specifications are complementary; what is shown on one is as binding as if called for on both.

1.7 ELECTRICAL REFERENCE SYMBOLS

A. Symbols are based on industry standards supplemented by special symbols for the particular project. Refer to the legend to identify symbols shown on plans.

1.8 PROJECT/SITE CONDITIONS

A. Become thoroughly familiar with the project, the site, and the local conditions under which the work is to be performed. Failure to do so does not relieve the Contractor from contract requirements.

B. Install work as shown on drawings, unless prevented by project conditions.

C. When proposing changes, submit proposal showing proposed rearrangement of work to meet project conditions, including changes to work specified in other sections. Obtain permission of the Engineer before proceeding.

1.9 REFERENCES

A. Furnish material and equipment which has been tested and conforms to the applicable referenced standards. Install material and equipment in accordance with the requirements and within the limits of the standards.

1. American Society for Testing and Material - ASTM.

2. American National Standards Institute - ANSI.

3. Insulated Cable Engineers Association - ICEA.

4. Institute of Electrical and Electronics Engineers - IEEE.

5. National Electrical Manufacturers' Association - NEMA.

6. National Fire Protection Association - NFPA.

7. Underwriters' Laboratories, Inc. - U.L.

8. Factory Mutual Systems - FM.

9. National Electrical Contractors Association - NECA "Standard Practices for Good Workmanship in Electrical Contracting."

10. International Electrical Testing Association, Acceptance Testing Specifications - NETA, ATS.

11. Rural Utilities Service - RUS.

12. FEMA 413 - Installing Seismic Restraints for Electrical Equipment.

1.10 REGULATORY REQUIREMENTS

A. Perform all work in accordance with the edition of the following codes, including state and local amendments, statutes, and ordinances, in effect at the time of bid opening.

1. NFPA 70, National Electrical Code.

2. ANSI C-2, National Electrical Safety Code.

1.11 SUBMITTALS

A. Submit under the provisions of the GCPs and Section U-500.

1.12 SITE OBSERVATIONS

A. Request construction observation at least 48 hours prior to covering any buried or concealed work or pulling of wire or cable.

B. Cooperate with the Engineer during observations and demonstrate installation complies with contract requirements. Correct any deficiencies noted prior to proceeding with the work.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Submit under the provisions of the GCPs.

B. In the absence of specific GCP requirements, submit two copies of complete manuals 60 days prior to substantial completion.

C. Submit in neatly organized electronic form. Include project name, Contractor's name, address and telephone number, and telephone number on each cover.

D. Prepare data in the form of an instruction manual with a table of contents and a tabbed fly leaf for each section. Provide a separate section for each product or system installed.

E. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

F. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams.

G. Type Text: As required to supplement product data. Provide logical sequence of operations for each procedure, incorporating manufacturer's instructions.

H. For Each Item of Equipment and Each System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts. Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts.

I. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include any special operating instructions. Include reprogramming instructions for all programmable equipment.

J. Maintenance Requirements: Include routine procedures and guide for troubleshooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, and checking instructions.

K. Provide servicing and lubrication schedule, and list of lubricants required.

L. Provide a copy of all approved shop drawings.

M. Provide a copy of manufacturer's recommended spare parts list for applicable equipment.

N. Include copies of warranties and bonds.

O. Include logs of all tests performed.

P. After review, make corrections as noted. Unless otherwise noted in the GCPs, resubmit 14 days prior to substantial completion inspection.

1.14 PROJECT RECORD DOCUMENTS

A. Maintain on site, one set of the following record documents; record actual revisions to the work:

1. Contract drawings.

2. Specifications.

3. Addenda.

4. Change orders and other modifications to the contract.

5. Reviewed shop drawings, product data, and samples.

B. Record revisions concurrent with construction progress.

C. Legibly mark and record product substitutions or alternates utilized, changes made by addendum or change order, changes made in conduit routing or circuiting, and changes in equipment locations. Accurately dimension locations of buried or concealed equipment.

D. Upon project completion, submit record documents to the Engineer.

1.15 TESTING

A. Notify the Engineer at least 48 hours prior to conducting tests. Conduct the final test in the presence of the Engineer. Have instruments available for measuring, voltage and current values, and for demonstration of continuity, grounds, or open circuit conditions. Provide personnel to take measurements and make tests. Test in accordance with appropriate sections of NETA ATS. The Contractor is responsible for all test requirements.

B. Before performing tests, check all components of the system for proper installation and operation.

C. Furnish necessary personnel, equipment, and instruments. Demonstrate satisfactory operation of the entire installation in accordance with contract documents.

D. Perform tests required under other sections of specifications. Submit logs of all test results to the Engineer.

E. Repair, replace or adjust, as directed by the final observation report, all components of the installation that do not meet specified requirements.

F. Request observation of retesting after all corrections have been completed.

G. All costs associated with additional observation, which are required as a result of incomplete work, are the responsibility of the Contractor.

1.16 INSTRUCTION OF THE DEPARTMENT PERSONNEL

A. Before final completion, at a mutually agreeable time, instruct the Department's designated personnel in operation, adjustment, and maintenance of equipment and systems.

B. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

D. Demonstrate start-up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment.

E. Provide the number of hours of instruction as indicated for each system.

System or Equipment	Hours of Instruction
Electrical Distribution Equipment	8

F. Provide one-half of the specified instruction at time of substantial completion and other half at time of final completion. Each instruction session shall cover all pertinent material. The first session is to cover all necessary material and provide "hands on" demonstrations. The second session is to review material previously covered, cover material in greater detail, and answer users' questions.

1.17 CERTIFICATE OF COMPLETION

A. Submit, at time of request for substantial completion observation , a completed letter in the following format:

I, (Name), of (Firm), certify that the electrical work is complete in accordance with Contract Plans and Specifications, and authorized change orders (copies attached) and will be ready for final inspection as of (Date). I further certify that the following specification requirements have been fulfilled:

1. Ground tests performed, _____ copies of method used and results attached.

2. Operating manuals completed and instructions of operating personnel performed for all systems, (Date), (Signature, the Engineer).

3. As-Built drawings up-to-date and ready to deliver to the Engineer.

4. All other tests required by Specifications have been performed.

5. All spare parts turned over to the Department.

6. All systems are fully operational.

Signed:_____

1.18 FINAL COMPLETION

A. Clean all fixtures and equipment. Repair any damaged surfaces.

B. Adjust all equipment to operate within manufacturer's recommended tolerances and as specified.

C. Turn over to the Engineer all operation and maintenance manuals and record drawings.

1.19 WARRANTIES

A. Provide warranty as required by the GCPs.

B. In the absence of specific GCP requirements, provide warranty certifying that the Contractor shall promptly repair or replace all defective material and workmanship to the satisfaction of the Department.

C. Unless otherwise stated, the warranty begins on the date of written final acceptance of the project by the Engineer and extends for a period of one year.

D. In the event of equipment or component failure during the warranty period, it is the Contractor's responsibility to repair or replace such defective equipment or components and bear all associated costs.

E. The Contractor shall pursue manufacturer's written or implied warranties to the extent necessary to obtain replacement equipment or components prior to any other action being initiated. Provide proof of action taken upon request. Inform the Department in writing of the cause of failure.

PART 2 – PRODUCTS

2.1 ALL MATERIAL AND EQUIPMENT

A. Unless otherwise indicated, new and unused; currently manufactured model, standard product.

B. Similar Items: By the same manufacturer throughout the project.

C. Comply with referenced standards, listed by U.L. or other testing agency acceptable to the authority having jurisdiction. Listed specifically for the application where used.

D. Unless Otherwise Indicated, All Outdoor Equipment: NEMA 3R enclosures, galvanized hardware, corrosion resistant, compatible with -40ºF temperature.

E. Transport, handle and store in accordance with manufacturer's instructions. Store in original containers with seals and labels intact.

F. Cover and protect all items against dirt, water, chemical, and mechanical damage.

G. Store in dry, heated enclosure all items subject to thermal or moisture damage.

2.2 ACCEPTABLE MANUFACTURERS

A. As listed in RUS Informational Publication 202-1 – List of Materials Acceptable for use on Systems of USDA Rural Development, latest edition.

PART 3 – EXECUTION

3.1 ALL MATERIALS AND EQUIPMENT

A. Install in accordance with referenced standards and regulatory requirements.

B. Install in accordance with manufacturer's instructions and recommendations.

C. Install in accordance with National Electrical Contractors Association "Standard Practices for Good Workmanship in Electrical Contracting."

D. Install using experienced craftsmen skilled in the trade and in the particular section of work involved.

E. All workmanship is subject to approval.

F. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement caused by Seismic Design Category D activity. Provide adequate backing, blocking and reinforcement at attachment points to accept the forces involved.

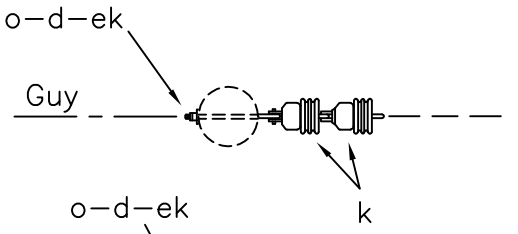
G. Repair any damage caused by installation of electrical products to original condition.

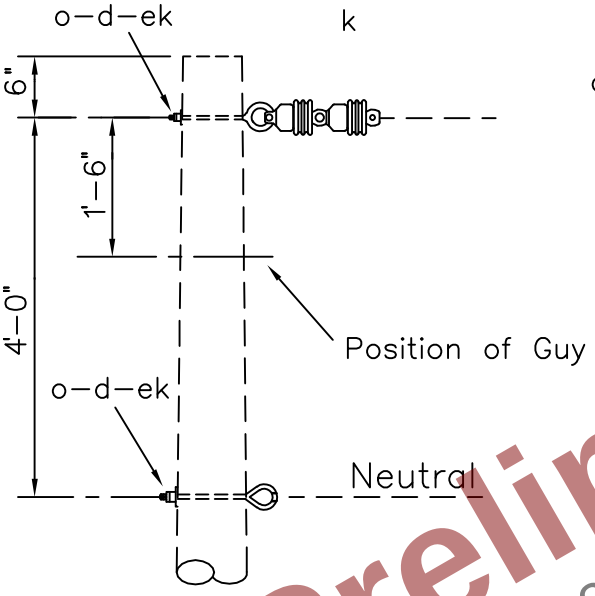
H. Keep the work area neat, clean, and orderly. Clean up periodically.

END OF SECTION

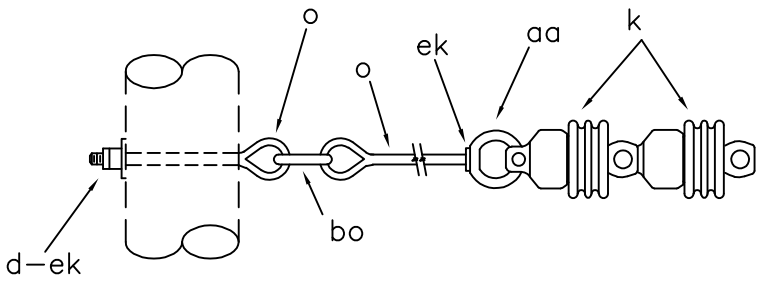
APPENDIX N

DETAIL SHEETS FROM RURAL UTILITY SERVICE (RUS) BULLETIN 1728F-804

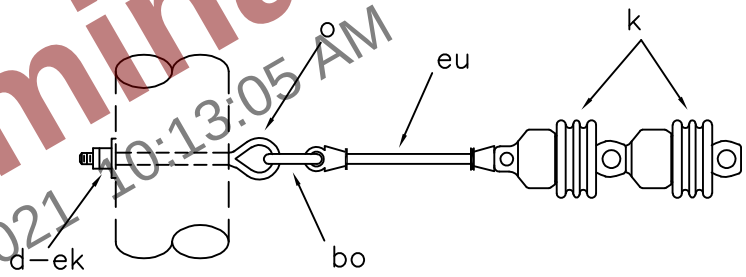




A5.1



A5.2



A5.3

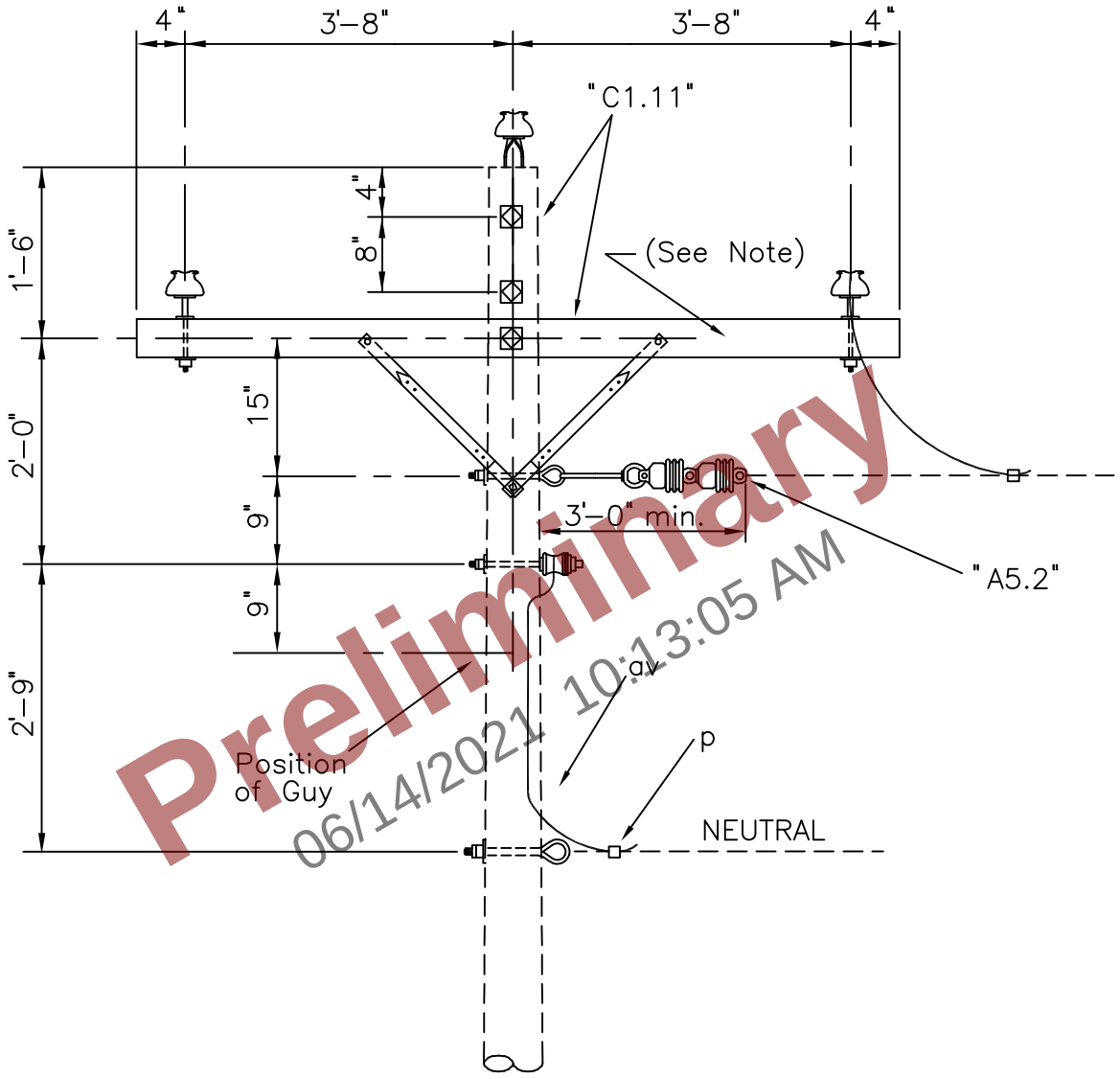
NOTE: When connecting to existing bolt end, use eyenut "aa" and locknut "ek" instead of eyebolt subassembly "o–d–ek".

ASSEMBLY: A5		.1	.2	.3
ITEM	MATERIAL	QTY	QTY	QTY
d	Washer, square, 3", curved	2	2	2
k	Insulator, suspension, 4 1/4"	2	2	2
o	Bolt, eye, 5/8"x req'd length	2	3	2
p	Connectors, as req'd			
aa	Nut, eye		1	
av	Jumper's, as req'd			
bo	Shackle, anchor		1	1
ek	Locknuts	2	3	2
eu (du)	Link, extension, insulated (Link, extension) – (optional)			1 (1)

DESIGN PARAMETERS:
PERMITTED LONGITUDINAL LOAD = 5000 lbs./Conductor

SINGLE DEADENDS

APRIL 2005	1 – PHASE PRIMARY 12.47/7.2 kV	A5.1,A5.2,A5.3 (A5),(A5–2)
RUS		



NOTE:

When tapping center phase, install post type insulator, "A1.011P", horizontally on crossarm, 19 inches (minimum) from surface of pole and fasten jumper to insulator.

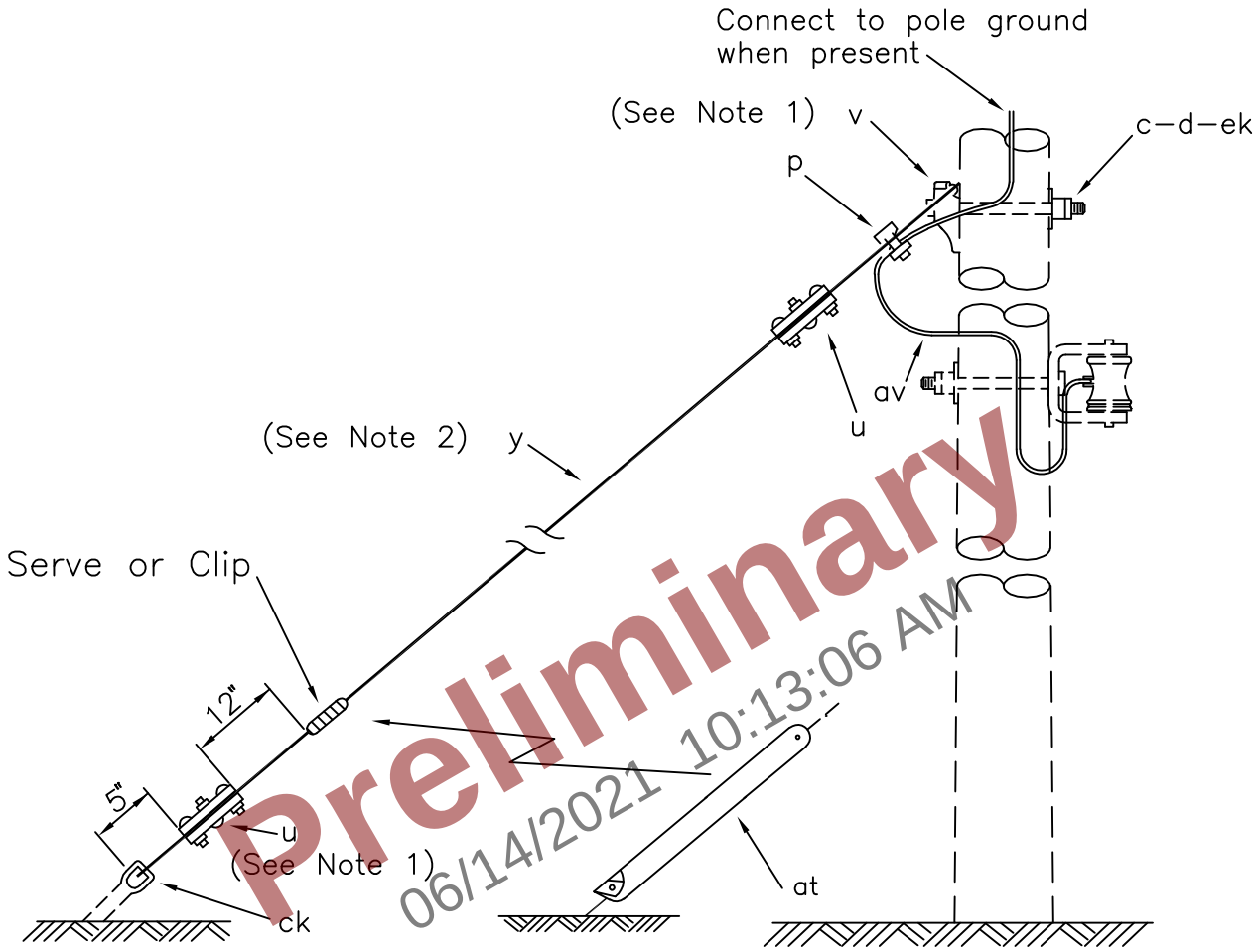
ITEM	QTY	MATERIAL
	1	"C1.11" Primary Assembly
	1	"A5.2" Primary Assembly
p		Connectors, as req'd
av		Jumpers, as req'd

DESIGN PARAMETERS:

PERMITTED LONGITUDINAL LOAD = 5,000 lbs./Conductor

SINGLE PHASE TAP GUIDE

APRIL 2005 RUS	3 – PHASE PRIMARY 12.47/7.2 kV	C5.11G



NOTES:

1. Other accepted and equivalent guy deadend (item "u") and attachment (item "v") material may be substituted for the ones shown.
2. Some types of guy attachments use 2 bolts and washer or lag screw (item"j"), change materials accordingly.
3. Specify guy wire size, type and required length.

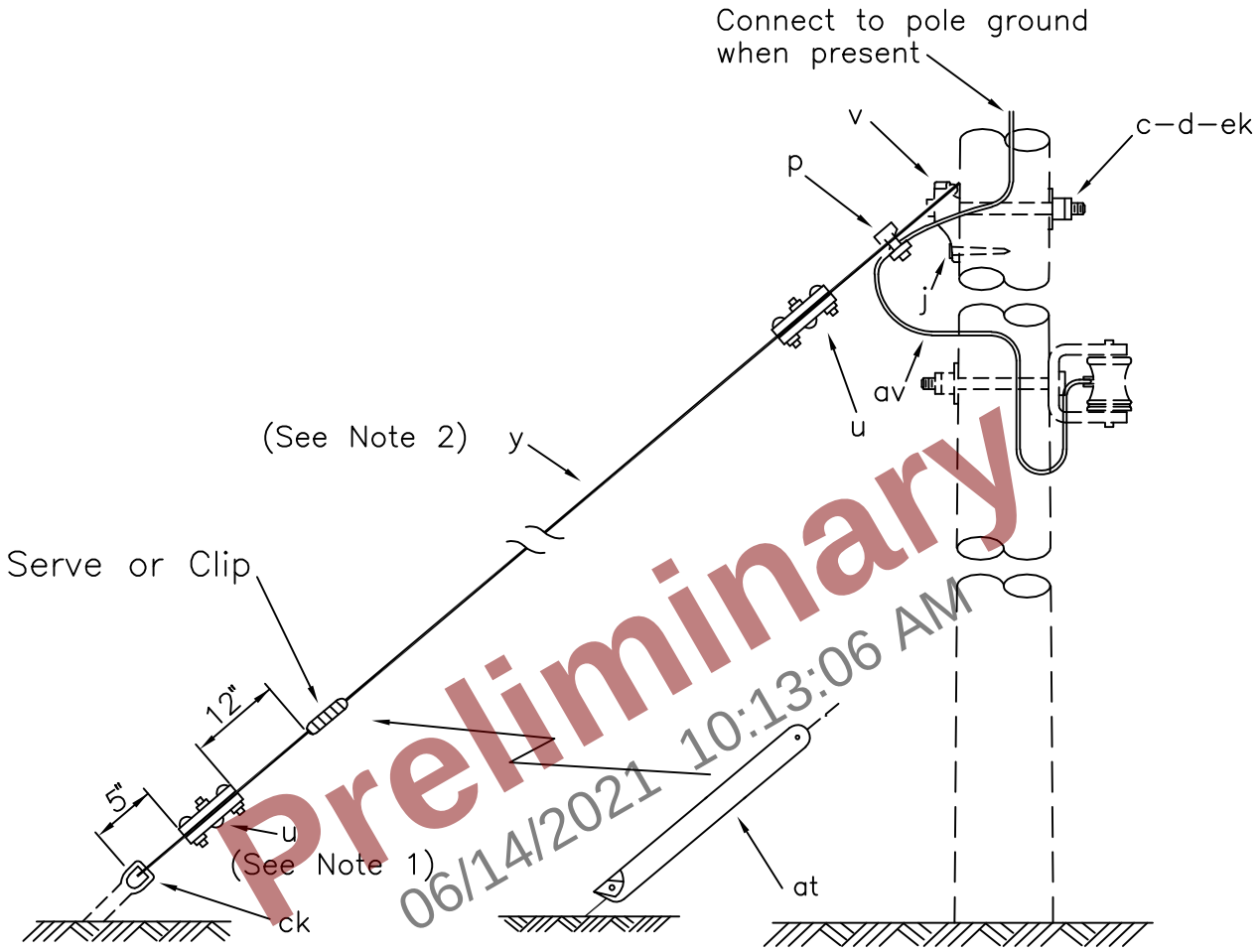
ITEM	QTY	MATERIAL
c	1	Bolt, machine, 5/8" x req'd length
d	1	Washer, 3" square, curved
p		Connectors, guy bond and as req'd
u	2	Deadend for guy strand (See Note 1)
v	1	Guy attachment (See Note 1)
y		Guy wire, as req'd (See Note 3)
at	1	Guy marker
av		Jumpers, as req'd
ck	1	Clamp, anchor bonding
ek	1	Locknuts

DESIGN PARAMETERS:

PERMITTED LOAD IS LESSER OF:
6,600 lbs (in any direction)
or 90% of RATED BREAKING
STRENGTH OF GUY WIRE

SINGLE DOWN GUY (THROUGH BOLT TYPE)

APRIL 2005		E1.1
RUS		(E1–2)



NOTES:
1. Other accepted and equivalent, heavy duty, guy deadend material (item "u") may be substituted for the ones shown.
2. Pole eye plate guy attachment and anchor shakle (item "bo") may be used.

ITEM	QTY	MATERIAL
c	1	Bolt, machine, 3/4" x req'd length
d	1	Washer, square, 4", curved
p		Connectors, guy bond and as req'd
j	1	Screw, lag, 1/2" x 4"
u	2	Deadend for guy strand, heavy duty
v	1	Guy attachment, guy hook type
y		Guy wire, as req'd (See Note 4)
at	1	Guy marker
av		Jumpers, as req'd
ck	1	Clamp, anchor bonding
ek	1	Locknuts

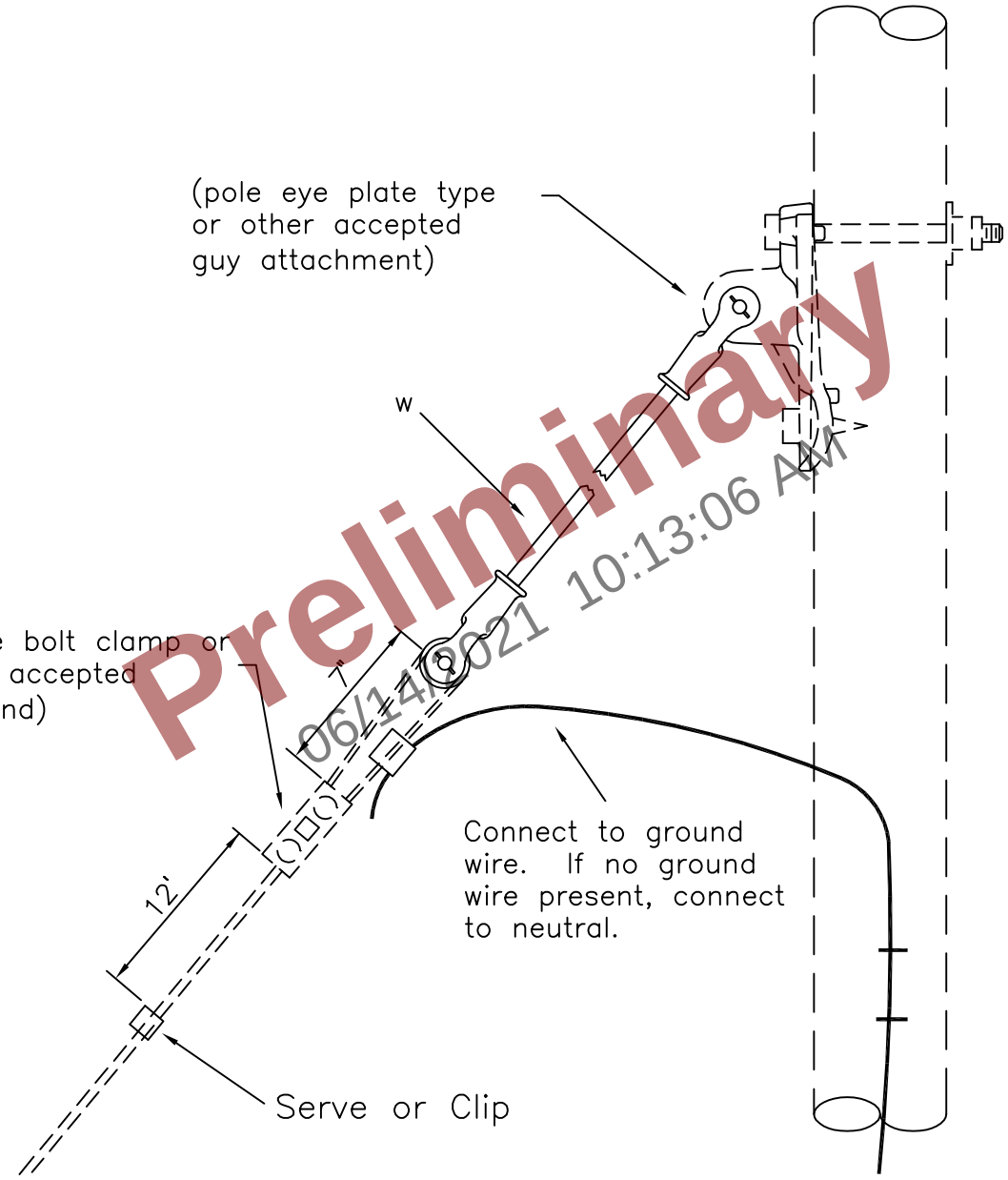
3. 2–5/8 machine bolts and 2–3 square curved washers may be used to install guy attachment.
4. Specify guy wire size, type and required length.

DESIGN PARAMETERS:

PERMITTED LOAD IS LEAST OF:
8,500 lbs (in any direction)
or 90% of RATED BREAKING STRENGTH OF GUY WIRE

SINGLE DOWN GUY – HEAVY DUTY (THROUGH BOLT TYPE)

APRIL 2005		E1.1L
RUS		(E1–3)



NOTE: Ground wire jumper may be attached to down guy wire below guy deadend connector.

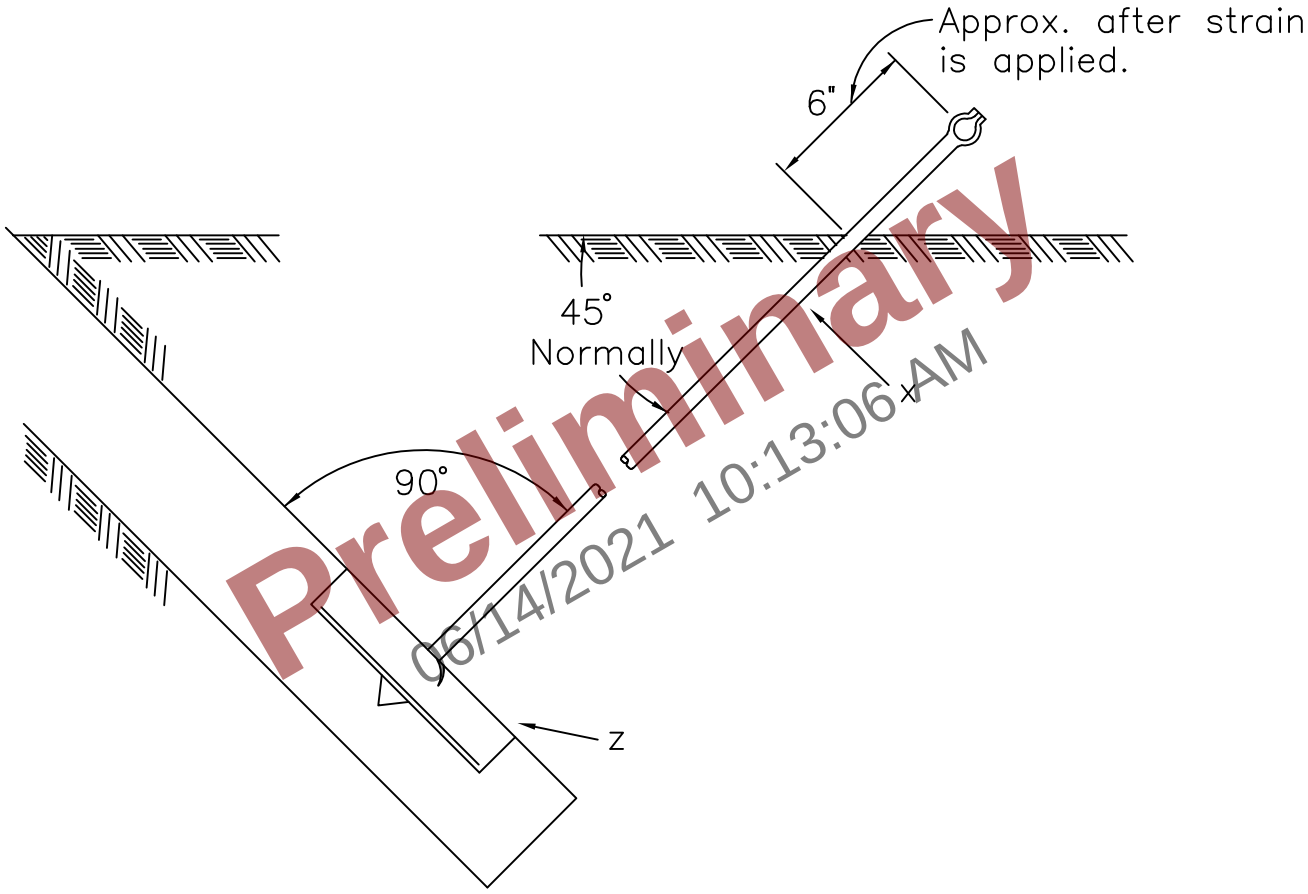
ITEM	MATERIAL
w	Insulator, guy strain

DESIGN PARAMETERS:

PERMITTED LOAD = 8,500 lbs.

GUY STRAIN INSULATOR

APRIL 2005		
RUS		E1.5



NOTE: Designated maximum holding power rating assumes proper installation in class 5 soil.

ASSEMBLY: F3		.6	.8	.10	.12
	Minimum Area (sq. in.)	90	100	120	135
ITEM	MATERIAL	QTY	QTY	QTY	QTY
x	Rod, anchor, thimble eye, 5/8" x 7'0"	1	1		
x	Rod, anchor, twin eye, 3/4" X 8'0"			1	1
z	Anchor, plate type	1	1	1	1

ASSEMBLY NUMBERS	
NEW	(OLD)
F3.6	(F1–1P)
F3.8	(F1–2P)
F3.10	(F1–3P)
F3.12	(F1–4P)

DESIGN PARAMETERS:
DESIGNATED MAXIMUM
HOLDING POWER (lbs.)

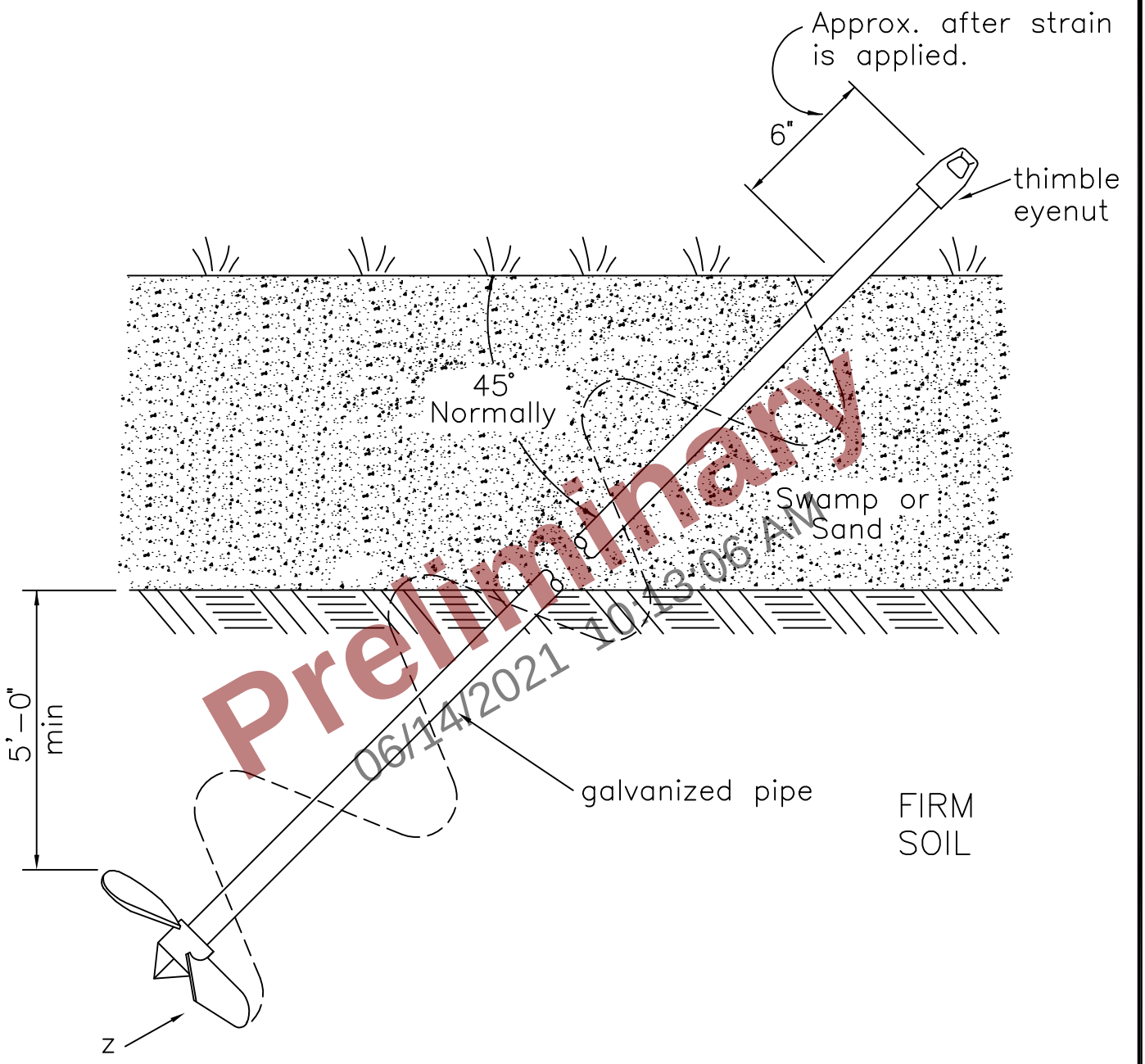
F3.6:	6,000
F3.8:	8,000
F3.10:	10,000
F3.12:	12,000

PLATE TYPE ANCHORS

APRIL 2005

RUS

F3.6, F3.8, F3.10, F3.12



NOTE: Designated maximum holding power rating assumes proper installation. See anchor specifications for additional information.

ITEM	MATERIAL	F6.6 QTY	F6.8 QTY	F6.10 QTY
z	Anchor, swamp type (diameter)	1–10"	1–12"	1–15"
	Nut, thimble eye type	1	1	1
	Pipe, galvanized, as req'd			

ASSEMBLY NUMBERS	
NEW	(OLD)
F6.6	(F6–1)
F6.8	(F6–2)
F6.10	(F6–3)

DESIGN PARAMETERS:
DESIGNATED MAXIMUM HOLDING POWER (lbs.)

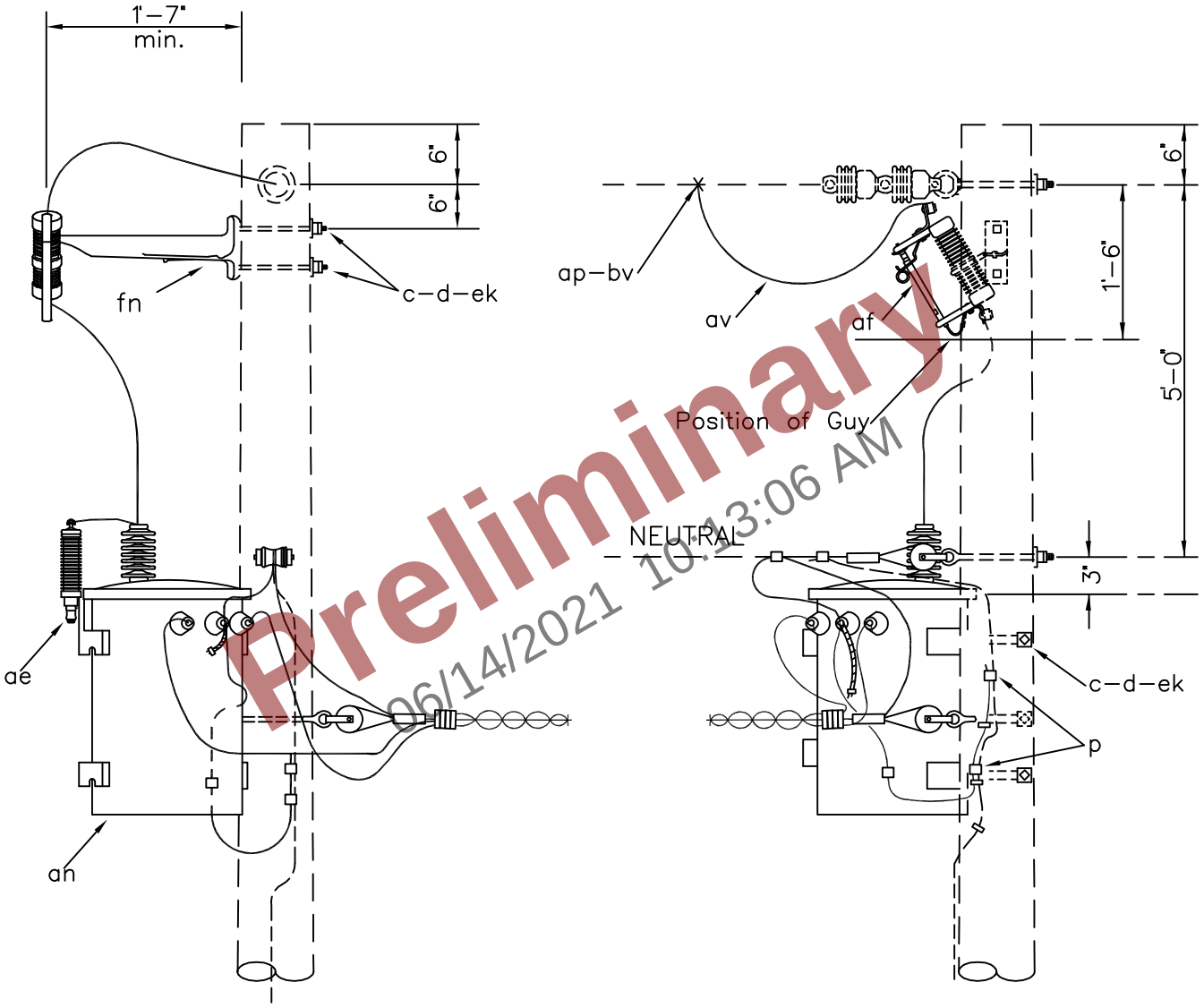
F6.6:	6,000
F6.8:	8,000
F6.10:	10,000

SWAMP ANCHORS (POWER INSTALLED)

APRIL 2005

RUS

F6.6, F6.8, F6.10



NOTE: Rotate cutout so that the blade faces climbing face of pole.

ITEM	QTY	MATERIAL
c	4	Bolt, machine, 5/8" x req'd length
d	4	Washer, square, 2 1/4"
p		Connectors, as req'd
ae	1	Arrester, surge (9 kV)
af	1	Cutout, dist. open (15 kV)
an	1	Transformer, 12.47 kV, conventional

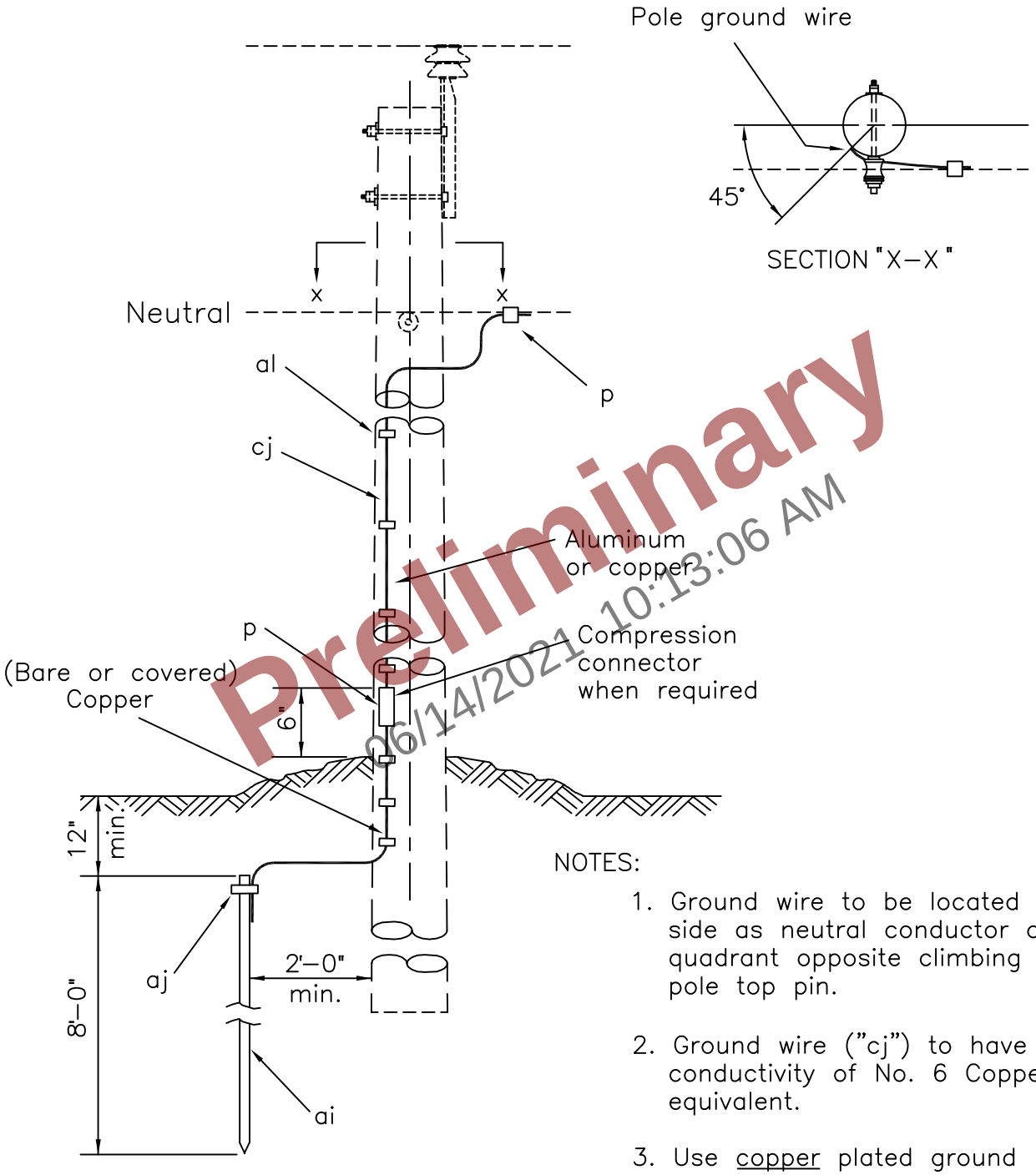
ITEM	QTY	MATERIAL
ap	1	Clamp, hot line
av		Jumpers, stranded, as req'd
bv	1	Rod, armor as req'd
ek	4	Locknuts
fn	1	Bracket, extension

DESIGN PARAMETERS:

See Guide Drawing "G1.1G"

SINGLE–PHASE, CONVENTIONAL TRANSFORMER (DEADEND POLE)

APRIL 2005		
RUS	12.47/7.2 kV	G1.6



NOTES:

1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.

2. Ground wire ("cj") to have minimum conductivity of No. 6 Copper or equivalent.

3. Use copper plated ground rod and copper ground wire and staples, or use galvanized steel ground rod, staples and soft annealed iron, 3–strand, 5/16" ground wire with class C galvanizing.

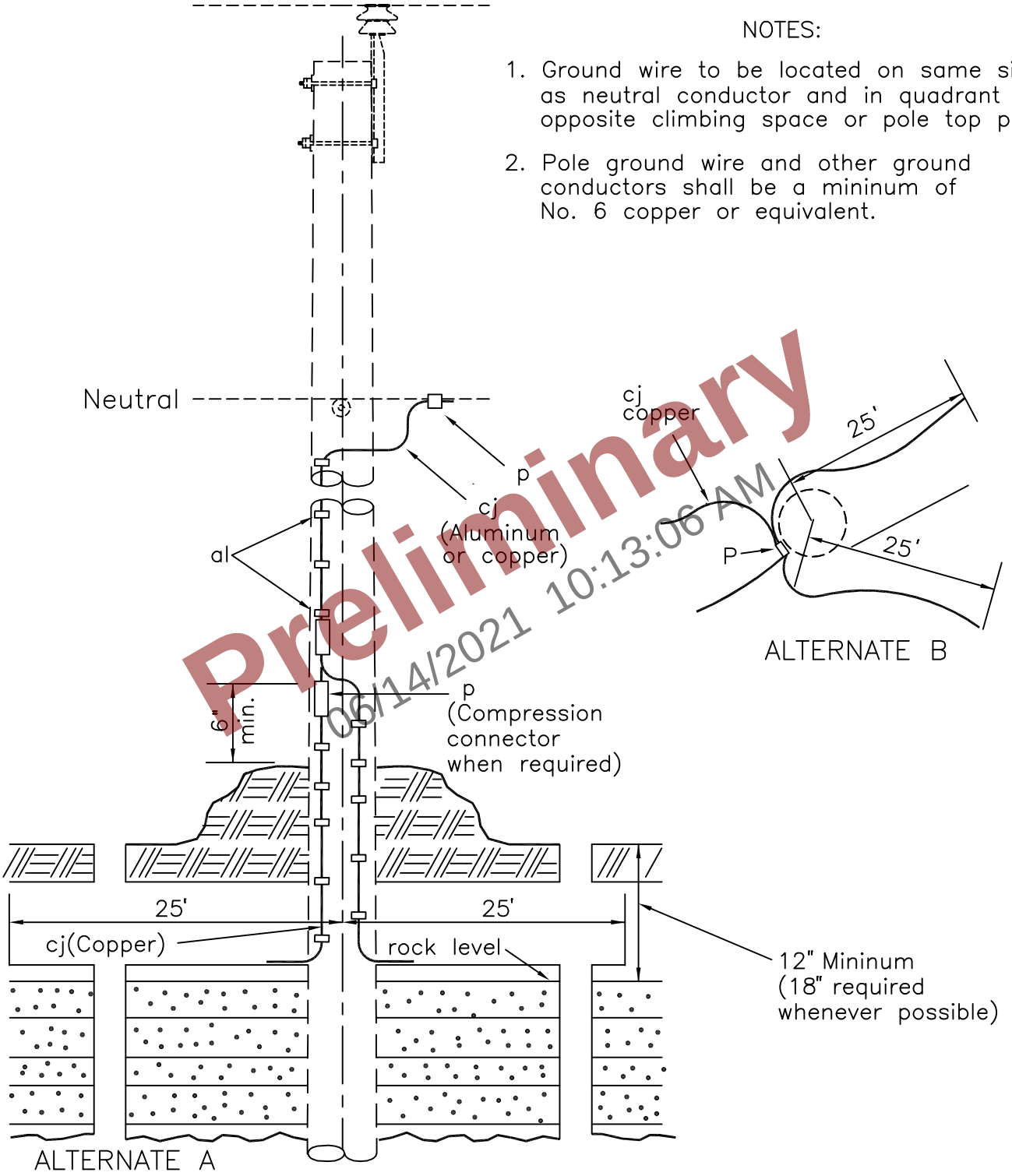
ITEM	QTY	MATERIAL
p		Connector, compression, as req'd
ai	1	Rod, ground, 5/8" min. diameter
aj	1	Clamp, ground rod
al		Staple, ground wire, as reg'd
cj		Wire, pole ground, as req'd

GROUNDING ASSEMBLY – GROUND ROD TYPE

APRIL 2005 RUS		H1.1 (M2–11)

NOTES:

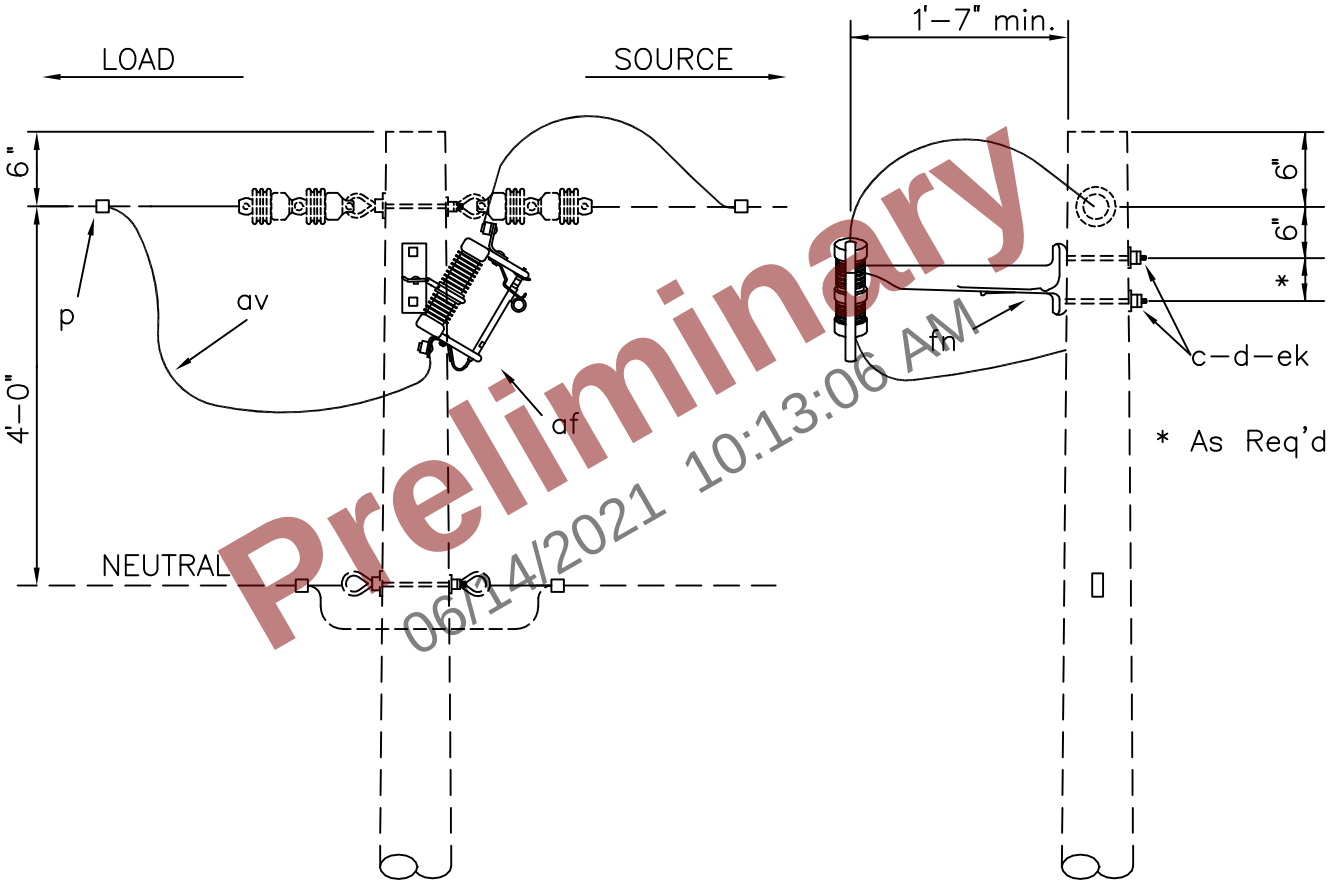
1. Ground wire to be located on same side as neutral conductor and in quadrant opposite climbing space or pole top pin.
2. Pole ground wire and other ground conductors shall be a mininum of No. 6 copper or equivalent.



ITEM	QTY	MATERIAL
p		Connector, compression, as req'd
al		Staple, ground wire, as req'd
cj		Wire pole ground as req'd See Note 3 on Drawing H1.1

GROUNDING ASSEMBLY — TRENCH TYPE

APRIL 2005 RUS		H2.1 (M2–13)



NOTE: Specify fuse size or solid blade

ITEM	QTY	MATERIAL
c	2	Bolt, machine, 5/8" x req'd length
d	2	Washer, square, 2 1/4"
p	2	Connector, compression type
af	1	Cutout, distribution, open (15 kV)
av		Jumpers, as required
ek	2	Locknuts
fn	1	Bracket, extension

CUTOUT – SINGLE PHASE

APRIL 2005		S1.1
RUS	12.47/7.2 kV	(M3–4)