STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES



STANDARD SPECIFICATIONS FOR AIRPORT CONSTRUCTION

TUNUNAK AIRPORT RELOCATION AIP No. 3-02-0486-001-2012 / 51791

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

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.

CONTENTS

Page Number

GENERAL PROVISIONS

Section 10. Definitions and Terms	GCP-10-1 to GCP-10-9
Section 20. Bidding Requirements and Conditions	GCP-20-1 to GCP-20-5
Section 30. Award and Execution of Contract	GCP-30-1 to GCP-30-5
Section 40. Scope of Work	GCP-40-1 to GCP-40-6
Section 50. Control of Work	GCP-50-1 to GCP-50-13
Section 60. Control of Materials	GCP-60-1 to GCP-60-10
Section 70. Legal Relations and Responsibility to Public	GCP-70-1 to GCP-70-8
Section 80. Prosecution and Progress	GCP-80-1 to GCP-80-15
Section 90. Measurement and Payment	
Section 100. Contractor Quality Control Program	
Section 110. Method of Estimating Percentage of Material	
Within Specification Limits (PWL)	GCP-110-1 to GCP-110-5

DRAINAGE

Item D-701 Storm Drains and Culverts	D-701-1 to D-701-6
Item D-760 Thaw Pipe and Thaw Wires	D-760-1 to D-760-6

FENCING

Item F-162 Chain Link Fence	F-162-1	to F-162-3
Item F-170 Steel Bollard	F-170-1	to F-170-2

CONTRACTOR FURNISHED SERVICES

Item G-100 Mobilization and Demobilization	G-100-1
Item G-115 Worker Meals and Lodging, or Per Diem	G-115-1
Item G-120 Disadvantaged Business Enterprise (DBE) Program	. G-120-1 to G-120-8
Item G-130 Services to be Furnished by the Contractor	.G-130-1 to G-130-8
Item G-131 Engineering Transportation	G-131-1 to G-131-2
Item G-135 Construction Surveying and Monuments	G-135-1 to G-135-6
Item G-150 Equipment Rental.	G-150-1 to G-150-2
Item G-300 Critical Path Method (CPM) Scheduling	. G-300-1 to G-300-2
Item G-710 Traffic Control for Roads, Streets, and Highways	. G-710-1 to G-710-12

LIGHTING & ELECTRICAL

Item L-100 Runway and Taxiway Lighting	L-100-1 to L-100-9
Item L-101 Rotating Beacon	L-101-1 to L-101-5
Item L-107 Wind Cone	L-107-1 to L-107-4
Item L-108 Underground Cable	L-108-1 to L-108-8
Item L-109 Transformer Vault and Vault Equipment	L-109-1 to L-109-11
Item L-110 Underground Electrical Duct	L-110-1 to L-110-6

EARTHWORK

Item P-152 Excavation and Embankment......P-152-1 to P-152-9

Item P-154 Subbase Course	P-154-1 to P-154-3
Item P-157 Erosion, Sediment, and Pollution Control	P-157-1 to P-157-22
Item P-165 Removal of Structures	P-165-1 to P-165-2
Item P-170 Soil Testing	P-170-1 to P-170-3

AGGREGATE BASE & SURFACE COURSES

Item P-208 A	agregate Surface	Course	.P-	208-	1 to	P-	208	3-4
--------------	------------------	--------	-----	------	------	----	-----	-----

MISCELLANEOUS

Item P-610 Structural Portland Cement Concrete	P-610-1 to P-610-6
Item P-640 Segmented Circle	P-640-1 to P-640-2
Item P-650 Aircraft Tie-Down	P-650-1 to P-650-2
Item P-660 Retroreflective Markers and Cones	P-660-1 to P-660-2
Item P-661 Standard Signs	P-661-1 to P-661-3
Item P-671 Runway and Taxiway Closure Markers	P-671-1 to P-671-2
Item P-681 Geotextile for Separation & Stabilization	P-681-1 to P-681-2
Item P-684 Floating Silt Curtain	P-684-1 to P-684-2

STRUCTURES

Item S-142 Equipment Storage Building	S-142-1
Item S-143 Fuel Tank	. S-143-1 to S-143-2
Item S-145 Bridge	S-145-1

TURFING

Item T-901 Seeding	T-901-1 to T-901-3
Item T-905 Topsoiling	T-905-1 to T-905-2
Item T-908 Soil Stabilization	T-908-1 to T-908-3

UTILITIES

Item U-500 Electrical System.....U-500-1

APPENDICES

.

Appendix A - Erosion and Sediment Control Plan (Not Lised)

Appendix B – Construction Surveying Requirements

- Appendix C Materials Sampling and Testing Frequency
- Appendix D Safety Plan

Appendix E – Permits

Appendix F – Traffic Plan (Not Used)

Appendix G – Sign Plan (Not Used)

Appendix H – Mining Plan (Not Used)

Appendix I - Aviation Materials Certification List

Appendix J – FAA Technical Specifications for Approach Lighting Aids (Not used)

Appendix K - Mandatory Post-Award Conference Notice and Agenda

Appendix L – Snow Removal Equipment Building Technical Specifications

Appendix M – Bridge Technical Specifications

Appendix N – Material Sales Agreement (Not included for PPS&E)

Appendix O – Power Extension Technical Specifications

Tununak Airport Tununak Airport Relocation Project 51791/AIP 3-02-0486-001-2012

SECTION 10

DEFINITIONS AND 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. <u>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.</u>

<u>These Specifications incorporate by reference a number of publications including regulations, design and construction standards, or recommendations published by outside sources.</u> 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, <u>abbreviated format</u>, incomplete <u>sentences</u>, and/<u>or</u> 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 FAA Advisory Circular AC ACI American Concrete Institute AIA American Institute of Architects Airport Improvement Program AIP Alaska Occupational Safety and Health AKOSH American National Standards Institute ANSI AOA Air Operations Area Alaska Statute AS ASDS Alaska Sign Design Specifications American Society for Testing & Materials ASTM Alaska Test Method (See Alaska Test Methods Manual) ATM CFR Code of Federal Regulations CSP Construction Safety 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
FOP	Field Operating Procedure (See Alaska Test Methods Manual)
FSS	Flight Service Station
ICEA	Insulated Cable Engineers Association (formerly IPCEA)
MRP	Mining and Reclamation Plan
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NOTAMs	Notices to Airmen
SSAC	DOT&PF Standard Specifications for Airport Construction
SSPC	Society for Protective Coatings
SPCC	Spill Prevention, Control, and Countermeasure (Plan)
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. This is also called verification sampling and testing when specifically used to validate the contractor's data.

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.

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 are used or intended to be used for the <u>unobstructed</u> movement of aircraft, in addition to its associated runway, runway safety area, taxiway, taxiway safety area and <u>or</u> 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 TEST METHODS MANUAL. 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.

APPENDICES. Supplemental contract documents.

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. 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 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 PLAN (CSP). A Contract document that specifies methods of controlling the operations of the Contractor, subcontractors, and suppliers so as to provide for (1) safety of workers, equipment, and public, (2) the movement of aircraft in the Air Operations Areas of the airport, and (3) the least inconvenience to traffic. A plan that sets forth guidelines for operational safety on airports during construction.

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. Contract time may be specified either in calendar days or by completion date.

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 with regulatory requirements or the Contract documents.

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

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.

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 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. They may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Refer to the following website to determine the status of replaced Federal Specifications: <u>http://apps.fss.gsa.gov/pub/fedspecs/index.cfm</u>

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.

HOLIDAYS. State of Alaska legal holidays are:

- 1. New Year's Day January 1
- 2. Martin Luther King, Jr. Day Third Monday in January
- 3. Presidents' Day Third Monday in February
- 4. Seward's Day Last Monday in March
- 5. Memorial Day Last Monday in May
- 6. Independence Day July 4
- 7. Labor Day First Monday in September
- 8. Alaska Day October 18
- 9. Veteran's Day November 11
- 10. Thanksgiving Day Fourth Thursday in November
- 11. Christmas Day December 25
- 12. Every Sunday
- 13. 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, 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, Sunday and the following Monday are both legal holidays (See AS 44.12).

INDEPENDENT ASSURANCE (IA). Activities that are an unbiased and independent evaluation of all the sampling and testing (or inspection) procedures used in the quality assurance program. [IA provides an independent verification of the reliability of the acceptance (or verification) data obtained by the agency and the data obtained by the contractor. The results of the IA testing or inspection are not to be used as a basis of acceptance. IA provides information for quality system management.]

INSPECTOR. The Engineer's representative authorized to make detailed inspections of Contract performance and materials.

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 with a total value of 5 percent or more of the Contract award amount.

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). <u>Also referred to as "Aviation Materials Certification List."</u> A list of materials for which the Contractor shall submit certifications to the Engineer. 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 WAQTC FOP for AASHTO T27/T 11 on the minus 3-inch material, and has a plastic index of 6 or less as determined by WAQTC FOP for AASHTO T 90.

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. <u>There may be separate</u> 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.

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.

QUALITY ASSURANCE (QA). (1) All those planned and systematic actions necessary to provide confidence that a product or facility will perform satisfactorily in service; or (2) making sure the quality of a product is what it should be. [QA addresses the overall process of obtaining the quality of a service, product, or facility in the most efficient, economical, and satisfactory manner possible. Within this broad context, QA includes the elements of quality control, independent assurance, acceptance, dispute resolution, etc. The use of the term QA/QC or QC/QA is discouraged and the term QA should be used. QA involves continued evaluation of the activities of planning design, development of plans and specifications, advertising and awarding contracts, construction, and maintenance, and the interactions of these activities.]

QUALITY ASSURANCE SPECIFICATIONS. Specifications that require contractor quality control and agency acceptance activities throughout production and placement of a product. Final acceptance of the product is usually based on a statistical sampling of the measured quality level for key quality characteristics. [QA specifications typically are statistically based specifications that use methods such as random sampling and lot-by-lot testing, which let the contractor know if the operations are producing an acceptable product.]

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.

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.

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. <u>Standard specifications may include General Contract Provisions, and separate specifications for work inside and outside the building boundary line.</u>

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.

Notwithstanding the forgoing paragraphs, for a building included in the work 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" as applied to the work mean 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). A Contract document that specifies methods of routing pedestrian and/or vehicular traffic through or around a construction area, including specifying the location of all traffic control devices, for work outside the air operations area. Also referred to as "Highway Traffic Control Plan". A drawing or drawings indicating the method or scheme 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

BIDDING REQUIREMENTS AND CONDITIONS

20-01 QUALIFICATION OF BIDDERS. A bidder shall:

- **a.** On wholly state-funded projects, submit evidence of Contractor Registration, under AS 08.18, and valid Alaska Business License at the time designated for bid opening;
- **b.** On federal-aid projects, submit evidence of Alaska Business License and Contractor Registration prior to award; and
- **c.** 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.

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, including plans and specifications. Bidders shall examine the bidding requirements listed under Subsection 50-06 Utilities.

The records of geotechnical investigations including boring logs, test results, geology data reports, soil reports, material site reports, and geotechnical reports included in a bid package or made accessible to bidders or Contractors, are for information purposes only. These records are not part of the Contract. These records indicate subsurface conditions only at specific locations and times, and only to the depths penetrated. They do not necessarily reflect variations in soil, rock or groundwater conditions that may exist between or outside such locations. Actual conditions may differ from what is shown in the records. Material sources referenced in these records may not contain materials of sufficient quantity or quality to meet project requirements. The accessibility of these records does not constitute approval, nor guarantee suitability of soils or sources, or the rights to use sources for this project, except as specifically provided in Subsections 60-02.d.(2) Mandatory Sources and 60-02.d.(3) Designated Sources. The records shall not substitute for independent investigation, interpretation, or judgment of the bidder or contractor. The Department is not responsible for any interpretation or conclusion drawn from its records by the bidder or Contractor.

Bidders and Contractors shall examine Subsection 60-02 Material Sources for further information about material source development.

Any questions about bidding procedures, site conditions, or Contract requirements must be submitted in writing to the persons designated on the Invitation To Bid. 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. Bids shall only be submitted on the forms furnished by the Department 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 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.

For multiple-project bid openings, bidders may limit the total dollar amount or number of projects to be accepted by completing the following statement and adding it to the Bid Form for at least one of the projects being bid. 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 in ink 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; or
 - (6) Fails to meet any other material requirement of the Invitation To Bid.
- **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 Bid Bond (Form 25D-14), or a certified check, cashier's check, or 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 Bid Bond.

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

20-08 DELIVERY OF BIDS. Bids shall be submitted in the envelope furnished by the Department, or one of the same general size and shape that has the same identifying information. The envelope shall clearly indicate its contents and the designated address, as shown on the Invitation to Bid. Bids for other work may not be included in the envelope. Electronic or faxed bids will not be considered, unless specifically called for in the Invitation to Bid.

20-09 WITHDRAWAL OR REVISION OF BIDS. Bidders may withdraw or revise a bid in writing delivered by mail or by fax, provided that the designated office receives the withdrawal or revision before the time set for opening of bids. Revisions shall be submitted on the forms furnished by the Department or legible copies of the Department's forms.

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.

20-10 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.

20-11 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 mail, courier, fax, or may post the addenda on its web site. Unless picked up in person or included with the bid documents, addenda or notice that an addenda has been issued will be addressed to the individual or company to whom bidding documents were issued and sent to the 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 received, either on the Bid Form or by fax prior to the scheduled time of bid opening. If a bidder received no addenda, the bidder shall enter "None" on the Bid Form.

20-12 RECEIPT AND OPENING OF BIDS. The Department will only consider bids, revisions, and withdrawals received before the scheduled time of bid opening.

Bids will be opened and read publicly at the time and place indicated in the Invitation to Bid. The Department is not responsible for prematurely opening or failing to open bids that are improperly addressed or identified.

20-13 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;
- I. 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.

20-14 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.

20-15 MANDATORY POST-AWARD CONFERENCE. There will be a mandatory post-award conference held in Tununak prior to the Contractor beginning work. The Contractor awarded the Tununak Airport Improvements is required to attend the post-award conference. All costs incurred by the Contractor to attend this conference, including air transportation, are at his expense. The Department will schedule the post-award 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 K 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.

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.

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 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, and insurance 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 responsible 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 specified penal amount of each bond. The net worth and the total value of the security assets of each individual surety shall not be less than the penal amount of the bond. In addition, each individual Surety, upon the Department's request, shall execute an affidavit if individual surety on a form provided by the Department. Each individual surety affidavit contains a Certificate of Sufficiency that must be signed by an official of an institution having full knowledge of assets and responsibilities of the Surety. 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. First Deed of Trust. A first deed of trust with the Department named as beneficiary, against the unencumbered value of real property or an agreement by a second party, including deeds of trust, mortgage, lien, or judgment interests to subrogate their interests to the Department in the real property offered by the individual Surety. A title insurance policy, with the Department as a named beneficiary, and a current (within three months) professional appraisal or assessed valuation is required to ascertain the true value of the property offered as collateral. Fire and casualty insurance, with the Department as a named insured, and in limits and coverages acceptable to the Contracting Officer, are required if buildings or other valuable improvements are involved. The appraiser must acknowledge in writing that the appraisal is prepared for the benefit of the Department and the Department has the right to rely on its contents. The deed of trust must be recorded in the recording office where the property is located.
- b. Irrevocable Letters of Credit. Irrevocable letters of credit with a financial institution approved by the Contracting Officer.
- 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 AS 21 and (ii) have a financial rating acceptable to the Department. The Contractor shall notify the Engineer, in writing, at least 30 days before cancellation of any coverage or reduction in any limits of liability.

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 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 liability 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 <u>for worker's compensation</u>, <u>commercial general</u> <u>liability</u>, <u>automobile liability</u>, <u>and umbrella coverage (if required)</u> to the Department before award of the Contract. <u>Provide evidence of all other insurance coverages required under this Contract prior to</u> <u>commencement of work</u>. 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:

- a. Denote the type, amount, and class of operations covered;
- b. Show the effective (and retroactive) dates of the policy;
- c. Show the expiration date of the policy;
- d. Include all required endorsements;
- e. Be executed by the carrier's representative; and
- f. 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 (<u>Project Name and Number</u>). The insurance carrier agrees that it shall notify the Engineer, in writing, at least 30 days 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.

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.

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 approved, 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.

40-03 DIFFERING SITE CONDITIONS. The Contractor shall immediately notify the Engineer in writing and specifically describe the alleged differing site condition if the Contractor discovers:

- **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.

Failure to give the Engineer immediate 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.

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.

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 stone, gravel, sand, or other material that is determined suitable by the Engineer, and that is encountered within the lines and grades of the project. 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, 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.

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, flagpersonsflaggers, 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 that G-700, G-710, and P-670 pay items, if included in the bid schedule, will pay directly for the traffic control measures and hazardous area barriers that are specifically described for payment 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.

40-08 VALUE ENGINEERING PROPOSALS BY CONTRACTOR.

a. Purpose and Scope. The purpose of this section is to encourage the Contractor to propose changes to Contract designs, materials, or methods based on the Contractor's experience and ingenuity. The Value Engineering Proposals (VEPs) contemplated are those that may result in immediate savings to the Department under this Contract without impairing essential functions and characteristics of the Project, including, but not limited to: service life, economy of operation, ease of maintenance, desired appearance, and safety. Cost savings on this project resulting from VEPs offered by the Contractor and accepted by the Department shall be shared equally between the Contractor and the Department.

The following are not eligible for value engineering proposals: changes in the basic design of a pavement type, runway and taxiway lighting, visual aids, hydraulic capacity of drainage facilities, or changes in grade or alignment that reduce the geometric standards of the project.

- **b.** Submitting Proposals. All VEPs must be in writing. The Contractor shall submit the following with each VEP:
 - (1) A statement that the proposal is submitted as a Value Engineering Proposal under subsection 40-08;
 - (2) A description of the difference between the existing Contract requirements and the proposed change, stating the comparative advantages and disadvantages of each, including effects on service life, economy of operations, ease of maintenance, desired appearance, and safety;
 - (3) Drawings or specifications that show the proposed revisions relative to the original Contract requirements. The Contractor may submit schematics for conceptual approval of the proposal;
 - (4) A detailed and complete cost estimate comparing the original estimated costs for performing the work under the existing Contract and under the proposed VEP;
 - (5) A summary of the Contractor's development costs for the VEP, including costs for designing, testing, preparing and submitting the VEP;
 - (6) A description and estimate of added costs the Department may incur in implementing the VEP, such as review, testing and evaluation of the VEP and Contract administration costs;
 - (7) A date by which the Department must make a decision to obtain the cost savings projected in the VEP. The date identified must allow a reasonable time for the Department to conduct an adequate review and evaluation of the VEP and process a Change Order without affecting the Contractor's schedule;
 - (8) A statement of the probable effect the VEP would have on the Contract completion time. The Department's approval of the VEP shall not change the Contract completion date unless a change to the completion date is specifically provided for in the Change Order authorizing the VEP; and
 - (9) A description of any previous use or testing of the proposed change and the conditions and results. If the proposal was previously submitted on another Department project, indicate the date, project name and number, and the action taken by the Department.

- c. Conditions. VEPs will be considered only when all of the following conditions are met:
 - (1) The Contractor has not based any bid prices on the anticipated acceptance of a VEP. If the VEP is rejected, the Contractor shall complete the work at the Contract prices.
 - (2) VEPs, regardless of their approval status, become the property of the Department. The Contractor shall submit VEPs without use or disclosure restrictions. The Department shall have the right to use, duplicate or disclose the VEP and any data necessary to use the VEP on the Project, on any other project, and on any other Contracts. The Contractor shall identify any trade secret information, patented materials or proprietary processes that restrict use of the VEP.
 - (3) The Department is the sole judge as to whether a VEP qualifies for consideration and evaluation. It may reject any VEP that does not allow a reasonable time for adequate review and evaluation by the Department or that requires excessive time or costs for review, evaluations, or investigations, or which is not consistent with the Department's design standards and policies, safety considerations, land use restrictions, permit stipulations, right-of way limitations, or other essential criteria for the project. The Department may reject a VEP without obligation to the Contractor if it contains proposals that are already under consideration by the Department or that have already been authorized for the Contract.
 - (4) If additional information is needed to evaluate a VEP, the Contractor shall provide it in a timely manner. Failure to do so may result in rejection of the VEP.
 - (5) The Contractor may submit VEPs for an approved subcontractor if the Department makes reimbursement to the Contractor.
 - (6) If the Contractor hires a design professional to prepare the proposal, that professional must seal the documents and provide evidence of Professional Liability Insurance with limits acceptable to the Department.
 - (7) The Contractor shall not implement proposed changes before the Department accepts the VEP.
 - (8) The Department shall not consider VEPs to share in cost savings due to changes previously ordered or authorized under other Contract sections or for work already done.
 - (9) The Engineer shall reject all unsatisfactory work resulting from an accepted VEP. The Contractor shall remove all rejected work or materials, and shall reconstruct the work under the original Contract at the Contractor's sole expense under Subsection 50-11.
 - (10)Reimbursement for modifications to the VEP to adjust field or other conditions is limited to the total amount of the original Contract bid prices.
 - (11)The Department shall not be held liable for costs or delays due to the rejection of a VEP, including but not limited to the Contractor's development costs, loss of anticipated profits and increased material, labor or overhead costs.

d. Processing.

- (1) The Engineer shall accept or reject the VEP, in writing, by the date the Contractor specifies, unless extended by mutual consent. If rejected, the Engineer will explain the reasons for rejection. A VEP may be rejected if the Contractor allows the Department insufficient time to adequately review and evaluate it.
- (2) The Contractor may withdraw or modify a VEP at any time before it is accepted.

- (3) If the VEP is approved in concept (without final drawings and specifications), the Department may either undertake the re-design itself or issue the Contractor a limited notice to proceed, subject to mutual agreement, authorizing the final design. The notice to proceed will include reference to any pertinent design criteria, Department policies, and other limitations on the design or construction methods. Approval in concept does not constitute acceptance of the VEP and will not obligate the Department to accept or pay for the final design.
- (4) If the final VEP is accepted, the Engineer will issue a Change Order under Subsection 40-02 incorporating the VEP into the Contract.
- e. Payment. If the Department accepts the VEP, payment will be authorized as follows:
 - (1) The Department will make a direct payment for the changed work at the unit or lump sum agreed prices in the Change Order. Such prices will include reimbursement of the Contractor's costs to develop and submit the VEP, including overhead and profit.
 - (2) In addition, the Department will share the net savings with the Contractor in a separate lump sum contract item, VEP Incentive, GCP-40a. The amount of the VEP incentive will be equal to 50 percent of the net savings to the Department. The net savings are the difference between the original Contract price for the affected work and the cost of the revised work. For the purpose of this calculation, the cost of the revised work will include costs the Department may incur as a result of the VEP, such as review of the proposal, testing and evaluation, and added Contract administration costs. These costs will be estimated and agreed to in the Change Order.
 - (3) The VEP Incentive, contract item GCP-40a, will be paid on a prorated basis as the revised work is performed.

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 being performed improperly. The Engineer has authority to accept completed work, issue Directives, issue Interim Work Authorizations, issue Change Orders, and recommend Contract payments.

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

The Engineer has authority to suspend work for reasons listed under Subsection 80-06. If the suspension is to protect workers or the 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. 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 Contractor shall submit to the Engineer for approval five sets of 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 use full-size (22"x34") white paper with dark blue or black lines on all working and detail drawings.

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.

Although the Contractor shall conduct its operations according to the approved working drawings, 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.

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 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 visual and electronic signals, including power supplies and Lighting used in the guidance of aircraft, whenever the airport is open to the arrival or departure of aircraft;
 - (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, the applicable completion dates or specific calendar days to complete the removal, adjustment, or relocation 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 call the following utilities directly:

AT&T Alascom (long distance telephone) GCI Contact the following utilities directly:

Electric Utility in Tununak Alaska Village Electric Cooperative Inc. (AVEC) 4831 Eagle Street Anchorage, Alaska 99503 Tel: (907) 561-1818 Fax: 1-800-959-0324

<u>Telephone Utility in Tununak</u> <u>United Utilities, Inc.</u> <u>5450 A Street</u> <u>Anchorage, Alaska 99518</u> <u>Tel: (907) 561-1674 or 1-800-478-2020</u> Fax: (907) 273-5322

Bethel Office: 109 Blackberry Street Bethel, Alaska 99559 Tel: (907) 543-7575 Fax: (907) 543-7544

Request AVEC inspection of the installed facilities 14 calendar days in advance of the date when the facility will be completed. AVEC 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): <u>Alaska Department of Transportation and Public Facilities</u> <u>Southwest M&O District</u> <u>Attention Mr. Troy LaRue, Superintendent (MS 2525)</u> <u>P.O. Box 196900</u> <u>Anchorage, AK 99519-6900</u> Phone (907) 269-0751

Submit applications to AVEC 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 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;
- (7) Take all precautions necessary to protect the safety of workers and the public when performing work involving utilities;
- (8) Follow an approved traffic control plan;
- (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;
- (17)Obtain plan approval from the local fire authority, and provide for the continued service of fire hydrants, before working around fire hydrants;
- (18)Do all pressure testing or camera testing required to verify utility acceptance in a timely manner; and
- (19)Coordinate the Storm Water Pollution Prevention Plan (SWPPP) (Section P-157) 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 and the utility owner.
- (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. When the work of this contract requires the closing of a runway that has visual or navigational aids, interruption of service to these aids, or displacement of a threshold, allow sufficient advance notice (through the Engineer) for the FAA to deactivate/activate these devices. Comply with subsection 80-04d FAA Systems Operations Control Center notification 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 provide to the Engineer daily written updates of all actions that may effect the operation of visual and electronic signals, lighting, or power supplies, used in the guidance of aircraft.

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. The survey work shall meet the requirements set forth in the *Alaska Construction Surveying Requirements*.

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.
The cost of surveying is to be subsidiary to the items of work for which surveying is required, except where a pay item for specified surveying work is included in the bid schedule.

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. 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 by 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 substantial completion (definition in Subsection 10-03). 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.

Avoid placing 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 preventative 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 and all edge lighting shall be in good working order. 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 acceptance (Subsection 50-14).

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 during construction and before the project is accepted as substantially complete 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:

- **a.** Suspend the work until corrective maintenance is completed;
- **b.** Assess a traffic price adjustment against the Contract Amount when an adjustment rate is specified in the Contract; and
- **c.** Employ others for corrective maintenance and deduct the cost from the Contract amount.

50-14 PARTIAL ACCEPTANCE. The Contractor may submit a written request for partial acceptance of a geographically separate unit of the project. The Engineer will accept the unit in writing before project completion if the Engineer inspects the unit and finds that the unit is substantially complete to Contract requirements, and acceptance is in the best interest of the State.

The Contractor may submit a written request for partial acceptance of a completed useable portion of the project. The Engineer may, in their discretion, accept the portion in writing before project completion if the Engineer performs an inspection of the portion and finds that the portion is substantially complete to Contract requirements, and acceptance is in the best interest of the State.

Partial acceptance of the unit or 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 except as listed under Subsection T-901-3.4 Maintenance of Seeded Areas. 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, except for work specified under Subsection T-901-3.4 Maintenance of Seeded Areas, 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 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 an Intent to Claim in writing to the Engineer.

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.

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. The Contracting Officer will issue written acknowledgement of the 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 the claim is made in good faith, that the supporting cost and pricing data are accurate and complete to the best of the Contractor's knowledge and belief, and that the amount requested accurately reflects the Contract adjustment that the Contractor believes is due.
- **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 any longer period required by 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. If the Contractor disagrees that it is liable for the removal, repair, or replacement of the defective work, refuses to reimburse the State for the removal, repair or replacement of the defective work, or does not pay the full amount of the costs of removal, repair, or replacement of the defective work, the Department shall file a claim against the Contractor under AS 36.30.620 with the subsequent adjudication of the claim under AS 36.30.620 through AS 36.30.687.

SECTION 60

CONTROL OF MATERIAL

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. The Contractor shall utilize Useable Excavation according to Subsection 40-04 before using material sources listed in this Subsection. When there is insufficient Useable Excavation, the Contractor shall 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.

The Department has completed preliminary exploration and has made available the material sites shown on the plan sheets entitled "Material Site Plan."

When there is insufficient Useable Excavation, the Contractor shall supply additional required material from the following sources:

- (1) **Contractor-Furnished Sources.** For a material source that is a commercial plant as defined in Subsection 80-01.c.(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 stateowned sources that are not under the Department's control;
 - (e) Pay as subsidiary costs all related costs to obtain, develop, and use the sources, including but not limited to permit costs and mineral royalties;
 - (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.

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. No mandatory sources have been identified for this project. 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 approval is 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 that estimates quality and quantity of material 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 it is subsequently found that the quality or quantity of material producible from a Mandatory Source is not as represented by the materials report, and a change of source is necessary for that reason alone, a Change Order with equitable adjustment will be made.

(3) Designated Sources. No designated sources have been identified for this project. 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 that estimates quality and quantity of material 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 subsequently found that the quality and quantity of material producible from that source is not as represented by the materials report, 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.

The <<<u>Contractor OR State; TBD once Material Sales Agreement is negotiated>></u> will pay all royalties as indicated in Appendix M.

- (5) Excluded Material Sources. Some material sources may not be considered acceptable regardless of location or ownership. The bid documents may identify some material sources excluded from use. The Department reserves the right to exclude any material source or any portion of a material source, at any time after Contract award, that is determined by material testing to be unsuitable for use on the project.
- 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 Section P-157.

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 GCP-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 Engineer may authorize the use of certain materials or assemblies based on a manufacturer's certificate of compliance. The certificate must state that the material

or assembly fully complies with Contract requirements, include the project name and number, and be signed by the manufacturer. The certificate must accompany each lot of the materials or assemblies delivered to the project and must clearly identify the lot.

The Contractor shall submit a manufacturer's certificate of compliance, as required, for each item listed on the Materials Certification List (MCL) included in the Contract documents. The Contractor shall submit additional manufacturer's certificates of compliance if required by the Contract or by the Engineer. If the Specifications require a material certification that is not listed on the MCL, the Engineer reserves the right to add it.

Materials or assemblies 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 meet Contract specifications, they may be rejected and ordered removed under Subsection 50-11. The Engineer may refuse permission to incorporate materials or products into the project based on a manufacturer's certificate of compliance that does not meet specifications.

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. The Submittal Register shall list all working drawings, catalog cuts, manufacturer's certifications, quality control testing plans, schedules of work and other items required to be submitted to the Department by the Contractor including but not limited to Storm Water Pollution Prevention Plan, Quality Control Program, Progress Schedule, Utility Repair Plan, Blasting Plan, Mining Plan, annual EEO reports, DBE payment documentation and subcontracts. The register shall be filled out sequentially by bid item and shall allow at least three spaces between bid items. The intent of the Submittal Register is to provide a blueprint for the smooth flow of specified project documents.

Submit catalog cuts and manufacturer's certifications to the Engineer for review as required by the Materials Certification List (MCL) or by the Contract. The Engineer will track material submittals using the MCL. Choose materials or equipment in the L series of bid items that are FAA certified under AC 150/5345-53, Airport Lighting Equipment Certification Program; except for items not certified such as beacon towers and electrical duct. The Engineer will approve the L series bid items that meet contract requirements and are FAA certified under this AC without further review. For materials other than L series, you may submit for approval a material that is listed on the Qualified Products List, and if that material meets Contract requirements, the Engineer will grant approval without further review.

The number of copies required for submittals may be included in the specifications for individual bid items. If the number of copies of a submittal is not otherwise specified, three copies shall be required. On each sheet submitted to the Department, including working drawings, catalog cuts, manufacturer's certifications, etc., space shall be provided for Contractor and Department review stamps.

Each copy of each submittal shall include a Submittal Summary sheet. The Contractor may use forms provided by the Department or a similar form of the Contractor's choice as approved by the Department. The Contractor shall sign submittals and submit them to the Engineer. The Department will review submittals within 30 days after they are received. 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 will review resubmittals within 30 days after they are received. The Contractor shall not order material or use working drawings that have not been approved by the Department. The Contractor shall be responsible for timely submittals. Failure by the Department to review submittals within the time given 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.

60-09 BUY AMERICAN STEEL AND MANUFACTURED PRODUCTS.

- **a.** The Contractor agrees that only domestic steel and manufactured products will be used by the contractor, subcontractors, material, men, and suppliers in the performance of this contract, as defined below.
- **b.** The following terms apply to this clause:
 - (1) Steel and Manufactured Products. As used in this clause, steel and manufactured products include (1) those produced in the United States or (2) a manufactured product produced or manufactured in the United States, if the cost of its components mined, produced or manufactured in the United States exceeds 60% of the cost of all its components and final assembly has taken place in the United States. Components of foreign origin of the same class or kind as the products referred to in subparagraphs c.(1) or c.(2) shall be treated as domestic.
 - (2) **Components.** As used in this clause, components means those articles, materials, and supplies incorporated directly into steel and manufactured products.
 - (3) Cost of Components. This means the costs for production of the components, exclusive of final assembly labor costs.
- **c.** Buy American Certificate. Execution and submission of the Buy American Certificate Form 25D-061, is required according to sections 30-07 and 30-08. If there are no exceptions to be listed on the certificate, the bidder shall enter "NONE" on the first line.

If exceptions are listed on the Buy American Certificate, they shall meet at least one of the following criteria for the certificate to be considered appropriately executed:

(1) Those products or materials that the U.S. Department of Transportation has determined, under the *Aviation Safety and Capacity Expansion Act of 1990*, are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality. (The current list is included on the back of Form 25D-061.)

- (2) Those products or materials where the U.S. Department of Transportation has determined, under the *Aviation Safety and Capacity Expansion Act of 1990*, that domestic preference would be inconsistent with the public interest.
- (3) Where inclusion of domestic material will increase the cost of the overall project contract by more than 25%.

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
 - (6) Fuel Tank Capacity Diagram (converting stick readings at 6-inch vertical increments to gallons)
- **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.

SECTION 70

LEGAL RELATIONS 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.

In addition to all other laws, the Contractor shall fully comply with all laws, regulations and permits issued by agencies of the United States and the State of Alaska when working in, over or adjacent to wetlands, tidelands, anadromous fish streams, eagle nests, navigable waters, or coastal waters.

In addition to other laws, the Contractor shall ensure that all work in, over or adjacent to navigable waters is conducted so that free navigation of the waterways is not obstructed and that existing navigable depths are not impaired, except as allowed by the U.S. Coast Guard and the U.S. Army Corps of Engineers.

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.

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. <u>See Appendix E for permits</u> obtained by the Department. 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:

- **a.** Acquire any permits and licenses required to complete the project that are not acquired by the Department;
- **b.** Provide qualified professionals to collect data or perform studies necessary to acquire permits for the use of sites not previously permitted;
- c. Give all notices required for the prosecution of the work;
- d. Abide by all permits and licenses whether acquired by the Department or by the Contractor;

- e. 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;
- f. Obtain modifications to permits acquired by the Contractor;
- g. Pay all charges, fees and taxes; and
- h. Provide proof of payment of all taxes before the Department makes final payment.

The Contractor shall not work in areas that are not permitted for use by the Contract. Before working in an area not previously permitted for use by the Contract, the Contractor shall:

- a. Contact all government agencies having possible or apparent permit authority over that area;
- **b.** Obtain all required permits, <u>clearances</u>, and licenses from those agencies;

These permits and clearances may include, but are not limited to: APDES General Permit, State Historic Preservation Officer approval; Department of Natural Resources Coastal Consistency Determination, Title 16 Material Site Reclamation, and Temporary Water Use Permits; Department of Environmental Conservation Section 401 Certification, Solid Waste Disposal Site and Construction Camp Permits; Department of Fish and Game Special Area Permits; U.S. Fish and Wildlife Service Threatened and Endangered Species clearance; U.S. Corps of Engineers Section 404/10 Permits; city or local government development permits and flood hazard permits; Material Sales Agreements; and the permission of the property owner or lessee.

- c. Obtain permission from any property owners or lessees with an interest in the property; and
- **d.** 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. The 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 the written consent of the designer; 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.

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 grant 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 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. When used during periods of darkness, such barricades, warning signs and hazard markings shall be suitably illuminated. Barricades, warning signs, and markings for hazards that are in the air operations area shall be a maximum of 18 inches high. Barricades shall be spaced not more than 25 feet apart.

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* (published by the Department), and according to the Traffic Control Plan.

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 Construction Safety Plan.

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.

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. 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.
- b. 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.
- c. 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;
 - (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; and
 - (4) Not refuel and service equipment within 100 feet of wetlands and/or other water bodies.

- **d. 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 Section P-157. Dispose of hazardous material according to federal, state and local laws and regulation.
 - (7) Store, handle and dispose of hazardous material that the Contractor or subcontractors brought to or used on the project, at no additional cost to the Department.
- e. 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.
- f. 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.
- **g. 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, the condition of each area and haul route will be compared to the earlier photographs. Prior to demobilization 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.
- h. 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 dumping 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 dumping. 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.

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. The Engineer may, at their 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, *Occupational 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.

SECTION 80

PROSECUTION AND PROGRESS

80-01 SUBLETTING OF CONTRACT. The Contractor shall submit a Contractor Self Certification for Subcontractors and Lower Tier Subcontractors, Form 25D-042, before the Contractor or any subcontractor sublets, 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 sublet 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 subletting, 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. Submittals. The Contractor shall ensure that for all the following for each 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, as well as other items listed in Form 25D-042 are included in the subcontracts;
 - (4) The subcontractors pay current prevailing rate of wages as per Subsection 70-04 Wage Rates and file certified payrolls with the Engineer and DOLWD for all work performed on the project.; and
 - (5) Upon receipt of a request for more information regarding subcontracts, the requested information is provided to the Department within 5 calendar days;-
 - (6) The Department is furnished with two copies of the subcontract signed by both parties and including item descriptions and prices of subcontracted work before the subcontracted work begins.
- **b.** Work that is Subcontracting. The following will be considered as subcontracting, unless performed by the Contractor:
 - (1) Roadside or Onsite Production. Roadside or onsite 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.
- **c.** Work that is not Subcontracting. 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.
- **d. Owner-Operators.** Hauling of materials for the project by bona fide truck owner-operators who are listed as such on the 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:

- (1) The owner-operator's right to control the manner in which the work is to be performed;
- (2) The owner-operator's opportunity for profit or loss depending upon their managerial skill;
- (3) The owner-operator's investment in equipment or materials required for their task, or the employment of helpers;
- (4) Whether the service rendered requires a special skill;
- (5) The degree of permanence of the working relationship; and
- (6) 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.

Not withstanding 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 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 Contractor shall submit the following documents to the Engineer at least five working days before the preconstruction conference:

- a. A Critical Path Method (CPM) Schedule is required, in a format acceptable to the Engineer, showing the order in which the work will be carried out and the contemplated dates on which the Contractor and subcontractors will start and finish each of the salient features of the work, including any scheduled periods of shutdown. Indicate any anticipated periods of multiple-shift work in the CPM Schedule. If revisions to the proposed CPM Schedule are required, make them promptly. Promptly submit a revised CPM Schedule if there are substantial changes to your schedule, or upon request of the Engineer. 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 GCP-50-02 and GCP-60-08, and for other events such as inspection of structural steel fabrication.
- c. A list showing all proposed subcontractors and material suppliers.
- d. A Submittal Register, according to Subsection GCP-60-08.
- e. A Construction Phasing plan, when required under Section G-300.
- f. 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 Section P-157.
- **g.** A letter designating the Contractor's Project Superintendent, defining that person's responsibility and authority, and providing a specimen signature.
- **h.** A letter designating an Equal Employment Opportunity Officer and a Disadvantaged Business Enterprise Officer, and designating those person's responsibilities and authority.

i. A Quality Control Plan, as required under Sections GCP-60-03 and GCP-100.

- **j.** A letter designating a Safety Officer for workers, and designating that person's responsibilities and authority.
- **k.** A Traffic Control Plan<u>and a Construction Safety Plan</u>, as required under Subsections GCP-70-09 <u>and GCP-80-04</u> and Section G-710.
- I. A Utility Repair Plan, as required under Subsection GCP-50-06.e.
- m. 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.

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.

To prevent impacts to migratory birds, the following construction activities are prohibited between May 5 and July 25:

(1) Clearing of vegetation.

(2) Fill placement over vegetated areas.

(3) Excavation of vegetated areas.

(4) Other construction activities that cause disturbance of vegetation.

The prohibited activities specified in (1) through (4) above do not apply if the vegetated areas have been sufficiently disturbed or altered (e.g. by grubbing, excavation, fill placement or use of plastic or other materials that will cover the nesting habitat) prior to May 5 to eliminate the nesting habitat.

There is potential eagle/raptor nesting habitat in the sea cliffs adjacent to Ugchirnak Mountain. If eagle or raptor nests are discovered in this or any other area of the project, then all construction activity within 660 feet of the nest site must cease between April 15 and August 15.

If blasting is to occur on Ugchirnak Mountain, then a spring bird survey shall be conducted by a gualified individual prior to commencement of blasting activities. Blasting shall be avoided between March 1 and July 31; however, if blasting is needed during this time, a monitor will be used to determine whether blasting is disturbing nesting birds.

b. Construction Safety Plan (CSP). The Contractor shall provide the Engineer with a detailed Construction Safety Plan. The CSP shall specify minimum requirements for operational safety during construction activities. The plan shall be in general conformance with the FAA Advisory Circular 150/5370-28, Operational Safety on Airports During Construction. Appendix D provides a safety plan for the Contractor's use in developing his CSP and Traffic Control Plan. Additional traffic control is required for construction traffic on community roads and streets; see Item G-710 for reference. A CSP is included within the contract documents. The CSP specifies minimum requirements for operational safety during construction activities. The Contactor shall conduct operations according to the CSP and the provisions set forth within the current version of AC 150/5370-2, Operational Safety on Airports During Construction. No deviations or modifications may be made to the approved CSP unless approved in writing by the Engineer.

The Contractor shall implement all necessary CSP 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 CSP 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 CSP, and that the subcontractors and suppliers implement and maintain all necessary safety measures.

The CSP 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.

The new runway shall be marked with closed-runway markers once embankment dimensions are 40 feet by 1,000 feet or greater. Marker locations will be shown on the Contractor's Construction Safety Plan and project phasing plan. The Contractor shall move and maintain the markers as required to support his operations. Placement, moving, and maintenance of all temporary markings is a subsidiary obligation and will not be paid for directly.

- **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 with Airport Management, the FAA Flight Service Station, and the Engineer. The Contractor shall provide written notice to the Airport Management, FAA, and the Engineer, at least 45 days before working in the Air Operations Area. The Contractor shall copy to the Engineer all correspondence with Airport Management and FAA.

The Contractor shall prepare a NOTAMs on a form provided by the Department, and submit the form through the Engineer to the Airport Management 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 close an Air Operations Area until a NOTAMs has been issued by Airport Management or by FAA, until the Engineer has authorized the Contractor to work there, and until the necessary temporary marking and associated lighting is in place as provided in Subsection 70-09.

For questions, the primary FAA contact is the FAA Systems Operations Control Center at (800) 478-2139. <u>As an alternate contact if If</u> the primary contact is unavailable, contact the Chairman of Long Term Outage Committee, Operations Engineering Section, FAA Airways Facilities Division at (907) 271-<u>5800</u>5552.

Contact the FAA Systems Operations Control Center at least 45 days prior to:

- (1) Closing a runway.
- (2) Re-opening a closed runway.

(3) Interrupting service or removing visual or navigational aids.

(4) Displacing a runway threshold.

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 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.

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:
 - (a) With a Flight Service Station: When the airport has an operating FSS, 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. The Contractor shall furnish a liaison radio operator and 2-way radio communication with each work party located within the Air Operations Area.
 - (b) Without a Flight Service Station: At those airports without an operating FSS, 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. The Contractor shall furnish 2-way radio communication with each work party located within the Air Operations Area and arrange for all communication with aircraft through one liaison radio operator.

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 construction safety plan requirements, violate security plan requirements, perform the work in an unskilled manner, who are intemperate or disorderly, or who jeopardize the safety of the public, other workers or Engineer's personnel. 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 or by specific Completion Date.

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 Items c.(1) through c.(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 unsafe conditions for the workers or the public;

(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 on a basis commensurate with the amount and difficulty of the extra work, provided that the extra work is for a controlling item.

- **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; and
 - (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.

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.

FOR EACH CALENDAR DAY OF DELAY		
Original Contract Amount		Daily Charge
From More Than	To and Including	
\$ O	\$ 100,000	\$ 300
100,000	500,000	550
500,000	1,000,000	750
1,000,000	2,000,000	1,000
2,000,000	5,000,000	1,500
5,000,000	10,000,000	2,500
10.000.000		3.000

TABLE 80-1 DAILY CHARGE FOR LIQUIDATED DAMAGES FOR EACH CALENDAR DAY OF DELAY

Permitting the Contractor to continue work 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 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:

- (a) Applied to reduce any payments to be made by the Department under the Contract;
- (b) Credited to the cost of the work; or
- (c) 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:
 - 1. 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.
 - 2. 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 Contractorowned equipment, unless the affiliate, division, subsidiary or other organization has an established practice of leasing to unaffiliated lessees.
 - (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) Loss of anticipated profits or 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 disposal 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.
- I. **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, letter or numeric suffixes included within parentheses following the pay item number are used to differentiate the types.

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 ft²). Horizontally, unless specified on the ground surface. No deductions will be made for individual fixtures with an area of 500 ft² 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 (yd³). At the location specified using one of the following methods:
 - (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 D 4311 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 board foot = 1 ft² X 1 inch thick.
- g. Thousand Gallon (MGal). By one of the following methods:
 - (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 (ft²). Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 ft² 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 (yd²). Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 yd² or less. Transverse measurement for area computations will be the neat dimensions shown on the Plans or as directed by the Engineer.
- I. Station (100 feet). Horizontally, parallel to centerline.
- m. Ton (2,000 pounds). By one of the following methods:
 - (1) Commercial Weighing System. Permanently installed and certified commercial scale that meets the requirements for the project weighing system.
 - (2) Project weighing system. As specified under Subsection G-130.
 - (3) Invoices. If bulk material is shipped by truck or rail and is not passed through a mixing plant, furnish a supplier's invoice with net weight or volume converted to weight. Periodic check weighing may be required.

Trucks used to haul material being paid for by weight shall be weighed empty at least once daily and at such times as directed. Each truck shall bear a plainly legible identification mark.

Due to possible variations in the specific gravity of the aggregates, the measured weight may vary from the weight used to estimate bid quantity, and no adjustment in contract unit price will be made because of such variation.

If material is shipped by rail, the certified car weight may be accepted provided that only the actual weight of material is paid for. Car weights will not be acceptable for material to be passed through mixing plants.

Net certified scale weights or weights based on certified volumes in the case of rail shipments may be used as a basis of measurement, subject to correction when material has been lost, wasted, or otherwise not incorporated into the work.

When materials are shipped by truck or transport, net certified weights or volume, subject to correction for loss or foaming, may be used for computing quantities, in the Engineers discretion.

All aggregate paid by weight shall be less than 2% over optimum moisture.

(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.

When standard manufactured items are specified such as fence, wire, plates, rolled shapes, pipe conduit, etc., and these items are identified by unit weight, section dimensions, etc., such identification will be considered to be nominal weights or dimensions. Unless more stringently controlled by tolerances in cited specifications, manufacturing tolerances established by the industries involved will be accepted.

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 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, loss of expected reimbursement, or loss of 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 for Construction Equipment, published by PRIMEDIA Information, Inc., 1735 Technology Drive, Suite 410, San Jose, CA 95110-1313.

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 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.

If satisfactory progress is being made, 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, the Engineer may withhold up to 10 percent of the total amount earned as retainage from subsequent progress payments. The Engineer may withhold up to 200 percent of the estimated cost to complete final punch list items as retainage until those items are complete. The Engineer will notify the Contractor in writing within eight working days of a request for a progress payment of the reasons why part or all of the payment is being withheld as retainage and what actions may be taken by the Contractor to receive full payment.

Payments of withheld amounts will be made according to AS 36.90.200. No interest will be paid on amounts withheld as retainage.

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 approves 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 approves the final estimate and executes the Contractor's Release form, 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 loss of 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.

SECTION 100

CONTRACTOR QUALITY CONTROL PROGRAM

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. When required, the Contractor shall establish, provide, and maintain an effective Quality Control Program 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 intent of this section is to enable the Contractor to establish a necessary level of control that will:

- **a.** Adequately provide for the production of acceptable quality materials.
- **b.** Provide sufficient information to assure both the Contractor and the Engineer that the specification requirements can be met.
- c. Allow the Contractor as much latitude as possible to develop their own standard of control.

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 Quality Control Program has been reviewed by the Engineer. No partial payment will be made for materials subject to specific quality control requirements until the Quality Control Program has been reviewed.

The quality control 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.

100-02 DESCRIPTION OF PROGRAM.

- a. General Description. The Contractor shall establish a Quality Control Program 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 Quality Control Program shall ensure conformance to applicable specifications and Plans with respect to materials, workmanship, construction, finish, and functional performance. The Quality Control Program 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 quality control.
- b. Quality Control Program. The Contractor shall describe the Quality Control Program in a written document which shall be reviewed by the Engineer prior to the start of any production, construction, or off-site fabrication. The written Quality Control Program shall be submitted to the Engineer for review at least 5 calendar days before the preconstruction conference.

The Quality Control Program shall be organized to address, as a minimum, the following items:

- a. Quality control organization;
- **b.** Project progress schedule;

- c. Submittals schedule;
- **d.** Inspection requirements;
- e. Quality control testing plan;
- f. Documentation of quality control activities; and
- g. Requirements for corrective action when quality control and/or acceptance criteria are not met.

The Contractor is encouraged to add any additional elements to the Quality Control Program that he/she deems necessary to adequately control all production and/or construction processes required by this contract.

100-03 QUALITY CONTROL ORGANIZATION. The Contractor's Quality Control Program shall be implemented by the establishment of a separate quality control organization. An organizational chart shall be developed to show all quality control personnel and how these personnel integrate with other management/production and construction functions and personnel.

The organizational chart shall identify all quality control staff by name and function, and shall indicate the total staff required to implement all elements of the Quality Control Program, 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 Quality Control Program, the personnel assigned shall be subject to the qualification requirements of Subsection 100-03a and 100-03b. The organizational chart shall indicate which personnel are Contractor employees and which are provided by an outside organization.

The quality control organization shall consist of the following minimum personnel:

a. Program Administrator. The Program Administrator shall be a full-time employee of the Contractor, or a consultant engaged by the Contractor. The Program Administrator shall have a minimum of 5 years of experience in airport and/or highway construction and shall have had prior quality control experience on a project of comparable size and scope as the contract.

Additional qualifications for the Program Administrator shall include 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) An individual with 3 years of highway and/or airport paving experience acceptable to the Engineer, with a Bachelor of Science Degree in Civil Engineering, Civil Engineering Technology or Construction.
- (4) Construction materials technician certified at Level III by the National Institute for Certification in Engineering Technologies (NICET).
- (5) Highway materials technician certified at Level III by NICET.
- (6) Highway construction technician certified at Level III by NICET.
- (7) A NICET certified engineering technician in Civil Engineering Technology with 5 years of highway and/or airport paving experience acceptable to the Engineer.

The Program Administrator shall have full authority to institute any and all actions necessary for the successful implementation of the Quality Control Program to ensure compliance with the contract Plans and technical specifications. The Program Administrator shall report directly to a responsible officer of the construction firm. The Program Administrator may supervise the Quality Control Program on more than one project provided that person can be at the job site within 2 hours after being notified of a problem.

b. Quality Control Technicians. A sufficient number of quality control technicians necessary to adequately implement the Quality Control Program 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 or higher construction materials technician or highway construction technician and shall have a minimum of 2 years of experience in their area of expertise.

The quality control technicians shall report directly to the Program Administrator 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 Section 100-05.
- (2) Performance of all quality control tests as required by the technical specifications and Section 100-06.

Certification at an equivalent level, by a state or nationally recognized organization will be acceptable in lieu of NICET certification.

c. Staffing Levels. The Contractor shall provide sufficient qualified quality control 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 Quality Control Program shall state where different technicians will be required for different work elements.

100-04 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:

- a. Specification item number;
- **b.** Item description;
- **c.** Description of submittal;
- d. Specification Subsection requiring submittal; and
- e. Scheduled date of submittal.

100-05 INSPECTION REQUIREMENTS. Quality control 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 Section 100-07.

Inspections shall be performed daily to ensure continuing compliance with contract requirements until completion of the particular feature of work. These shall include the following minimum requirements:

During plant operation for material production, quality control 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 Quality Control Program shall detail how these and other quality control functions will be accomplished and utilized.

During field operations, quality control 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 Program shall document how these and other quality control functions will be accomplished and utilized.

100-06 QUALITY CONTROL TESTING PLAN. As a part of the overall Quality Control Program, the Contractor shall implement a quality control testing plan, as required by the technical specifications. The testing plan shall include the minimum tests and test frequencies required by the technical specification Item, as well as any additional quality control tests that the Contractor deems necessary to adequately control production and/or construction processes.

The testing plan can be developed in a spreadsheet fashion and shall, as a minimum, include the following:

- a. Specification item number (e.g., P-401);
- **b.** Item description (e.g., Plant Mix Bituminous Pavements);
- 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 minimum frequency <u>listed in appendix</u> <u>C</u> when requirements are not stated);
- f. Responsibility (e.g., plant technician); and
- g. Control requirements (e.g., target, permissible deviations).

The testing plan shall contain a statistically-based procedure of random sampling for acquiring test samples according to ASTM D 3665. The Engineer shall be provided the opportunity to witness quality control sampling and testing.

All quality control test results shall be documented by the Contractor as required by Section 100-07.

100-07 DOCUMENTATION. The Contractor shall maintain current quality control records of all inspections and tests performed. These records shall include factual evidence that the required 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 Contractor's Program Administrator.

Specific Contractor quality control records required for the contract shall include, but are not necessarily limited to, the following records:

a. Daily Inspection Reports. Each Contractor quality control 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 quality control inspections have been performed and shall, as a minimum, include the following:

- (1) Technical specification 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) Review of quality control tests; and
- (7) Safety inspection.

The daily inspection reports shall identify inspections 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 quality control technician and the Program Administrator. The Engineer shall be provided at least one copy of each daily inspection report on the work day following the day of record.

- **b.** Daily Test Reports. The Contractor shall be responsible for establishing a system which will record all quality control test results. Daily test reports shall document the following information:
 - (1) Technical specification 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 quality control charts. The daily test reports shall be signed by the responsible quality control technician and the Program Administrator.

100-08 CORRECTIVE ACTION REQUIREMENTS. The Quality Control Program 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 Quality Control Program as a whole, and for individual items of work contained in the technical specifications.

The Quality Control Program shall detail how the results of quality control inspections and tests will be used for determining the need for corrective action and shall contain clear sets of 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 quality control charts for individual quality control tests. The requirements for corrective action shall be linked to the control charts.

100-09 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 quality control 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 quality control inspections of either on-site or off-site Contractor's or subcontractor's work.

100-10 NONCOMPLIANCE.

- **a.** The Engineer will notify the Contractor of any noncompliance with any of the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered by the Engineer or their authorized representative to the Contractor or their authorized representative at the site of the work, shall be considered sufficient notice.
- **b.** In cases where quality control activities do not comply with either the Contractor's Quality Control Program or the contract provisions, or where the Contractor fails to properly operate and maintain an effective Quality Control Program, as determined by the Engineer, the Engineer may:
 - (1) Order the Contractor to replace ineffective or unqualified quality control personnel or subcontractors.
 - (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. When the Specifications provide for acceptance of material based on the method of estimating percentage of material within specification limits (PWL), the PWL will be determined according to this section. All test results for a lot will be analyzed statistically to determine the total estimated percent of the lot that is within specification limits. The PWL is computed using the sample average (X) and sample standard deviation (Sn) of the specified number (n) of sublots for the lot and the specification tolerance limits, L for lower and U for upper, for the particular acceptance parameter. From these values, the respective Quality index(s), QL for Lower Quality Index and/or QU for Upper Quality Index, is computed and the PWL for the lot for the specified n is determined from Table 1. Analysis of test results will be based on an Acceptable Quality Level (AQL) of 95.0% and a contractor's risk of 5.0% unless otherwise specified. AQL may be viewed as the lowest percent within the specification limits of a material that is acceptable as a process average and receive 100% pay. The Contractor's risk is the probability that when the Contractor is producing material at exactly the AQL, the materials will receive less than 1.00 pav factor.

There is some degree of uncertainty (risk) in the measurement for acceptance because only a small fraction of production material (the population) is sampled and tested. This uncertainty exists because all portions of the production material have the same probability to be randomly sampled. The Contractor's risk is the probability that material produced at the acceptable quality level is rejected or subjected to a pay adjustment. The Department's risk is the probability that material produced at the rejectable quality level is accepted.

IT IS THE INTENT OF THIS SECTION TO INFORM THE CONTRACTOR THAT, IN ORDER TO CONSISTENTLY OFFSET THE CONTRACTOR'S RISK FOR MATERIAL EVALUATED, PRODUCTION QUALITY (USING POPULATION AVERAGE AND POPULATION STANDARD DEVIATION) MUST BE MAINTAINED AT THE ACCEPTABLE QUALITY SPECIFIED OR HIGHER. IN ALL CASES. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PRODUCE AT QUALITY LEVELS THAT WILL MEET THE SPECIFIED ACCEPTANCE CRITERIA WHEN SAMPLED AND TESTED AT THE FREQUENCIES SPECIFIED.

110-02 METHOD FOR COMPUTING PWL. The computational sequence for computing PWL is as follows:

- a. Divide the lot into n sublots according to the acceptance requirements of the specification.
- b. Locate the random sampling position within the sublot according to the requirements of the specification. Make a measurement at each location, or take a test portion and make the measurement on the test portion according to the testing requirements of the specification.
- c. Discard outliers as determined by ATM SP-7.
- **d.** Find the sample average (X) for all remaining sublot values within the lot by using the following formula:

$$X = (x_1 + x_2 + x_3 + \dots x_n) / n$$

Where:

- X = Sample average of all sublot values within a lot = Individual sublot values X_1, X_2
- n = Number of sublots

e. Find the sample standard deviation (S_n) by use of the following formula:

$$S_n = [(d_1^2 + d_2^2 + d_3^2 + \dots + d_n^2)/(n-1)]^{1/2}$$

Where: $S_n = Sample standard deviation of the number of sublot values in the set$ $d_1, d_2, \ldots = Deviations of the individual sublot values x_1, x_2, \ldots$ from the average value X that is: $d_1 = (x_1 - X), d_2 = (x_2 - X) \ldots d_n = (x_n - X)$ n = Number of sublots

If the computed sample standard deviation (Sn) is <0.001, then use Sn = 0.20 for density and all sieves except the No. 200 sieve. Use Sn = 0.020 for asphalt cement content and the No. 200 sieve.

f. For single sided specification limits (i.e., L only), compute the Lower Quality Index Q_L by use of the following formula:

$$Q_{L} = (X - L) / Sn$$

Where: L = specification lower tolerance limit Q_L = Lower Quality Index

Estimate the percentage of material within limits (PWL) by entering Table 1 with Q_L , using the column appropriate to the total number (n) of measurements. Q_L is rounded to the nearest hundredth.

g. For double sided specification limits (i.e. L and U), compute the Quality Indexes Q_L and Q_U by use of the following formulas:

$$Q_L = (X - L) / S_n$$
 and $Q_U = (U - X) / S_n$

Where:

L and U = specification lower and upper tolerance limits. Limits for the largest sieve specified will be plus 0% and minus 1%.

 Q_L = Lower Quality Index Q_U = Upper Quality Index

QL and QU are rounded to the nearest hundredth.

Estimate the percentage of material between the lower (L) and upper (U) tolerance limits (PWL) by entering Table 1 separately with Q_L and Q_U , using the column appropriate to the total number (n) of measurements, and determining the percent of material above P_L and percent of material below P_U for each tolerance limit. Determine the PWL by use of the following formula:

 $PWL = (P_U + P_L) - 100$

Where: P_L = percent within lower specification limit P_U = percent within upper specification limit

EXAMPLE OF PWL CALCULATION

(This is an example PWL determination of five random samples from Lot 1. Cores for mat density are used for this example. Follow the same basic procedure for all acceptance criteria requiring a PWL calculation.)

Project:	Example Project
Test Item:	Item 401a, Lot 1

1. Densities of five random core samples from Lot 1 (n = 5).

- 2. Calculate average density (X) for Lot 1.
 - $X = (x_1 + x_2 + x_3 + x_4 + x_5)/n$
 - X = (93 + 94 + 92 + 95 + 95)/5X = 93.8 percent density
- 3. Calculate the standard deviation (S_n) for Lot 1.
 - $$\begin{split} & \text{S}_n = [(\{x_1-X\}^2 + \{x_2-X\}^2 + \{x_3-X\}^2 + \{x_4-X\}^2 + \{x_5-X\}^2)/n-1)]^{1/2} \\ & \text{S}_5 = [(\{93-93.8\}^2 + \{94-93.8\}^2 + \{92-93.8\}^2 + \{95-93.8\}^2 + \{95-93.8\}^2)/5-1]^{1/2} \\ & \text{S}_5 = [(0.64+0.04+3.24+1.44+1.44)/4]^{1/2} \\ & \text{S}_5 = [1.70]^{1/2} \\ & \text{S}_5 = 1.30 \end{split}$$
- 4. Calculate the lower Quality Index (Q_L) for Lot 1. (L = Lower specification limit.) $Q_L = (X - L)/S_n$ $Q_L = (93.8-92)/1.30$ $Q_L = 1.38$
- 5. Calculate the upper Quality Index (QU) for Lot 1. (U = Upper specification limit.) $Q_U = (U - X)/S_n$ $Q_U = (98-93.8)/1.30$ $Q_U = 3.23$
- 6. Determine the percent within lower specification limits (P_L) from Table 1. For n = 5 and QL = 1.38, PL = 94
- 7. Determine the percent within upper specification limits (PU) from Table 1. For n = 5 and Q_U = 3.23, P_U = 100
- 8. Calculate mat density PWL for LOT 1. $PWL = (P_{L} + P_{U}) -100$ PWL = (94 + 100) - 100 PWL = 94

	n = 3	n = 4	n = 5	n = 6	n = 7
	Upper or Lower Quality Index (Q ₁₁ or Q ₁)				
100	1 16-50 0	1 48-50 0	1 68-50 0	1 81-50 0	1 90-50 0
99	-	1.45-1.47	1.61-1.67	1.71-1.80	1.77-1.89
98	1.15	1.42-1.44	1.55-1.60	1.63-1.70	1.68-1.76
97	-	1.39-1.41	1.50-1.54	1.56-1.62	1.60-1.67
96	1.14	1.36-1.38	1.45-1.49	1.50-1.55	1.53-1.59
95	-	1 33-1 35	1 40-1 44	1 44-1 49	1 47-1 52
94	1 13	1 30-1 32	1 36-1 39	1 39-1 43	1 41-1 46
93	-	1 27-1 29	1 32-1 35	1 34-1 38	1 36-1 40
92	1 12	1 24-1 26	1 28-1 31	1 30-1 33	1 31-1 35
91	1 11	1 21-1 23	1 24-1 27	1 25-1 29	1 26-1 30
90	1 10	1 18-1 20	1 20-1 23	1 21-1 24	1 21-1 25
89	1 08-1 09	1 15-1 17	1 16-1 19	1 17-1 20	1 17-1 20
88	1.07	1 12-1 14	1 13-1 15	1 13-1 16	1 13-1 16
87	1.05-1.06	1 09-1 11	1 09-1 12	1 09-1 12	1 09-1 12
86	1.00 1.00	1.06-1.08	1.06-1.08	1.05-1.08	1.05-1.08
85	1.02-1.03	1.03-1.05	1 02-1 05	1 02-1 04	1 01-1 04
84	1.02 1.00	1.00-1.02	0.99-1.01	0.98-1.01	0.98-1.00
83	0.98-1.00	0.97-0.99	0.96-0.98	0.95-0.97	0.94-0.97
82	0.97	0.94-0.96	0.92-0.95	0.91-0.94	0.91-0.93
81	0.94-0.96	0.91-0.93	0.89-0.91	0.88-0.90	0.87-0.90
80	0.92-0.93	0.88-0.90	0.86-0.88	0.85-0.87	0.84-0.86
79	0.02 0.00	0.85-0.87	0.83-0.85	0.81-0.84	0.81-0.83
78	0.88-0.89	0.82-0.84	0 79-0 82	0 78-0 80	0.77-0.80
77	0.85-0.87	0.02 0.04	0.76-0.78	0.75-0.77	0.74-0.76
76	0.83-0.84	0.76-0.78	0.73-0.75	0.72-0.74	0.71-0.73
75	0.00 0.04	0.73-0.75	0.70-0.72	0.69-0.71	0.68-0.70
74	0.00 0.02	0.70-0.72	0.67-0.69	0.66-0.68	0.65-0.67
73	0.75-0.76	0.67-0.69	0.64-0.66	0.63-0.65	0.62-0.64
72	0.72-0.74	0.64-0.66	0.61-0.63	0.60-0.62	0.59-0.61
71	0.69-0.71	0.61-0.63	0.58-0.60	0.57-0.59	0.56-0.58
70	0.66-0.68	0.58-0.60	0.55-0.57	0.54-0.56	0.53-0.55
69	0.63-0.65	0.55-0.57	0.52-0.54	0.54-0.50	0.50-0.53
68	0.00 0.00	0.52-0.54	0.48-0.51	0.48-0.50	0.47-0.49
67	0.00 0.02	0.02 0.04	0.46-0.47	0.45-0.47	0.45-0.46
66	0.57 0.55	0.46-0.48	0.44-0.45	0.42-0.44	0.42-0.44
65	0.50-0.52	0.43-0.45	0.41-0.43	0.40-0.41	0.39-0.41
64	0.00 0.02	0.40-0.40	0.38-0.40	0.40 0.41	0.36-0.38
63	0 44-0 46	0.37-0.39	0 35-0 37	0.34-0.36	0.33-0.35
62	0.44 0.40	0.34-0.36	0.32-0.34	0.31-0.33	0.31-0.32
61	0.40 0.40	0.31-0.33	0.02 0.04	0.28-0.30	0.28-0.30
60	0.33-0.36	0.28-0.30	0.26-0.28	0.26-0.27	0.25-0.27
59	0.30-0.32	0.25-0.27	0.20-0.20	0.20-0.27	0.23-0.27
58	0.30-0.32	0.22-0.27	0.24-0.23	0.20-0.20	0.22-0.24
57	0.20-0.23	0.22-0.24	0.21-0.23	0.20-0.22	0.20-0.21
56	0.19-0.23	0.16-0.18	0.15-0.20	0 15-0 16	0.14-0.16
55	0 15-0 18	0 13-0 15	0 12-0 14	0 12-0 14	0 12-0 13
54	0.12-0.14	0.10-0.12	0.09-0.11	0.09-0.11	0.09-0.11
53	0.08-0.14	0.07-0.02	0.03-0.11	0.06-0.08	0.06-0.08
52	0.05-0.07	0.04-0.05	0.04-0.06	0.00-0.00	0.04-0.05
51	0.01-0.04	0.01-0.03	0.01-0.03	0.01-0.03	0.01-0.03
50	0.00	0.00	0.01-0.03	0.01-0.03	0.00
50	0.00	0.00	0.00	0.00	0.00

TABLE 1. Table for Estimating Percent of Lot Within Limits (PWL) For negative values of Q_U or Q_L , use absolute values of Q_U or Q_L and determine P_U or P_L from the table. The P_U or P_L associated with the negative Q_U or Q_L value is equal to 100 minus the table value of P_U or P_L .

Tununak Airport Tununak Airport Relocation Project 51791/AIP 3-02-0486-001-2012

P _U or P _L	n = 8	n = 9	n = 10 to 11	n = 12 to 14	n = 15 to 18
	Upper or Lower Quality Index (Q_U or Q_L)				
100	1.96-50.0	2.01-50.0	2.05-50.0	2.10-50.0	2.15-50.0
99	1.82-1.95	1.85-2.00	1.87-2.04	1.92-2.09	1.94-2.14
98	1.71-1.81	1.73-1.84	1.75-1.86	1.78-1.91	1.80-1.93
97	1.62-1.70	1.64-1.72	1.66-1.74	1.68-1.77	1.69-1.79
96	1.55-1.61	1.56-1.63	1.57-1.65	1.59-1.67	1.60-1.68
95	1.48-1.54	1.49-1.55	1.50-1.56	1.51-1.58	1.52-1.59
94	1.42-1.47	1.43-1.48	1.44-1.49	1.45-1.50	1.45-1.51
93	1.37-1.41	1.37-1.42	1.38-1.43	1.38-1.44	1.39-1.44
92	1.31-1.36	1.32-1.36	1.32-1.37	1.33-1.37	1.33-1.38
91	1.26-1.30	1.27-1.31	1.27-1.31	1.27-1.32	1.28-1.32
90	1.22-1.25	1.22-1.26	1.22-1.26	1.22-1.26	1.23-1.27
89	1.17-1.21	1.17-1.21	1.18-1.21	1.18-1.21	1.18-1.22
88	1.13-1.16	1.13-1.16	1.13-1.17	1.13-1.17	1.13-1.17
87	1.09-1.12	1.09-1.12	1.09-1.12	1.09-1.12	1.09-1.12
86	1.05-1.08	1.05-1.08	1.05-1.08	1.05-1.08	1.05-1.08
85	1.01-1.04	1.01-1.04	1.01-1.04	1.01-1.04	1.01-1.04
84	0.97-1.00	0.97-1.00	0.97-1.00	0.97-1.00	0.97-1.00
83	0.94-0.96	0.94-0.96	0.93-0.96	0.93-0.96	0.93-0.96
82	0.90-0.93	0.90-0.93	0.90-0.92	0.90-0.92	0.89-0.92
81	0.87-0.89	0.87-0.89	0.86-0.89	0.86-0.89	0.86-0.88
80	0.83-0.86	0.83-0.86	0.83-0.85	0.83-0.85	0.82-0.85
79	0.80-0.82	0.80-0.82	0.80-0.82	0.79-0.82	0.79-0.81
78	0.77-0.79	0.77-0.79	0.76-0.79	0.76-0.78	0.76-0.78
77	0.74-0.76	0.73-0.76	0.73-0.75	0.73-0.75	0.72-0.75
76	0.71-0.73	0.70-0.72	0.70-0.72	0.70-0.72	0.69-0.71
75	0.67-0.70	0.67-0.69	0.67-0.69	0.67-0.69	0.66-0.68
74	0.64-0.66	0.64-0.66	0.64-0.66	0.63-0.66	0.63-0.65
73	0.61-0.63	0.61-0.63	0.61-0.63	0.60-0.62	0.60-0.62
72	0.58-0.60	0.58-0.60	0.58-0.60	0.58-0.59	0.57-0.59
71	0.56-0.57	0.55-0.57	0.55-0.57	0.55-0.57	0.54-0.56
70	0.53-0.55	0.52-0.54	0.52-0.54	0.52-0.54	0.51-0.53
69	0.50-0.52	0.49-0.51	0.49-0.51	0.49-0.51	0.49-0.50
68	0.47-0.49	0.47-0.48	0.46-0.48	0.46-0.48	0.46-0.48
67	0.44-0.46	0.44-0.46	0.44-0.45	0.43-0.45	0.43-0.45
66	0.41-0.43	0.41-0.43	0.41-0.43	0.41-0.42	0.40-0.42
65	0.39-0.40	0.38-0.40	0.38-0.40	0.38-0.40	0.38-0.39
64	0.36-0.38	0.36-0.37	0.35-0.37	0.35-0.37	0.35-0.37
63	0.33-0.35	0.33-0.35	0.33-0.34	0.32-0.34	0.32-0.34
62	0.30-0.32	0.30-0.32	0.30-0.32	0.30-0.31	0.30-0.31
61	0.28-0.29	0.27-0.29	0.27-0.29	0.27-0.29	0.27-0.29
60	0.25-0.27	0.25-0.26	0.25-0.26	0.24-0.26	0.24-0.26
59	0.22-0.24	0.22-0.24	0.22-0.24	0.22-0.23	0.22-0.23
58	0.20-0.21	0.19-0.21	0.19-0.21	0.19-0.21	0.19-0.21
57	0.17-0.19	0.17-0.18	0.17-0.18	0.17-0.18	0.16-0.18
56	0.14-0.16	0.14-0.16	0.14-0.16	0.14-0.16	0.14-0.15
55	0.12-0.13	0.11-0.13	0.11-0.13	0.11-0.13	0.11-0.13
54	0.09-0.11	0.09-0.10	0.09-0.10	0.09-0.10	0.09-0.10
53	0.06-0.08	0.06-0.08	0.06-0.08	0.06-0.08	0.06-0.08
52	0.04-0.05	0.04-0.05	0.04-0.05	0.04-0.05	0.04-0.05
51	0.01-0.03	0.01-0.03	0.01-0.03	0.01-0.03	0.01-0.03
50	0.00	0.00	0.00	0.00	0.00

ITEM D-701 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
Galvanized Steel Corrugated Structural Plates and Fasteners	ASTM A 761
for Pipe, Pipe-Arches, and Arches	
Polymer Precoated Corrugated Steel Pipe for Sewers and Drains	ASTM A 762
Post-Coated and Lined (Bituminous or Concrete)	ASTM A 849
Corrugated Steel Sewer and Drainage Pipe	
Steel Sheet, Zinc and Aramid Fiber Composite Coated for	ASTM A 885
Corrugated Steel Sewer, Culvert, and Underdrain Pipe	
Corrugated Aluminum Alloy Culvert Pipe	ASTM B 745
Non-Reinforced Concrete Pipe	ASTM C 14
Reinforced Concrete Pipe	ASTM C 76
Reinforced Concrete D-Load Pipe	ASTM C 655
Reinforced Concrete Arch Pipe	ASTM C 506
Reinforced Concrete Elliptical Pipe	ASTM C 507
Precast Reinforced Concrete Box Sections	ASTM C 789 and C 850
Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based	ASTM F 794
on Controlled Inside Diameter	
Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe	ASTM F 949
With a Smooth Interior and Fittings	
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 D 3034
Corrugated Polyethylene Drainage Tubing	AASHTO M 252
Corrugated Polyethylene Pipe, 300 mm to 1200 mm Diameter	AASHTO M 294
Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings	AASHTO M 304
Based on Controlled Inside Diameter	

701-2.3 CONCRETE. Concrete for pipe cradles shall have a minimum compressive strength of 2,000 psi at 28 days and conform to the requirements of AASHTO M 157.

701-2.4 RUBBER GASKETS. Rubber gaskets for rigid pipe shall conform to the requirements of ASTM C 443. Rubber gaskets for PVC pipe and polyethylene pipe shall conform to the requirements of ASTM F 477. Rubber gaskets for zinc-coated steel pipe and precoated galvanized pipe shall conform to the requirements of ASTM D 1056, for the ``RE" closed cell grades.

701-2.5 JOINT MORTAR. Pipe joint mortar shall consist of one part 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 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 x 72 inches long, and color blue. Provide Carsonite CUM-375 utility marker or approved equal.

701-2.9 CLASS B BEDDING.

a. Class B bedding shall meet the requirements of subbase course as defined in specification subsection P-154-2.1, except that 100% of the material will pass a 1 inch sieve.

701-2.10 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 6 inches on each side.dimensions shown on the plans. 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 <u>12-24</u> 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 <u>1-3 feet foot</u> 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 granular <u>Class B bedding</u> material for the full trench width as shown on the plans. If additional excavation is required, tThe Engineer shall determine the depth of removal necessary. The granular <u>Class B bedding</u> 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 minimum of 4 feet 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.

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. The bedding material shall be sand or selected sandy soil, all of which passes a 3/8 inch sieve and not more than 10% of which passes a No. 200 sieve.

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:

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 <u>Class B bedding.</u> coarse sands and gravels with 100% passing the 3/4 inch sieve. For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 sieve. For all other areas, no more than 50% of the material shall pass the No. 200 sieve. The bedding shall have a thickness of at least 6-24 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.

Install camber in accordance with Appendix B, State of Alaska DOT&PF Construction Survey Requirements. Provide camber diagram to Engineer for approval.

Elliptical and elliptically reinforced pipes shall be placed with the manufacturer's top of pipe mark 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 A 760 for steel pipe and AASHTO M 36 for aluminum pipe.
- **c. PVC and Polyethylene Pipe.** Joints for PVC and polyethlyene pipe shall conform to the requirements of ASTM D 3212 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.

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.

Material for backfill shall be fine, readily compactable soil, or granular material selected from the excavation or a source of the Contractor's choosing. It shall not contain frozen lumps, chunks of highly plastic clay, or other objectionable material. Material for backfill shall be 100% passing a 2-inch sieve, 95-100% passing a 1/2-sieve, and 0-5% passing a No. 4 sieve.

Backfill material shall be as shown on the plans. Excavation and backfill materials will be measured and paid under their respective pay items.

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. Material shall be brought up evenly on both sides 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 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.

701-3.6 CULVERT MARKER POSTS. Install culvert marker posts at each permanent 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 in 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.

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 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. <u>Culvert marker posts will not be paid for directly, but will be subsidiary to pipe items</u>. Installation, removal, and disposal of temporary culverts will not be paid for directly but will be subsidiary to pipe items.

Payment will be made under:

Item D-701a (1) Corrugated SteelPipe, 36 inch - per linear footItem D-701a (2) Corrugated SteelPipe, 42 inch - per linear footItem D-701bConcrete for pipe cradles - per cubic yardItem D-701cRock excavation - per cubic yard

MATERIAL REQUIREMENTS

AASHTO M 36 Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

AASHTO M 45 Aggregate for Masonry Mortar

Tununak Airport Tununak Airport Relocation Project 51791/AIP 3-02-0486-001-2012

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 1200 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 A 761	Steel Galvanized, Corrugated Structural Plates and Fasteners for Pipe, Pipe-Arches, and Arches
ASTM A 762	Precoated (Polymeric) Galvanized Steel Sewer and Drainage Pipe
ASTM A 849	Post-Coated and Lined (Bituminous or Concrete) Corrugated Steel Sewer and Drainage Pipe
ASTM A 885	Steel Sheet, Zinc and Aramid Fiber Composite Coated for Corrugated Steel Sewer, Culvert, and Underdrain Pipe
ASTM B 745	Corrugated Aluminum Alloy Culvert Pipe
ASTM C 14	Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C 76	Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C 443	Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
ASTM C 506	Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C 507	Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C 655	Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C 700	Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated
ASTM C 789	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers
ASTM C 850	Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers with Less than 2 feet of Cover
ASTM D 1056	Flexible Cellular MaterialsSponge or Expanded Rubber
ASTM D 3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
Turning of Airport	

- ASTM D 3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- ASTM F 477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe
- ASTM F 794 Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based on Controlled Inside Diameter
- ASTM F 949 Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings

ITEM D-760 THAW PIPE AND THAW WIRES

DESCRIPTION

760-1.1 Furnish, fabricate, and install thaw pipes or electric thaw wire.

MATERIALS

760-2.1 THAW PIPE. Not Used. Use materials that conform to the following:

Pina	ASTM A 53 galvanized per AASHTO M 111
r ipe	A china co, garvanized per Arterne in The
Fittinas	 ASTM A 234. galvanized according to AASHTO M 111
Pine Hangers	ASTM A 17 galvanized per AASHTO M 111
ripe nangers	
Braces for Standpipe	ASTM A 36, galvanized per AASHTO M 111
Bolts and Nuts	ASTM A 307 galvanized per AASHTO M 232
	/ Chin / Corr, galvalized per / Corr Chin 202

760-2.2 THAW WIRE. Provide materials, devices, fittings, and hardware meeting NEMA standards and bearing the approval of a third party certification, meeting ANSI Z 34.1.

Deliver all warranties and guarantees provided by the manufacturer to the Engineer before acceptance of this work.

a. Conduit and Fittings.

- (1) Use conduit, couplings, elbows, and nipples that are rigid, hot-dip galvanized steel meeting ANSI C80.1. Install them as indicated on the applicable drawings. Use threaded type couplings, elbows, and nipples.
- (2) Use fittings and miscellaneous conduit hardware that are vapor-proof, galvanized cast iron or steel meeting ANSI/NEMA FB-1 and are compatible with the rigid conduit furnished and installed. Use threaded type fittings.
- **b.** Heat Cable. Use heat cable that meets the following standards:
 - (1) Parallel-circuit, 120 or 240 VAC, 16 AWG minimum copper bus wire, with self-limiting conductive core.
 - (2) Modified polyolefin inner jacket, tinned copper or nickel-clad metallic braid, and fluoropolymer overjacket.
 - (3) Rated in conduit at 8 W/ft. at 50 °F.
 - (4) UL Listed or FM approved specifically as a culvert deicing system in conduit.

Use connection components that are rated at NEMA 4X. Use power connections and seals specifically designed for use with the particular type and size of heat cable.

c. Controls.

(1) Use a thermostat that is heavy duty, single stage, line voltage type. Operating temperature range: 25 to +125 °F. Provide with NEMA 1 enclosure and capillary bulb for remote sensing.

(2) Use a contactor that is electrically held, 30 amp rated, lighting type, with NEMA 1 enclosure.

- (3) Use a switch that is heavy duty hand-off-auto type with a gloved hand selector switch knob and NEMA 1 enclosure.
- (4) Use a spring wound mechanical line voltage timer. Contacts close during timer period. Contact rating 20 amps inductive at 120 volts. Time period is 12 hours without hold. Intermatic PFGH or approved equal.
- **d.** Conductors. Use copper conductors with insulation rated for 300-600 volts-minimum where the impressed voltage is 100 volts or less and 600 volt where the impressed voltage is between 100 and 600 volts.
 - (1) Service and Feeder Cables. Use No. 8 AWG, or larger, with type USE, THWN, THHN, or XHHW insulation.
 - (2) Underground Wire. Use No. <u>10</u>-6 AWG with type XHHW or USE insulation where buried in conduit.
 - (3) Branch Circuit Wire. Use No. <u>10-12</u> AWG with type USE or XHHW insulation.
 - (4) Control Wire. Use No. 16 AWG with stranded conductor with type SIS insulation within control panels.
 - (5) Splices for Copper Conductors. Use solderless, preinsulated, compression set type only with heat-shrink tubing jacket. When making splices between power leads and heat cable cold leads, use splicing kits designed specifically for that purpose.
 - (6) Terminations. Use compression set or bolted type.
- e. Device, Junction, and Pull Boxes.
 - (1) Boxes Installed Above Grade. Use boxes that are hot dipped galvanized cast iron or corrosion resistant alloy complete with conduit hubs. Use boxes designed for damp or wet locations.
 - (2) Boxes Installed Below Grade (exposed to earth). Use concrete boxes as required or shown in the drawings. Provide covers constructed of ribbed cast metal alloy.
 - (3) Cast Thermoplastic or Fiberglass Boxes. Use where indicated in the drawings.
- f. Receptacles, Remote Power. Use remote power receptacles that are 2-pole, 3-wire grounding, male, 30 amp, 120 or 240 VAC, NEMA L6-30.
- g. Circuit Breakers. Provide 1- or 2-pole circuit breakers as scheduled in the drawings. Multiple breakers must operate all poles simultaneously. Use circuit breakers that operate manually for normal ON-OFF switching and automatically for overload and short-circuit conditions. Ensure that the operating mechanism will not prevent trip action when held in the ON position. Provide 10,000-ampere symmetrical interrupting capacity minimum. Provide bolt-in type with a molded case.

Use Ground Fault Interrupter (GFI) circuit breakers that sense ground fault current, that trip at 30±1 milliamperes within 2 cycles, and that have the following:

(1) Internal circuitry to prevent nuisance tripping caused by voltage spikes, radio frequency interference, and electromagnetic interference.

- (2) A 'TEST' button that provides approximately 30 milliamperes of simulated ground fault current to verify the operation of the sensing and tripping devices. The button must reset the trip unit within the circuit breaker.
- (3) Type b auxiliary contacts to close when the circuit breaker is tripped or shutoff.
- h. Grounding.
 - (1) Electrodes. Use electrodes that are copper-clad steel rods with a minimum diameter of 5/8 inch Increase diameter as required to drive to the necessary depth without being damaged.
 - (2) Splices and Connections. Use an exothermic weld for all connections and joints in inaccessible locations. Use standard clamps and connectors in accessible locations.
- i. Terminal Posts. Use terminal posts that are 6 X 8-inch treated wood posts 8 feet long.
- j. Branch Circuit Panelboard. Use panelboards that meet the following:
 - (1) Sized and rated according to the panel schedules in the drawings
 - (2) Have multiple lugs (as required), a neutral terminal bar, and a ground terminal bar if ground conductors are terminated in the panelboard
 - (3) Use panelboards that are braced for 10,000 symmetrical RMS amperes
 - (4) With copper or aluminum bus bars

CONSTRUCTION REQUIREMENTS

760-3.1 THAW PIPE. Not Used.

- a. Pipe Hangers. Drill or field punch the bolt holes and then ream them. Ensure that the diameter of the hole does not exceed the diameter of the bolt by more than 1/8 inch. Draw the bolt heads and nuts tightly against the pipe.
- **b. Pipe Jointing.** Remove all scale from the pipe. After cutting, ream all pipe. Assemble all pipe and fittings using an application of pipe compound.
- **c.** Installation. Prevent dirt or other foreign matter from entering the pipe. After the thaw pipe is fully assembled and installed, flush it thoroughly with water.

Repair damage to galvanized coatings per AASHTO M 36.

760-3.2 THAW WIRE. Meet all applicable requirements and recommendations of the <u>2008 NEC</u> and the NESC.

Furnish the Engineer with circuit and wiring diagrams.

When required on the plans, install a post and meter combination for each individual thaw wire or a single post and meter combination for any group of thaw wires as specified and paid for under Item L-160.

a. Conduit and Fittings.

(1) Use galvanized rigid steel (GRS) conduit for direct burial at depths required by NEC Articles 300 and 710, unless noted otherwise. Repair damage to galvanized coatings per AASHTO M 36.

- (2) Provide bituminous asphalt coating for all ferrous conduit installed directly in earth. Apply 2 coats after conduit is completely assembled. Use conduit with factory-applied protective coating in lieu of asphalt if suitable touch-up materials are used to seal couplings and repair injuries to the factory-applied coat.
- (3) Cut and ream all conduit squarely at the ends. Make fittings tight.
- (4) Route concealed conduit in a direct path with a minimum number of bends. Use bends of long radii where possible.
- (5) Keep all bends free from dents or flattening.
- (6) Install conduit mechanically and electrically continuous from termination to termination. Connect securely to cabinets, junction boxes, and device boxes using a locknut on the outside and a grounding bushing on the inside. Bushings and locknuts are not required where conduits are screwed into threaded connections.
- (7) Before the installation of conductors, use caps or corks to keep foreign material out of open conduits.

(8) Attach conduit inside of culvert with conduit saddle and straps spaced at 4 feet.

- **b.** Heat Cable. Install per manufacturer's instructions and as indicated on the electrical plans. Install in 1-1/2 inch GRS-conduit as indicated on the electrical plans. Do not splice heat cable.
- c. Controls. Install the controls in the load center along with the panelboard as indicated on the electrical plans. Refer to the detail drawings.

d. Conductors.

- (1) Install all conductors in conduit.
- (2) Clean all conduit before installing conductors.
- (3) Install conductors continuously from box to box. Splice only at device or dedicated junction boxes, except for box with pilot light.
- (4) Circuit all feeder and branch circuits as shown in the drawings.
- (5) Install all conductors in a single raceway at one time so that conductors do not cross one another while being pulled into place. Leave sufficient conductor length at all fittings and boxes.
- (6) Stay within the pulling tensions specified by the manufacturer or as noted elsewhere in this division.
- (7) Maintain bending radii in excess of those allowed by the manufacturer.
- (8) Use lubricants according to UL, the conductor, and raceway manufacturers' requirements.
- (9) Neatly bundle and form conductors to fan into terminals at regular intervals inside panels.
- (10)Coordinate conductor insulation temperature rating and ampacity rating with the temperature and ampacity rating of the circuit protection devices.

e. Color Coding.

- (1) Color all conductors #6 AWG and smaller continuously. Conductors larger than #6 may be either continuously colored or marked at each end and at every accessible point with appropriately colored paint, tape, or adhesive labels.
- (2) Mark or color grounding conductors according to the NEC.
- (3) Mark or color grounded conductors according to paragraph d. and according to the NEC.
- (4) Mark or color ungrounded conductors according to the following convention:

Nominal Voltage/Phase	Grounded	Ungrounded
120 volt, single phase, 2 wire	White	Black
120/240 volt, single phase 3 wire	White	Black/Red

f. Device, Junction, and Pull Boxes.

- (1) Anchor device boxes to structural members so there is no apparent movement when the device is operated.
- (2) Install junction and pull boxes in permanently accessible locations only. Size boxes according to NEC, Article 370.
- (3) Mount all boxes square and plumb.

g. Grounding.

- (1) General. Drive ground rod near remote power receptacle post and connect the following <u>items to it</u>: Create an equipotential ground plane for the installation as shown on the drawing and as required at the service meter/disconnect cabinet. Connect the following items to the service entrance ground bar:
 - (a) The grounded neutral conductor for the utility service.
 - (b) Ground electrode(s).

(c)(a) All non-current-carrying electrical equipment, conduit, and enclosures.

- (d) Metal culvert and/or end sections.
- (e) Heat cable metal sheath.
- (2) Resistance. Ensure that the resistance between the service entrance ground electrode and earth ground, as measured using a multiple ground rod method and a Biddle 250220-1 Megger Null Balance Earth Tester or a Biddle 250260 Megger Direct Reading Earth Tester or approved equal, is as close to zero as possible with the design shown in the drawings. Give the resistance measurement to the Engineer in writing. Include the environmental conditions during testing.
- (32)Conductors. Size conductors according to the drawings or, if not shown on drawings, as required by Tables 250-66-94 and 250-122-95 of the NEC. Protect conductors from physical damage.
- (4<u>3</u>)Electrodes. Drive ground rods at least 8 feet deep.
- **h.** Controls. Install the controls in the load center along with the panelboard as indicated on the electrical plans. Refer to the detail drawings.

i. Branch Circuit Panelboard.

- (1) Mounting. Mount panelboard interiors inside load center cabinet after the enclosure has been installed as shown on the plans and as described under Item L-160.
- (2) Circuit Breakers. Install circuit breakers in the order specified in the drawing panelboard schedules. Type the circuit directory with circuit descriptions as they are shown in the drawing panelboard schedules. Make the directory configuration identical to the circuit breaker configuration.

METHOD OF MEASUREMENT

760-4.1 <u>Not Used.</u> The length of thaw pipe to be paid for will be the number of linear feet of thaw pipe in place, completed and approved; measured along the line and grade of the pipe, or by each complete and approved unit.

760-4.2 The length of thaw wire installation to be paid for will be the number of linear feet of heated sections in place, completed and approved, or by each complete and approved units.

BASIS OF PAYMENT

760-5.1 All fittings, including standpipes, are subsidiary.

Payment will be made under:

Itom D-7602	[Dia] inch Diameter Thaw Pine - ner linear foot
ltom D-760h	[Dia Linch Diamotor Thaw Pipe - por each
Itom D-760c	Thaw Wire Installation - per linear foot
	That whe installation per intear loot
Item D-760d	Thaw Wire Installation – per each

MATERIAL REQUIREMENTS

AASHTO M 36	Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
AASHTO M 111	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
AASHTO M 232	Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 36	Carbon Structural Steel
ASTM A 47	Ferritic Malleable Iron
ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 234	Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
ASTM A 307	Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ANSI C80.1	Rigid Steel Conduit, Zinc Coated (GRC)
ANSI Z 34.1	Third-Party Certification Programs for Products, Processes, and Services
ANSI/NEMA FB-1	Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable

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 C or 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.

162-6 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. Concrete shall be of a commercial grade with a minimum 28-day compressive strength of 2,500 psi or an approved, pre-mixed, sacked concrete.

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 IIco 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.

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.

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 F-162a	8-foot Chain-Link Fence - per linear foot
Item F-162b	<u>4-foot</u> Single Swing Gate - per each
Item F-162c	(Width) Double Swing Gate - per each
Item F-162d	(Width) Single Cantilever Gate - per each
Item F-162e	(Width) Double Cantilever Gate - per each
Item F-162f	(Width) Pedestrian Gate (w/Keyless Lock) - per each

MATERIAL REQUIREMENTS

AASHTO M 181	Chain-Link Fence
AASHTO M 280	Metallic-Coated (Carbon) Steel Barbed Wire
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 A-53.
- b. Concrete. Use commercial grade concrete with a minimum 28-day compressive strength of 2,500 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, alipahtic 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 AASHTO M 268, Type III-A. Use sheeting with a smooth sealed outer surface.

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 degrees 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 F-170a	Steel Bollard - per each
Item F-170b	Steel Bollards - per lump sum

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, supplies and incidentals to the project site; to establish offices, buildings and other facilities, except as provided under Section <u>G-</u>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.

Contractor shall pressure-wash all wheeled and track construction equipment to be transported to Tununak by barge (or other means of transportation) to remove accumulated soil and other debris. Washing shall be done before said equipment is loaded on barge. This provision is to minimize the potential of transporting invasive weed species to the project area.

METHOD OF MEASUREMENT

100-2.1 Payment for mobilization and demobilization will be made in partial payments as follows:

- **a.** Up to sixty percent of the amount bid for mobilization and demobilization may be paid when equipment and supplies are landed in serviceable condition at the project site and other necessary preparations have been completed so that work can commence on other pay items.
- **b.** The remaining balance will be paid as contractor facilities are dismantled and equipment is removed from the airport property, with the final increment paid upon completion of demobilization or as approved by the Engineer.

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

100-3.1 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 G-100a 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 their July 25, 2005 memo WHPL #197 and the State Laborer's and Mechanic's Minimum Rates of Pay (current issue).

Ensure subcontractors comply with the DOLWD requirements. <u>The direct internet address is http://www.labor.state.ak.us/lss/pamp600.htm.</u>

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 G-115a Worker Meals and Lodging, or Per Diem - per lump sum

ITEM G-120 DISADVANTAGED BUSINESS ENTERPRISE (DBE) PROGRAM (Federal-Aid Contracts)

120-1.1 DESCRIPTION. The work consists of providing Disadvantaged Business Enterprises (DBEs), as defined in Title 49, CFR (Code of Federal Regulations), Part 26, with the opportunity to participate on an equitable basis with other contractors in the performance of contracts financed in whole, or in part, with funding through the United States Department of Transportation (USDOT). The Contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of USDOT-assisted contracts.

120-1.2 INTERPRETATION. It is the intent of this section to implement 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 will be considered a material breach of contract, which may result in the termination of this contract or such other remedy as the Department deems appropriate. The Department also considers failure to comply with this section to be so serious as to justify debarment action as provided in AS 36.30.640(4).

120-1.4 DEFINITIONS AND TERMS. The following definitions will apply.

- a. Broker. A DBE certified by the Department that arranges for the delivery or provision of creditable materials, supplies, equipment, transportation/hauling, insurance, bonding, etc., within its certified category, that is necessary for the completion of the project. A broker of materials certified in a supply category must be responsible for scheduling the delivery of materials and fully responsible for ensuring that the materials meet specifications before credit will be given.
- b. Commercially Useful Function (CUF). The execution of the work of the Contract by a DBE carrying out its responsibilities by actually performing, managing, and supervising the work involved using its own employees and equipment. The DBE shall 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. To determine whether a DBE is performing a commercially useful function, an evaluation of the amount of work subcontracted, industry practices, whether the amount the firm is to be paid under the Contract is commensurate with the work it is actually performing and the DBE credit claimed for its performance of the work. Other relevant factors will be considered. The determination of CUF is made by the Engineer after evaluating the way in which the work was performed during the execution of the Contract.
- c. Disadvantaged Business Enterprise (DBE). An enterprise which is a for-profit small business concern
 - (1) that is at least 51 percent owned by one or more individuals who are both socially and economically disadvantaged or, in the case of a corporation, in which 51 percent of the stock is owned by one or more such individuals;
 - (2) whose management and daily business operations are controlled by one or more of the socially and economically disadvantaged individuals who own it; and
 - (3) has been certified by the Department according to 49 CFR, Part 26.
- d. DBE Key Employee. Permanent employees identified by the DBE owner in its certification file in the Department's Civil Rights Office (CRO).

- e. DBE Utilization Goal. The percent of work to be performed by certified DBEs that is established by the Department and specified in the Contract.
- f. **Good Faith Efforts.** Efforts by the bidder or Contractor to achieve a DBE goal or other requirement of 49 CFR Part 26, by their scope, intensity, and appropriateness to the objective, that can reasonably be expected to fulfill the program requirement.
- **g. Manufacturer.** A DBE certified by the Department in a supply category that changes the shape, form, or composition of original material in some way and then provides that altered material to the project and to the general public or the construction industry at large on a regular basis.
- **h.** Notification. For purposes of soliciting DBE participation on a project and to count toward a contractor's Good Faith Efforts, notification shall be by letter or fax transmission, with a return receipt requested or successful transmission report. Telephonic contact with a DBE may be allowed, however it shall be based on the ability of the CRO to independently verify this contact.
- i. Regular Dealer. A DBE certified by the Department in a supply category that
 - (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
 - (4) fabricate (assembles large components) for use on a construction project, consistent with standard industry practice, for delivery to the project.

120-2.1 UTILIZATION GOAL. The DBE Utilization Goal for this contract is shown on Form 25A-324 (DBE Subcontractable Items) as a percentage of the total basic bid amount. A DBE may be considered creditable towards meeting the DBE Utilization Goal at time of Contract award, if the DBE is certified by the Department in a category covering the CUF to be performed at the time of listing on Form 25A-325C (DBE Utilization Report).

A bidder shall demonstrate the ability to meet the DBE Utilization Goal or perform and document all of the required Good Faith Efforts under Subsection 120-3.2 in order to be eligible for award of this Contract.

If the quantity of work of a bid item involving a DBE firm is reduced by the Department, the DBE Utilization Goal on Form 25A-325C will be reduced proportionately.

120-3.1 DETERMINATION OF COMPLIANCE.

a. Phase I - Bid. Each bidder must register with the CRO annually according to §§26.11 & 26.53(b)(2)(iv) of 49 CFR, Part 26. Use Form 25D-6. No contract may be awarded to a bidder that has not registered.

- **b.** Phase II Award. The apparent low bidder will provide the following within 15 days of receipt of notice of intent to award:
 - (1) Written DBE Commitment. Written commitments from DBEs to be used on the project. The written commitment shall contain the following information:
 - (a) A description of the work that each DBE will perform;
 - (b) The dollar amount of participation by the DBE firm;
 - (c) Written documentation of the bidder/offeror's commitment to use a DBE subcontractor whose participation it submits to meet a contract goal; and
 - (d) Written confirmation from the DBE that it is participating in the contract as provided in the prime Contractor's commitment.
 - (2) DBE Utilization Report. Form 25A-325C listing the certified DBEs to be used to meet the DBE Utilization Goal.
 - (3) Good Faith Effort Documentation. Summary of Good Faith Effort Documentation (Form 25A-332A and attachments) and DBE Contact Reports (Form 25A-321A) if the Contractor submits less DBE utilization on Form 25A-325C than is required to meet the DBE Utilization Goal. If accepted by the Department, this lower DBE utilization becomes the new DBE Utilization Goal. If the bidder cannot demonstrate the ability to meet the DBE Utilization Goal, and can not document the minimum required Good Faith Efforts (as outlined in Subsection 120-3.2 below), the Contracting Officer will determine the bidder to be not responsible.

c. Phase III - Construction.

- (1) **Designation of DBE/EEO Officer.** At the preconstruction conference, the Contractor shall submit, in writing, the designation of a DBE/EEO officer.
- (2) DBE Creditable Work. The CUF work items and creditable dollar amounts shown for a DBE on the DBE Utilization Report (Form 25A-325C) shall be included in any subcontract, purchase order or service agreement with that DBE.
- (3) DBE Replacement. If a DBE replacement is approved by the Engineer, the Contractor shall replace the DBE with another DBE for the same work in order to fulfill its commitment under the DBE Utilization Goal. In the event that the Contractor cannot obtain replacement DBE participation, the Engineer may adjust the DBE Utilization Goal if, in the opinion of the Engineer and the CRO, both of the following criteria have been met:
 - (a) The Contractor has not committed any discriminatory practice in its exercise of good business judgment to replace a DBE.
 - (b) If the Contractor is unable to find replacement DBE participation and has adequately performed and documented the Good Faith Effort expended according to Subsection 120-3.2.
- (4) DBE Utilization Goal. The DBE Utilization Goal will be adjusted to reflect only that amount of the DBE's work that can not be replaced.

120-3.2 GOOD FAITH EFFORT.

a. Good Faith Effort Criteria. The Contracting Officer will use the following criteria to judge if the bidder, who has not met the DBE Utilization Goal, has demonstrated sufficient Good Faith Effort to be eligible for award of the contract.

Failure by the bidder to perform and document all of the following actions constitutes insufficient Good Faith Effort.

- (1) Consideration of all subcontractable items. The bidder shall, at a minimum, seek DBE participation for each of the subcontractable items upon which the DBE goal was established as identified by the Department (on Form 25A-324) prior to bid opening. It is the bidder's responsibility to make the work listed on the subcontractable items list available to DBE firms, to facilitate DBE participation.
- (2) If the bidder can not achieve the DBE Utilization Goal using the list of available DBE firms based on the subcontractable items list, then the bidder may consider other items that could be subcontracted to DBEs.
- (3) Notification to all active DBEs listed for a given region in the Department's most current DBE Directory at least 7 calendar days prior to bid opening. The bidder must give the DBEs no less than five days to respond. The bidder may reject DBE quotes received after the deadline. Such a deadline for bid submission by DBEs will be consistently applied. DBEs certified to perform work items identified on Form 25A-324 must be contacted to solicit their interest in participating in the execution of work with the Contractor. Each contact with a DBE firm will be logged on a Contact Report (Form 25A-321A).
- (4) Non-competitive DBE quotes may be rejected by the bidder. Allegations of non-competitive DBE quotes must be documented and verifiable. A DBE quote that is more than 10.0% higher than the accepted non-DBE quote will be deemed non-competitive, provided the DBE and non-DBE subcontractor quotes are for the exact same work or service. Bidders must have a non-DBE subcontractor quote for comparison purposes. Such evidence shall be provided in support of the bidder's allegation. Where the bidder rejects a DBE quote as being non-competitive under this condition, the work must be performed by the non-DBE subcontractor and payments received by the non-DBE subcontractor during the execution of the Contract shall be consistent with the non-DBE's accepted quote. This does not preclude increases as a result of Change documents issued by the Department.
- (5) Provision of assistance to DBEs who need help in obtaining information about bonding or insurance required by the bidder.
- (6) Provision of assistance to DBEs who need help in obtaining information about securing equipment, supplies, materials, or related assistance or services.
- (7) Providing prospective DBEs with adequate information about the requirements of the Contract regarding the specific item of work or service sought from the DBE.
- (8) Follow-up of initial notifications by contacting DBEs to determine whether or not they will be bidding. Failure to submit a bid by the project bid opening or deadline by the bidder is de facto evidence of the DBE's lack of interest in bidding. Documentation of follow-up contacts shall be logged on the Contact Report (Form 25A-321A).
- (9) Items (3) through (8) will be utilized to evaluate any request from the Contractor for a reduction in the DBE Utilization Goal due to the default or decertification of a DBE and the Contractor's subsequent inability to obtain additional DBE participation.

- **b.** Administrative Reconsideration. Under the provisions of 49 CFR. Part 26.53(d), if it is determined that the apparent successful bidder has failed to meet the requirements of this subsection, the bidder must indicate whether they would like an opportunity for administrative reconsideration. Such an opportunity must be exercised by the bidder within 3 calendar days of notification it has failed to meet the requirements of this subsection. As part of this reconsideration, the bidder must provide written documentation or argument concerning the issue of whether it met the goal or made adequate good faith efforts to do so.
 - (1) The decision on reconsideration will be made by the DBE Liaison Officer.
 - (2) The bidder will have the opportunity to meet in person with the DBE Liaison Officer to discuss the issue of whether it met the goal or made adequate good faith efforts to do so. If a meeting is desired, the bidder must be ready, willing and able to meet with the DBE Liaison Officer within 4 days of notification that it has failed to meet the requirements of this subsection.
 - (3) The DBE Liaison Officer will render a written decision on reconsideration and provide notification to the bidder. The written decision will explain the basis for finding that the bidder did or did not meet the goal or make adequate good faith efforts to do so.
 - (4) The result of the reconsideration process is not administratively appealable to USDOT.

120-3.3 COMMERCIALLY USEFUL FUNCTION (CUF).

- a. Creditable Work. Measurement of attainment of the DBE Utilization Goal will be based upon the actual amount of money received by the DBEs for creditable CUF work on this project as determined by the Engineer according to this Section. CUF is limited to that of a:
 - (1) regular dealer;
 - (2) manufacturer;
 - (3) broker;
 - (4) subcontractor;
 - (5) joint-venture; or
 - (6) prime contractor.
- **b.** Determination of Commercially Useful Function. In order for the CUF work of the DBE to be credited toward the goal, the Contractor will ensure that all of the following requirements are met:
 - (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) A DBE trucking firm certified and performing work in a transportation/hauling category is restricted to credit for work performed with its own trucks and personnel certified with the CRO prior to submitting a bid to a contractor for DBE trucking. The DBE trucking firm must demonstrate that it owns all trucks (proof of title and/or registration) to be credited for work and that all operators are employed by the DBE trucking firm. A DBE trucking firm that does not certify its trucks and personnel that it employs on a job will be considered a broker of trucking services and limited to credit for a broker. (This does not effect the CUF of that same firm, when performance includes the hauling of materials for that work.)
 - (3) The DBE is certified in the appropriate category at the time of
 - (a) the Engineer's approval of the DBE subcontract, consistent with the written DBE commitment; and

- (b) the issuance of a purchase order or service agreement by the Contractor to a DBE performing as either a manufacturer, regular dealer, or broker (with a copy to the Engineer).
- (4) 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.
- (5) 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.
- (6) The work of the DBE firm must meet the following criteria when determining when CUF is being performed by the DBE:
 - (a) The work performed 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 requirements.
 - (c) The work 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 key employee will be at the work site and responsible for the work.
 - (d) The manner in which the work is sublet or performed will conform to standard, statewide 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 (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 the 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 the delivery of creditable materials and fully responsible for ensuring that the materials meet specifications.

- (f) All subcontract work, with the exception of truck hauling, will be sublet by the same unit of measure as is contained in the Bid Schedule unless prior written approval of the Engineer is obtained.
- (g) The DBE will control all business administration, accounting, billing, and payment transactions. The prime contractor will not perform the business, accounting, billing, and similar functions of the DBE. The Engineer may, according to AS 36.30.420(b), inspect the offices of the DBE and audit the records of the DBE to assure compliance.
- (7) On a monthly basis, the Contractor shall report on Form 25A-336 (Monthly Summary of DBE Participation) to the CRO the payments made (canceled checks or bank statements that identify payor, payee, and amount of transfer) for the qualifying work, goods and services provided by DBEs.

c. Decertification of a DBE. Should a DBE performing a CUF become decertified during the term of the subcontract, purchase order, or service agreement for reasons beyond the control of and without the fault or negligence of the Contractor, the work remaining under the subcontract, purchase order, or service agreement may be credited toward the DBE Utilization Goal.

Should the DBE be decertified between the time of Contract award and the time of the Engineer's subcontract approval or issuance of a purchase order or service agreement, the work of the decertified firm will not be credited toward the DBE Utilization Goal. The Contractor must still meet the DBE Utilization Goal by either

- (1) withdrawing the subcontract, purchase order or service agreement from the decertified DBE and expending Good Faith Effort (Subsection 120-3.2, Items (3) through (8) to replace it with one from a currently certified DBE for that same work or service through subcontractor substitution (GCP Subsection 30-01); or
- (2) continuing with the subcontract, purchase order or service agreement with the decertified firm and expending Good Faith Effort to find other work not already subcontracted out to DBEs in an amount to meet the DBE Utilization Goal through either
 - (a) increasing the participation of other DBEs on the project;
 - (b) documenting Good Faith Efforts [Subsection 120-3.2, items (3) through (8)]; or
 - (c) by a combination of the above.
- **d. DBE 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 firm the Engineer will coordinate notification of the presumptive finding through the CRO to the Contractor, who will notify the DBE firm.

The Engineer, in cooperation with the CRO, may determine that the firm is performing a CUF if the rebuttal information convincingly demonstrates the type of work involved and normal industry practices establishes a CUF was performed by the DBE. Under no circumstances shall the Contractor take any action against the DBE firm until the Engineer has made a final determination. The Engineer's decisions on CUF matters are not administratively appealable to USDOT.

120-3.4 DEFAULT OF DBE. In the event that a DBE firm under contract or to whom a purchase order or similar agreement has been issued defaults on their work for whatever reason, the Contractor shall immediately notify the Engineer of the default and the circumstances surrounding the default.

The Contractor shall take immediate steps, without any order or direction from the Engineer, to retain the services of other DBEs to perform the defaulted work. In the event that the Contractor cannot obtain replacement DBE participation, the Engineer may adjust the DBE Utilization Goal if, in the opinion of the Engineer, the following criteria have been met:

- **a.** The Contractor was not at fault or negligent in the default and that the circumstances surrounding the default 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 Good Faith Effort expended according to items (3) through (8) of Subsection 120-3.2 for the defaulted work; or
- c. It is too late in the project to provide any real subcontracting opportunities remaining for DBEs.

The DBE Utilization Goal will be adjusted to reflect only that amount of the defaulted DBE's work that can not be replaced.

120-4.1 METHOD OF MEASUREMENT. The Contractor will be entitled to count toward the DBE Utilization Goal those monies actually paid to certified DBEs for CUF work performed by the DBE as determined by the Engineer. The Contractor will receive credit for the utilization of the DBEs, as follows:

- **a.** Credit for the CUF of a DBE prime contractor is 100% of the monies actually paid to the DBE under the contract for creditable work and materials according to 49 CFR 26.55.
- **b.** Credit for the CUF of a subcontractor is 100% of the monies actually paid to the DBE under the subcontract for creditable work and materials. This shall include DBE trucking firms certified as a subcontractor and not a broker. Trucks leased from another DBE firm shall also qualify for credit and conforms to the provisions of 49 CFR 26.55(d).
- **c.** Credit for the CUF of a manufacturer is 100% of the monies paid to the DBE for the creditable materials manufactured.
- **d.** Credit for the CUF of a regular dealer of a creditable material, product, or supply is 60% of its value. The value will be the actual cost paid to the DBE but will not exceed the bid price for the item.
- e. 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% of the cost of the procurement contract for the creditable item.
- f. Credit for the CUF of a broker performed by a DBE certified in the transportation/hauling category for arranging for the delivery of a creditable material, product or supply is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5% of the cost of the hauling subcontract.
- **g.** Credit for the CUF of a broker performed by a DBE certified in a bonding or insurance category for arranging for the provision of insurance or bonding is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5% 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 joint venture agreement, as certified for this project by the Department. The DBE joint venture partner will be responsible for performing all of the work as delineated in the certified JV agreement.

120-5.1 BASIS OF PAYMENT. 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 required documentation to verify proof of payment or documentation requested by the Department to help in the determination of CUF, the Department will consider this to be unsatisfactory work. If the Contractor fails to utilize Good Faith Efforts to replace a DBE, regardless of fault (except for Subsection 120-3.4 item c.), the Department will also consider this unsatisfactory work. Unsatisfactory work may result in disqualification of the Contractor from future bidding under GCP Subsection 20-13 and withholding of progress payments consistent with GCP Subsection 90-06.

ITEM G-130 SERVICES TO BE FURNISHED BY THE CONTRACTOR

DESCRIPTION

130-1.1 This work consists of furnishing and maintaining facilities specified in the Contract and listed in the bid schedule for the Department's project administrative personnel to use during the project. Facilities must be fully usable for the specified service. Maintain facilities adequately to preserve their utility. Services include heat, electricity, water and any others required to operate the facility. All facilities remain your property when you complete the work. Locate the sites and acquire all permits required unless otherwise shown on the Plans or specified.

REQUIREMENTS

130-2.1 FIELD OFFICE. Furnish and maintain a suitable office for the Engineer to use during construction. The field office will be converted to a passenger waiting room after construction is complete. Provide a skid mounted, insulated, rigid building with metal siding and metal roof designed to withstand wind and snow loading. Submit building plans for approval prior to shipment. Skid foundation shall be suitable for transport and support of the building, constructed of treated wood or steel, and anchored to the ground. Floor, walls, and roof shall be insulated to a thermal resistance of not less than R19. Floor shall be 3/4" AC grade tongue and groove plywood or better, finished with a non-skid durable floor coating. Ceiling height shall be not less than 8 feet. 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. Provide a suitable stove or other heating device with fuel. Furnish adequate electrical lighting and 120-volt, 60-cycle power. Construct the office with at least 500 square foot of floor space and at least 60 square foot of window area, along with adequate ventilation. Provide at least 12 linear feet of shelf space. Equip the field office with sanitary facilities. Provide janitorial services at least weekly. Furnish two private telephone lines with voice/data capability for the exclusive use of the Engineer. Furnish a telephone connected to the first line and the second line is to be available for a dedicated facsimile machine/dial-up or a shared facsimile/Internet connection. Provide a broadband Internet connection with send and receive data capability supporting 56-a transmission capacity of at least 200 kilobytes per second or higher data transfer rate in at least one direction.

Computers and facsimiles for State personnel are furnished by the State.

All long distance calls made by State personnel and the Internet service provider will be paid by the State. Local calls and all connection fees shall be paid by the Contractor.

Provide at least one designated handicap parking space. Make the field office accessible according to the requirements of Americans with Disabilities Act Accessibility Guidelines (ADAAG).

Make the field office available for occupancy two weeks before commencing work on the project through one week after Project Completion.

At the end of the project, convert the field office to a passenger waiting room as follows:

Subject to an agreement between the Department and the Native Village of Tununak, the building shall be transferred to the Native Village of Tununak upon project completion and shall be relocated to the location shown on the Plans. If the Native Village of Tununak does not take ownership of the building, the Contractor shall remove it from the project, and if removed, no additional work on the building is required.

Anchor building foundation to the ground to prevent movement due to wind forces. Remove all furnishings. Install two sitting benches, 8 feet long, along inside walls.

The building shall have a 100 amp service using a 100 amp combination meter/main disconnect. Equipment and installation shall meet the requirements of the local electric utility. Arrange with the local electric utility and pay for electric service to the site. Install in rigid steel conduit (RSC) with liquidtight flexible conduit connection at office.

Provide and install a UL-listed 4-A-60-BIC portable fire extinguisher.

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 one week 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 relocate 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 square foot.
 - (2) Two 10 square foot windows that open and lock.
 - (3) Lockable door(s).
 - (4) Work bench(es), 30 inches X 16 feet total, 3 feet high.
 - (5) Shelf space, 12 inches X 16 feet.
 - (6) One 20-inch deep sink with attached faucet and approved drain.
 - (7) A gravity fed 250-gallon tank with jet pump or pressurized constant water supply of acceptable quality.
 - (8) Electrical service and facilities as follows:
 - (a) Electrical current, 120/240 V (ac), 60-cycle on 24-hour basis.
 - (b) Wiring system to support a 40-amp user load demand. At least one 15-amp lighting circuit, and two 20-amp outlet circuits with GFI protection.
 - (c) Outlets, six duplex outlets conveniently spaced around the lab, consistent with local codes.
 - (d) Lights, switch by door and either four 100-watt incandescent or eight 40-watt fluorescent.
 - (e) Exhaust fan, minimum 5 cubic feet per second.
 - (9) Heating equipment suitable to maintain a uniform 70 °F room temperature.
 - (10)Storage cabinet, 3 ft X 3 ft X 3 ft, lockable, securely fixed to an inside wall with a hinged door opening outward.
 - (11)Office desk and 2 chairs.

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 ft X 12 ft, ceiling height 8 ft.
 - (2) Door 48 inches wide and window 5 square foot that opens, both lockable.
 - (3) Electrical service and facilities as in b.(8), except for the following:
 - (a) Lighting fixtures, 2 ea.
 - (b) Outlets, 3 conveniently spaced around the structure.
 - (c) Wiring system with each circuit GFI protected to satisfy a 20-amp user load demand.
 - (4) Work table 3 ft X 20 in X 3 ft high, capable of supporting 250 pounds and affixed to an inside wall as directed.

- (5) Concrete-slab floor, 8 ft X 8 ft X 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 a. 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, 36-inch width X 11-inch tread X 7-inch rise.
 - (2) Landing, 4 ft X 4 ft centered on the entryway.
 - (3) Handrail(s) firmly affixed to the stairway.
- e. Lab Equipment and Services. Provide the following:
 - (1) Propane necessary for the lab operation, including two 100-lb 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.

130-2.3 CURING SHED. Furnish and maintain a suitable weather tight shed for curing concrete test cylinders, with a suitable box or bins for curing concrete test cylinders.

Provide a box large enough or enough bins to contain at least 6 test cylinders from each pour that the Contractor proposes to make during any 28-day period. Use a box or bins at least 18 inches high and constructed of sturdy wood. Line the box or bins with a canvas or plastic liner to help retain moisture in the sand. Construct a lid to provide access to the box or bins.

Provide suitable heating to maintain the temperature in the box (or shed) between 60 and 80 °F at all times when curing the test cylinders. In addition, provide a suitable room thermometer in the shed to check the temperature.

Provide enough sand at the shed to fill the box or bins to be used for curing and enough water to keep the sand in the box or bins moist during the curing period.

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 SCALES. When the bid schedule calls for payment for material by weight, other than the barge displacement method, provide one of the following:

- a. Commercial weighing system. Permanently installed commercial scales.
- **b. Project weighing system.** Acceptable automatic digital scales and scale house.

Provide scales that record weight at least to the nearest 100 pounds. Maintain scale accuracy to within 0.5% of the correct weight throughout the range of use.

Do not use spring balances.

Do not use belt conveyor scales to determine pay weight. You may use belt conveyor scales to proportion plant blends and mixtures if the scales meet the general requirements for weighing equipment and are calibrated according to the manufacturer's instructions.

You may use batch weights to determine pay quantities when the batching equipment includes an approved and certified automatic weighing, cycling, and monitoring system. If doing so, tare trucks at least once per day or more as directed by the Engineer, and provide proof that their loaded weight does not exceed highway load limits.

Install and maintain platform scales with the platform level and rigid bulkheads at each end. Use a platform long enough to permit simultaneous weighing of all axle loads of the hauling vehicle, including coupled vehicles.

Maintain the accuracy of scales according to the specifications, tolerances and regulations for commercial weighing and measuring devices contained in the National Bureau of Standards, Handbook 44, as adopted by Alaska Statute, Section 45.75.050.(d). All commercial scales are subject to approval according to the Weights and Measures Act, AS 45.75. Have scales reinspected, as directed, to ensure their accuracy, and sealed to prevent tampering or other adjustment after certification.

Provide a weatherproof housing for platform scales to protect the recording equipment and allow the scale operator convenient access to the weigh indicator, scale computer, ticket printer, and the sequential printer. Furnish sanitary lavatory facilities, heating, adequate electrical lighting and 120-volt, 60-cycle power for the scale house.

Furnish competent scale operators to operate the system.

Weighing System: Provide an electronic computerized weighing system (ECWS) with the following capabilities:

a. Computer.

(1) Provide a scale computer that can store project numbers and all pay item descriptions for multiple projects and products that are weighed with the scale system.

Use 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 can record a complete shift's transaction on a 3.5-inch high-density diskette or other approved storage media.

- (2) The scale computer must store the following for each hauling vehicle used on the project:
 - (a) Vehicle identification number marked on the vehicle
 - (b) Tare weight
 - (c) Maximum allowable gross vehicle weight (MAVW)

Make sure the scale operator tares vehicles at least once a day. Perform additional tares, as directed, during hauling operations. Perform tares in the presence of the Engineer, when requested.

The Engineer will<u>calculate the check Contractor provided</u> MAVW for each vehicle (using truck measurements provided by the Contractor) 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 you cannot haul overloads in the traffic stream, or the manufacturer's recommended maximum allowable gross vehicle weight as certified by the Contractor when vehicles are allowed to haul overloads.

The scale operator should only use MAVWs that the Engineer has provided in writing. Do not issue any tickets to a vehicle until the Engineer provides the MAVW.

- (3) During weighing operations, the ECWS should 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 should not issue a ticket.
- (4) Provide a battery backup for the computer 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 you to shut down the hard drive without losing information.
- **b.** Tickets. Furnish 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. All weights must be at least to the nearest 100 pounds:
 - (1) Project number
 - (2) Item number and description
 - (3) Date weighed
 - (4) Time weighed
 - (5) Ticket number
 - (6) Vehicle Identification Number
 - (7) MAVW
 - (8) Gross weight
 - (9) Tare weight
 - (10)Net weight
 - (11)Subtotal item net weight for each haul unit since start of shift
 - (12)Accumulated item net weight for all haul units since start of shift

After printing, the weigh ticket must automatically advance to a perforation so it can be torn off and handed to the driver.

Manually weigh and record weights for up to 48 hours during a printer malfunction or break-down, when the Engineer gives you prior written authorization. The manual weighing operation must meet all other contract requirements.

Unless the Engineer gives prior written authorization, you will not receive payment for any material weighed without using the ECWS.

c. Sequential Printer. Provide 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 should also note these special situations in the Scales Diary.

Submit the printout to the Engineer at the end of each shift. You will not receive payment for any hauled material until the printout is submitted.

d. Data Diskettes. Provide the Engineer with a 3.5-inch high-density diskette or other approved storage media at the end of the shift. Record all ticket information produced during the shift. Store data in an approved format.

Download data from the permanent commercial vendor scale computer hard drive directly to a disk at the end of the shift. Do not convert or manipulate data. Provide conversion programs and training so that you can convert data into the information the Engineer requires.

If the diskette is not completely usable, then correct, construct, or reconstruct the data file. Use the sequential printout or other information as a data source, as directed. You will not receive payment for hauled material on a given date until you deliver an accurate "daily" data file to the Engineer. If the Engineer gives you written permission to weigh without the ECWS for a minor equipment failure, construct an acceptable data file as described above.

- e. Scale Diary. The Scale Diary is a computer printout or bound book provided by the Engineer. The scale person must complete the Scale Diary and include 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 person's signature. Also include the following information on any scale used to weigh materials for payment:
 - (1) Owner of the scales and scale locations.
 - (2) Manufacturer's name, model serial number, maximum capacity, and type of scales (single beam, double beam, self-reading, etc.).
 - (3) Date(s) the scales were installed and/or adjusted.
 - (4) Scale service company inspections and accuracy checks (attach copy).
 - (5) Division of Measurement Standards inspections and accuracy checks certifications(attach copy).
 - (6) Time and dates of notification of any malfunctions.

The Scale Diary remains the Engineer's property.

Submit the Scale Diary to the Engineer at the end of each shift. You will not receive payment for any hauled material until you deliver the Scale Diary to the Engineer.

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. Submit the original report at the end of each shift.

You 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. Dump material from non-conforming vehicles until they conform, then reweigh the vehicles.

When a weighing device indicates less than true weight, you 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%.

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.

Platform scales, scale house and the ECWS remain your property after you complete the work.

130-2.6 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 before 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 in freezing weather. 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'-0" min width by 6'-8" 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" welded steel security chain securely attached inside the structure with tamperproof hardware for the Engineer to secure the testing equipment. Provide 120-volt, 60-cycle power, an interior light, and a wall receptacle for the heater. 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.

130-2.7 STORAGE CONTAINER. Furnish, transport and maintain a weathertight, lockable, steel enclosed 20 foot long X 8 foot wide X 8 foot 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.

Provide electrical service and other facilities as follows:

- **a.** Electrical current, 120V (ac), 60 cycle on a 24 hour a day basis.
- **b.** Wiring system to support a 20 amp user load demand.
- c. 2 GFI protected outlets conveniently spaced on the interior walls.
- d. Four 100 watt incandescent or eight 40 watt fluorescent lights located for maximum illumination.
- e. Provide a stairway with railing, built to meet the International Building Code, if there is more than 12inch difference in floor entry and existing ground elevation.

Return the container to the Regional Materials Laboratory, or location acceptable to the Engineer, upon project completion. Allow 7 days for the Department to unload the container. The storage container remains

your property after you complete the work.

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 G-130a, G-130b and G-130c 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 G-130a Field Office, includes initial telephone and Internet service costs to provide operational connections.

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, diskettes, etc., and all maintenance and repair services necessary to keep the system functional.

130-4.7 ENGINEERING COMMUNICATIONS. When pay item G-130j is included in the bid schedule, payment of periodic telephone and Internet charges for State personnel is based on paid receipts from the service provider plus 15 percent. When pay item G-130j is absent from the bid schedule, the State will pay the service provider directly for the periodic charges.

Payment will be made under:

Item G-130a	Field Office - per lump sum
Item G-130b	Field Laboratory - per lump sum
Item G-130c	Curing Shed - per lump sum
Item G-130d	Meal - per each
Item G-130e	Lodging - per each
Item G-130f	Reserved
Item G-130g	Nuclear Testing Equipment Storage Shed - per each
Item G-130h	Storage Container – per each
Item G-130j	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, <u>four-door</u> <u>crew cab</u> 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 CTAF (Common Traffic Advisory Frequency).
- **b. ATV.** All-terrain vehicle, 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 CTAF (Common Traffic Advisory Frequency). Equip with a rotating beacon or strobe light.
- **c. Snowmachine.** A snowmachine 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 1000 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 Departments 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 G-131a	Engineering Transportation (Truck) - per each
Item G-131b	Engineering Transportation (ATV) - per each
Item G-131c	Engineering Transportation (Snowmachine) - per each
Item G-131d	Engineering Transportation (Boat) - per each
Item G-131e	Engineering Transportation - per lump sum

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.

Furnish and install survey monuments and monument cases in conformance with the Plans or as directed.

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 a PK nail, wooden hub, rebar, large nail or other structure capable of being utilized as a marker.
- **c.** Witness Corner: A material mark 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 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, currently registered in the State of Alaska.

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-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-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 facing up-station.

135-2.3 SECONDARY MONUMENT. A minimum 5/8-inch x 30-inch rebar with a 2-inch aluminum cap attached to the top. Permanently stamp every secondary monument with the Surveyor's registration number and the year set.

CONSTRUCTION REQUIREMENTS

135-3.1 GENERAL. Use competent, qualified personnel and suitable equipment for the layout work required and furnish traffic control, stakes, templates, straight-edges and other devices necessary for establishing, checking and maintaining the required points, lines and grades.

Furnish computer services to accomplish the work. Check data received from the computer 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. 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 under the responsible charge of a Professional Land Surveyor.

Follow the Department's Construction Surveying Requirements.

Ensure that the contract surveyor contacts the Department survey manager prior to performing survey work under this item.

DOT&PF Central Region Survey Manager (907) 269-0538 (Phone) (907) 269-0600 (Facsimile)

The Department will provide sufficient centerline or reference thereto, and at least one benchmark to enable the establishment of planned elevations and centerline.

Keep field notes in standard <u>hard</u>bound notebooks in a clear, orderly, and neat manner consistent with 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.

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 remeasure 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 as deemed necessary.
- 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.** Asphalt pavement surveying necessary to comply with subsection P-401-5.2 acceptance criteria for smoothness and grade of finished asphalt pavement surfaces.

I. Staking and hubbing of bottom of excavation and the top of each layer in the pavement structure.

- **m.** 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.
- **<u>j-n</u>**. 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 harmonious-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.

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 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, provide 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:

- **a.** 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.
- **b.** Record and locate all baselines and connect them to the project's centerline, both horizontally and vertically.
- **c.** Upon completion of the before and after survey, provide the Engineer a grid layout sheet showing the baseline, stations and all spot elevations.
- **d.** 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.
- e. At the end of each day's work, hand deliver a copy of the downloaded raw data from the data collector, in hard copy form, to the Engineer. This hard copy will be signed by the Contractor or Surveyor. If editing is deemed necessary, show all changes in an amended hard copy.

Provide the 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 <u>hardbound field</u> 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.
- I. 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 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 G-135b, Conditional 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.

135-3.4 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 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 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 G-135b may include field work, office engineering, or any work described under the construction requirements of item G-135.

135-3.7 FINISH GRADE CHECKING. Perform all survey work required to verify that the finished surface of all asphalt concrete pavement meets the requirements for grade as specified in subsection P-401-5.2, f(4), Grade Acceptance Criteria. Multiple surveys may be necessary in areas that require reworking.

METHOD OF MEASUREMENT

135-4.1 The work will be measured according to Section GCP-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 Pay Items include all necessary personnel, equipment, transportation, and supplies to accomplish the work described in the Contract, or as directed by the Engineer.

Pay Item G-135a Construction Surveying by the Contractor, includes all Contractor surveying work described in the Contract.

Pay Item G-135b 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-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 G-135b.

Pay Item G-135c Monuments by the Contractor, includes all monument work described in the Contract.

Pay ItemG-135d 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.

Payment will be made under:

Item G-135a	Construction Surveying by the Contractor - per lump sum
Item G-135b	Extra Three Person Survey Party - per hour
Item G-135c	Monuments by the Contractor - per lump sum
Item G-135d	Extra Surveying by the Contractor – per contingent sum

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 <u>and/or the bid schedule</u> 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 G-150a Equipment Rental, Dozer (Minimum 70 HP)- per hour

ITEM G-300 CRITICAL PATH METHOD (CPM) 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 work 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.

As determined by CPM analysis, only delays in activities which affect milestone dates or contract completion dates will be considered for a time extension.

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 Section 90.

BASIS OF PAYMENT

300-5.1 At the lump sum price for CPM Scheduling.

Payment will be made under:

Item G-300a CPM Scheduling - per lump sum

ITEM G-710 TRAFFIC CONTROL FOR ROADS, STREETS, AND HIGHWAYS

710-1.1 DESCRIPTION. Protect and control traffic during the contract. Furnish, erect, maintain, replace, clean, move and remove the highway traffic control devices required to ensure the public's safety. Perform all administrative responsibilities necessary to implement this work.

Maintain all public corridors affected by the work in a smooth and passable condition. Construct and maintain approaches, crossings, intersections, and other necessary features throughout the project for the life of the contract.

710-1.2 ACRONYMNS AND DEFINITIONS.

ATM. When used in this section, ATM stands for the *Alaska Traffic Manual*, which is the MUTCD with the *Alaska Traffic Manual Supplement*.

HIGHWAY. A main direct road. Used throughout this section for the sake of brevity, the word "highway" also applies to roads and streets.

HIGHWAY TRAFFIC CONTROL ZONE. A portion of a construction project, haul route, utility work, or similar operation that affects traffic and requires highway traffic control to safely guide and protect motorists, pedestrians, bicyclists, or workers, outside of the AOA.

HIGHWAY TRAFFIC CONTROL PLAN (TCP). A drawing or drawings indicating the method or scheme for safety guiding and protecting motorists, pedestrians, bicyclists, and workers in a highway traffic control zone. The TCP depicts the <u>highway</u> traffic control devices and their placement and times of use.

TRAFFIC. The movement of vehicles, ATV's, equipment, pedestrians, and bicyclists through public corridors, construction areas, utility work, or similar operations.

710-1.3 HIGHWAY TRAFFIC CONTROL PLAN. Design and implement an approved TCP before beginning work within a highway traffic control zone.

The TCP includes, but is not limited to, signs, barricades, traffic cones, plastic safety fence, special signs, warning lights, highway flaggers, temporary lighting, temporary roadways and all other items required to direct traffic through or around the highway traffic control zone according to these Specifications and the ATM. Address in the TCPs, placement of highway traffic control devices, including location, spacing, size, mounting height and type. Include code designation, size, and legend per the ATM and the ASDS.

When a TCP is included in the Plans, use it, modify it, or design an alternative TCP. When a TCP is omitted from the Plans, provide one according to this Section and the ATM.

Submit new or modified TCPs to the Engineer for approval. Allow 1 week for the Engineer to review any TCP or each subsequent correction. You may change an approved TCP during construction provided you allow 48 hours for review and the Engineer approves the changes.

Certify by signature of the Worksite Traffic Supervisor that all TCPs conform with the ATM and Specifications. The Engineer will not accept the TCP without Worksite Traffic Supervisor's certification. Have your superintendent review and sign all TCPs before you submit them.

In all TCPs you submit, include the periods for which the TCP will be in effect. Provide the name and 24-hour telephone number of the Worksite Traffic Supervisor.

The TCPs, Plans, and Standard Drawings show the minimum required number of highway traffic control devices. If unsafe conditions occur, the Engineer may require additional highway traffic control devices.

Use of equipment in a highway traffic control zone must conform to an approved TCP, including all highway traffic control devices these operations require.

Rural projects that are off the NHS and the Alaska Highway System require a waiver per 17 AAC 25.800 to operate oversize and overweight vehicles outside the project limits off of airport property.

710-1.4 WORKSITE TRAFFIC SUPERVISOR. Provide a Worksite Traffic Supervisor responsible for maintaining 24-hour traffic operations.

- **a. Qualifications.** Ensure the Worksite Traffic Supervisor understands ATM requirements, the Plans, the Specifications, your proposed operations, and is certified as one of the following:
 - (1) Worksite Traffic Supervisor certified by the American Traffic Safety Services Association (ATSSA).
 - (2) Level One Signs and Markings Specialist certified by the International Municipal Signal Association (IMSA).

Item (2) requires documentation of at least 12 months of supervisory-level worksite <u>highway</u> traffic control or 12 months of responsible charge of such work. "Responsible charge" means that the Worksite Traffic Supervisor has been accountable for selecting devices and placing them in the highway traffic control system, or for continued system operation. The Worksite Traffic Supervisor satisfies this requirement if they have supervised persons performing this labor.

Renew certification no less frequently than every 4 years, and be able to show their certification anytime they are on the project.

b. Duties.

- (1) Prepare the TCPs and public notices and coordinate highway traffic control operations between the Project Superintendent and the Engineer.
- (2) Physically inspect the condition and position of all highway traffic control devices used on the project at least once each day and once each night. Ensure that highway traffic control devices work properly, are clean and visible, and conform to the approved TCP. Complete and sign a detailed written report of each inspection on the form provided by the Engineer within 24 hours.
- (3) Supervise the repair or replacement of damaged or missing highway traffic control devices.
- (4) Review and anticipate highway traffic control needs. Make available proper highway traffic control devices necessary for safe and efficient traffic movement.
- (5) Review work areas, equipment storage, and traffic-safety material handling and storage.
- (6) Hold traffic safety meetings with superintendents, foremen, subcontractors, and others as appropriate before beginning construction, prior to implementing a new TCP, and as directed. Invite the Engineer to these meetings. Conduct monthly open house public meetings to discuss the TCP and construction phasing.
- (7) Supervise all highway traffic control workers and highway flaggers.
- (8) Certify that all highway flaggers are certified as required by subsection 710-3.4c. Submit a copy of all highway flagger certifications to the Engineer.

MATERIALS

710-2.1 Provide highway traffic control devices meeting the following requirements:

- **a. Signs.** Use signs, including sign supports, that conform to Section P-661, the ATM, the ASDS, and AASHTO M 268. Make orange background signs from sheet aluminum, and use Type II or Type III orange reflective background sheeting on projects advertised before 1/01/2007, or use Type VIII or Type IX fluorescent orange reflective background sheeting at any time.
 - (1) Construction Signs: Regulatory, guide, or construction warning signs designated in the ASDS.
 - (2) Permanent Construction Signs: As designated on the Plans or an approved TCP.
 - (3) Special Construction Signs: All other signs are Special Construction Signs. Neatly mark the size of each sign on its back in 3-inch black numerals.
- **b.** Portable Sign Supports. Use wind-resistant sign supports with no external ballasting. Use sign supports that can vertically support a 48 X 48 inch highway traffic control sign at the height above the adjacent roadway surface required by the ATM.
- **c.** Barricades and Vertical Panels. Use barricades and vertical panel supports that conform to the ATM. Use Type III Barricades at least 8 feet long. Use reflective sheeting that meets AASHTO M 268 Type II or III.
- **d.** Warning Lights. Use Type A (low intensity flashing), Type B (high intensity flashing) or Type C (steady burn) warning lights that conform to the ATM.
- e. Drums. Use plastic drums that conform to the requirements of the ATM. Use reflective sheeting that meets AASHTO M 268 Type II or III.
- f. Traffic Cones and Tubular Markers. Use reflectorized traffic cones and tubular markers that conform to the requirements of the ATM. Use traffic cones and tubular markers at least 28 inches high. Use reflective sheeting that meets AASHTO M 268 Type II or III.
- **g. Plastic Safety Fence.** Use 4 foot high construction orange fence manufactured by one of the following companies, or an approved equal:
 - (1) "Safety Fence" by Services and Materials Company, Inc., 2200 South "J" Street, Elwood, Indiana, 46036. Phone (800) 428-8185.
 - (2) "Flexible Safety Fencing" by Carsonite, 1301 Hot Springs Road, Carson City, Nevada, 89706. Phone (800) 648-7974.
 - (3) "Warning Barrier Fence" by Plastic Safety Systems, Inc. P.O. Box 20140, Cleveland, Ohio, 44120. Phone (800) 662-6338.
- h. Flagger Paddles. Use flagger paddles with 24 inches wide by 24 inches high sign panels, 8 inch Series C lettering (see ASDS for definition of Series C), and otherwise conform to the ATM. Use reflective sheeting that meets AASHTO M 268 Type VIII or IX. Use background colors of fluorescent orange on one side and red on the other side.

710-2.2 CRASHWORTHINESS. Submit documentation, that all highway traffic control devices conform to the requirements of National Cooperative Highway Research Program (NCHRP) Report 350 (Test Level 3).

CONSTRUCTION METHODS
710-3.1 GENERAL CONSTRUCTION REQUIREMENTS. Keep the work, and portions of the project affected by the work, in good condition to accommodate traffic safely. Provide and maintain highway traffic control devices and services <u>inside and outside the project limits</u> on and off of airport property within the highway traffic control zone, day and night, to guide traffic safely.

Unless otherwise provided in this Section, keep all roadways, business accesses, and pedestrian facilities open to traffic. Obtain the Engineer's approval before temporarily closing residential, commercial, or street approaches. Provide access through the project for emergency vehicles and school and transit buses. Properly sign and/or flag all locations where you must redirect or stop the traveling public.

Stop your equipment at all points of intersection with the traveling public unless an approved TCP shows otherwise.

Operate flood lighting at night according to the ATM. Adjust flood lighting so that it does not shine into oncoming traffic.

Provide and maintain safe routes for pedestrians and bicyclists through or around highway traffic control zones at all times, except when regulations prohibit pedestrians or bicyclists.

Immediately notify the Engineer of any traffic related accident that occurs within the project limits within the highway traffic control zone as soon as you, an employee, or a subcontractor becomes aware of the accident.

710-3.2 ROADWAY CHARACTERISTICS DURING CONSTRUCTION. Obtain an approved TCP before reducing existing roadway lane and shoulder widths before starting construction. Maintain a clear area with at least 2 feet between the edge of traveled way and the work area. Use barricades, traffic cones, or drums to delineate this area. Place highway traffic control devices on the work side of the clear area. Space them according to the ATM.

If you are allowed to maintain traffic on an unpaved surface, conduct construction to provide a smooth and even surface that public traffic can use at all times. Properly crown the roadbed surface for drainage. Before beginning other grading operations, place sufficient fill at culverts and bridges to permit traffic to cross smoothly and unimpeded. Use part-width construction techniques when routing traffic through roadway cuts or over embankments under construction. Excavate the material or place it in layers. Alternate construction activities from one side to the other. Route traffic over the side opposite the one under construction.

You may detour traffic when the Plans or an approved TCP allows it. Maintain detour routes so that traffic can proceed safely. When detours are no longer required, obliterate the detour. Topsoil and seed appropriate areas.

If you cannot maintain two-way traffic on the existing roadway or detour, you may use half-width construction or a road closure if it is shown on an approved TCP. Make sure the TCP indicates closure duration and conditions. Schedule roadway closures so you do not delay school buses and peak-hour traffic. For road closures, post closure-start and road-reopen times at the closure site, within view of waiting traffic.

710-3.3 PUBLIC NOTICE. Make sure the Worksite Traffic Supervisor gives notices of major changes, delays, lane restrictions, or road closures to local officials and transportation organizations, including but not necessarily limited to:

- a. Local Police Department
- b. Local Fire Department
- c. Local Government
- d. School and Transit Authorities
- e. Local Emergency Medical Services
- f. Local Media (newspapers, radio, television)
- g. U.S. Postal Service

h. Major Tour Operators

710-3.4 HIGHWAY TRAFFIC CONTROL DEVICES. Before starting construction, erect permanent and temporary highway traffic control devices required by the approved TCPs. Use highway traffic control devices only when they are needed. The Engineer will determine advisory speeds when necessary.

During hours of darkness when required by the approved TCP use flashing warning lights to mark obstructions or hazards and steady-burn lights for channelization.

Use only one type of highway traffic control device in a continuous line of delineating devices, unless otherwise noted on an approved TCP. Use drums or Type II barricades for lane drop tapers.

During non-working hours and after completing a particular construction operation, remove all unnecessary highway traffic control devices. Store all unused highway traffic control devices in a designated storage area, which does not present a nuisance or visual distraction to traffic. If sign panels are post mounted and cannot be readily removed, cover them entirely with either metal or plywood sheeting.

Keep signs, drums, barricades, and other devices clean at all times.

Use only highway traffic control devices that meet the requirements of the "Acceptable" category in ATSSA "Quality Standards for Work Zone Traffic Control Devices".

Immediately replace any devices provided under this Section that are lost, stolen, destroyed, inoperable or deemed unacceptable while used on the project.

All items paid under this Section remain your property unless otherwise stated. Remove them after completing the project.

- **a.** Embankments. Install plastic drums, barricades, tubular markers, plastic safety fence, and cones as specified on the Plans or TCPs to delineate open trenches, ditches, other excavations and hazardous areas when they exist along the roadway for more than one continuous work shift.
- **b.** Fixed Objects. Use flashing warning lights on all vehicles when they are working within 15 feet of the edge of traveled way. Use emergency flashers, flashing strobes or rotating beacons.

Locate private vehicles, idle construction equipment, construction material stockpiles and other items deemed by the Engineer to be fixed objects at least 30 feet from the edge of traveled way at all times. Do not park equipment in medians.

If you cannot meet the preceding restrictions because of land features or lack of right-of-way, park equipment as far away as practical but at least 15 feet from the edge of traveled way, as approved by the Engineer. Use drums or Type II barricades with flashing warning lights to delineate parked equipment. These highway traffic control devices are subsidiary.

c. Highway Flagger. Furnish trained and competent highway flaggers and all necessary equipment, including lighting of the highway flagger position during nighttime operations, to control traffic through the highway traffic control zone. The Engineer will approve each highway flagger operation before it begins and direct adjustments as conditions change.

Highway flaggers must be certified by one of the following:

- (1) Flagging Level I Certification by IMSA
- (2) Flagger Certification by ATSSA

Acceptable substitutions for items (1) and (2) are certified ATSSA Worksite Traffic Supervisors, IMSA Work Zone Traffic Safety Specialists, IMSA Signs and Markings Specialists and ATSSA Flagger Instructors.

Renew highway flagger training and certification no less frequently than every 4 years. Highway flaggers must be able to show their flagger certification anytime they are on the project.

Highway flaggers must maintain their assigned posts at all times, unless another qualified highway flagger relieves them, or you no longer need to flag traffic. Remove, fully cover, or lay down flagger signs when no highway flagger is present. Keep the highway flaggers' area free of encumbrances, such as parked vehicles, so that highway flaggers can be seen easily.

Provide approved equipment for two-way radio communications between highway flaggers when they are not in plain, unobstructed view of each other.

d. Watering. Furnish, haul, and place water for dust control, as directed. Use water trucks that can provide a light-water spray to control dust. 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. Comply with the Alaska Department of Fish and Game screening requirements for all water removal operations.

710-3.5 AUTHORITY OF THE ENGINEER. When the Engineer believes existing conditions may adversely affect the traveling public's safety and/or convenience, you will receive a written notice. The notice will state the defect(s), the corrective action(s) required, and the time required to complete such action(s) not to exceed 24 hours. If you fail to take corrective action(s) within the specified time, the Engineer will immediately close down the offending operations until you correct the defect(s). The Engineer may require outside forces to correct unsafe conditions. The cost of work by outside forces will be deducted from any monies due under the terms of this Contract.

710-3.6 HIGHWAY TRAFFIC PRICE ADJUSTMENT. A Highway Traffic Price Adjustment, under Item G-710c, will be assessed for unauthorized lane closures or lane reductions. Highway Traffic Price Adjustments are liquidated damages representing highway user costs. The Highway Traffic Price Adjustment Rate is a deduction from the Contract amount of \$30 per minute for unauthorized lane closure or lane reduction, per lane.

Authorized lane closures and/or lane reductions are those shown in the Contract, an approved TCP, or authorized in writing. Unauthorized lane reductions include unacceptable driving surfaces, such as severe bumps, ruts, washboarding, potholes, excessive dust or mud, and non-conforming, dirty, or out of place highway traffic control devices. The Engineer will make the sole determination as to whether the roadway, trail, or pedestrian facility is acceptable for full unimpeded use by the public. Failure to maintain an acceptable infrastructure or highway traffic control plan will result in a price adjustment equal to 100 percent of the Highway Traffic Price Adjustment Rate, for the time the roadway, trail, or pedestrian facility is in an unacceptable condition.

710-3.7 MAINTENANCE OF TRAFFIC DURING SUSPENSION OF WORK. Approximately one month before you suspend work for the season, schedule a preliminary meeting with the Engineer to outline the work you expect to complete before shutdown and the anticipated roadway condition. Schedule a field review with the Department for winter maintenance acceptance. At the field review the Engineer will prepare a punch list for implementation before acceptance.

To be relieved of winter maintenance responsibility, leave all roads with a smooth and even surface for public use at all times. Properly crown the roadbed surface for drainage and install adequate safety facilities.

After the project is accepted for winter maintenance and until you are ordered to resume construction operations, the Department is responsible for maintaining the facility. The Department will accept

maintenance responsibility only for portions of the work that are open to the public, as determined by the Engineer. The Department will not accept maintenance responsibility for incomplete work adjacent to accepted roads. You are responsible for maintaining all other portions of the work. The Engineer will issue a letter of "Acceptance for Winter Maintenance" that lists all portions of the work that the Department will maintain during a seasonal work suspension. You retain all contractually required maintenance responsibilities until you receive this letter.

If you suspend work due to unfavorable weather (other than seasonal) or due to your failure to correct unsafe conditions, carry out Contract provisions, or carry out the Engineer's orders, you must bear all costs for highway traffic maintenance during the suspended period.

When you resume work, replace or renew any work or materials lost or damaged during temporary use. If the Department caused damage during winter suspension, payment will be made for repairs by unit pay item or in accord with Subsection GCP-90-05, Compensation for Extra Work. When the Engineer directs, remove any work or materials used in the temporary maintenance. Complete the project as though work has been continuous.

710-3.8 CONSTRUCTION SEQUENCING. The construction sequencing is detailed in these provisions, the Special Provisions, and the Plans. You may propose alternative construction sequencing.

Throughout the project, maintain the existing roadway configuration (such as the number of lanes and their respective widths) except for restrictions to traffic allowed in the Special Provisions or on the Plans, and addressed through approved TCPs. A restriction to traffic is any roadway surface condition, work operation, or highway traffic control that reduces the number of lanes or impedes traffic. Obtain an approved TCP before restricting traffic.

Obtain the local school bus schedule and coordinate your work to ensure the school buses are not delayed through the <u>highway</u> traffic control zone. Submit this plan, as a TCP, to the Engineer for approval before implementation.

710-3.9 INTERIM PAVEMENT MARKINGS – RESERVED.

710-3.10 LIGHTING OF NIGHT WORK – RESERVED.

710-3.11 HIGH VISIBILITY GARMENTS. Ensure all workers within <u>project limits the highway traffic control</u> <u>zone</u> wear outer garments that are highly visible and comply with the following requirements:

- a. **Tops.** Wear fluorescent orange-red vests, jackets, or coverall tops at all times. Furnish each vest, jacket and coverall top with at least one 360-degree horizontal retroreflective band around the torso; and with two vertical retroreflective bands that begin at the horizontal band or lower in front, reach over the shoulder, and end at the horizontal band or lower in back. Furnish each jacket and coverall top with two horizontal retroreflective bands on each sleeve; one above and one below the elbow.
- **b.** Bottoms. Wear fluorescent orange-red pants or coverall bottom during nighttime work (sunset to sunrise). Worksite traffic supervisors, employees assigned to <u>highway</u> traffic control duties, and flaggers wear fluorescent orange-red pants or coverall bottom at all times. Furnish each pants or coverall bottom with two horizontal retroreflective bands on each leg.
- **c.** Raingear. Raingear tops and bottoms, when worn as the outer visible garment, conform to the requirements listed in this Subsection 710-3.11.
- **d.** Exceptions. When workers are inside an enclosed compartment of a vehicle, they are not required to wear high visibility garments.
- e. Standards. All high visibility garments conform to the requirements of ANSI/ISEA 107-2004, Class 2 for tops or Class E for bottoms, and Level 2 retroreflective material.

Retroreflective bands are made of material conforming to either:

- (1) A two inch wide strip, fluorescent yellow-green color, made of retroreflective microprisms; or
- (2) A two inch wide strip, silver color, made of retroreflective lenses bonded to a durable cloth backing; and on two long edges apply one inch wide strips, fluorescent yellow-green color, made of durable cloth material. Total width of band is 4 inch.
- f. Labeling. Garments are labeled in conformance with Section 11.2 of ANSI/ISEA 107-2004; except you may use garments labeled in conformance with ANSI/ISEA 107-1999 until 1/1/08.
- **g.** Condition. Furnish and maintain all vests, jackets, coveralls, rain gear, hard hats, and other apparel in a neat, clean, and presentable condition. Maintain retroreflective material to Level 2 standards.
- h. Subsidiary. Payment for high visibility garments for workers is subsidiary to other items.

710-3.12 OVERSIZE AND OVERWEIGHT VEHICLES. Comply with the legal size and weight regulations of 17 AAC 25 and all restrictions of the *Administrative Permit Manual*, except when the Department waives the requirements.

The engineer may <u>will</u> waive the permit requirements of regulation 17 AAC 25 regarding oversize and overweight vehicles within the project limits when provided that the contractor submits and follows an acceptable approved Highway Traffic Control Plan.

Permits shall be obtained from the Department's Division of Measurement Standards & Commercial Vehicle Enforcement, for movements of oversize and overweight equipment outside of the project limits, except when the Department waives the permit requirements outside of the project limits. Retain this permit for your records and submit a copy to the Engineer.

Submit a <u>highway</u> traffic control plan for hauling operations from the material site(s) to the project. Include all the <u>highway</u> traffic control devices required for these operations in the <u>highway</u> traffic control plan. Indicate the type, number and frequency of oversize and overweight hauling equipment.

The following items are required of oversize or overweight vehicles or equipment:

- **a.** Truck and equipment headlights must be on at all times during vehicle use;
- **b.** A roof mounted flashing or rotating amber beacon, visible from 360 degrees, must be on during vehicle use;
- c. For overweight street legal vehicles, mount clearly visible oversize signs on front and rear of vehicle; and
- **d.** For oversize equipment and/or overweight non-street legal equipment, mount 16" X 16" clean red/orange flags on the outboard points, in addition to clearly visible oversize signs on front and rear of equipment.

When oversize or overweight vehicles are used, add the following to the <u>Highway</u> Traffic Control Plan:

- **a.** Install and maintain orange plastic safety fence that separates the haul route from any adjacent school, business, residence, community center or public gathering place;
- **b.** Furnish <u>highway</u> flaggers as specified by the <u>Highway</u> Traffic Control Plan, and at additional locations where necessary, to control the haul route during all hauling operations. Coordinate their

placement with the Engineer. Haul route <u>highway</u> flaggers will be in addition to <u>airport</u> flaggers required by FAA Advisory Circular150/5370-2E, and the Construction Safety Plan;

- **c.** Limit haul unit speed to 10 mph when passing through any developed area or significant hazard. The Engineer is sole judge of what constitutes a developed area or significant hazard;
- **d.** Obey bridge load restrictions and all height restrictions on haul route;

- e. Maintain the haul route in a smooth and dust free condition. Remove all haul debris from the roadway and the surroundings;
- f. When overweight loads are hauled over existing pavement, remove the existing pavement and replace with new pavement of similar material and equal thickness to old pavement, as a subsidiary cost, after the haul is finished;
- **g.** Hauler is responsible for the costs of repair for damage to the highway structures, including but not limited to the bridge railings, guardrail, light poles, signs, signal, <u>highway</u> traffic control devices, utilities, and mailboxes on the roadways;
- **h.** Immediately reinstall all signs, signals, guardrail and other safety features that were removed for the haul; and
- i. If mailboxes were removed for the haul, reinstall mailboxes by the next day after the haul.
- j. Maintain a minimum 12 foot lateral separation between the nonstreet legal vehicles and the motoring public. Specify the highway traffic control devices required for these operations in the highway traffic control plan.

METHOD OF MEASUREMENT

710-4.1 Section GCP-90 and as follows. Quantities will not be measured during winter suspension of work.

- **a. Highway Traffic Control Device Items.** By the number of units in the Highway Traffic Control Rate Schedule, under item G-710d Highway Traffic Control that are installed, accepted, and operational. Incomplete or unsatisfactory devices will not be measured. Special Construction Signs are measured by the total area of legend-bearing sign panel, as determined under subsection P-661-4.1. Items measured by the day are for each item per 24-hour period.
- **b.** Highway Flagger. By the number of approved hours, supported by certified payroll.
- **c.** Watering. By the 1,000 gallons (M-Gallon) of water applied. The Engineer may specify measurement by weight or volume. 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.
- **d. Highway Traffic Price Adjustment.** By each minute of unauthorized lane closure or lane reduction, per lane, measured to the nearest minute. The Engineer will determine whether the roadway is opened to full unimpeded use by the traveling public.
- e. Highway Traffic Control. By the units specified.
- f. Plastic Safety Fence. By the linear foot, as placed, to protect or channelize pedestrian traffic as shown on an approved TCP. Any adjustments in configuration of the fence at the same location that does not result in an increased amount of fence is not measured. Opening and closing the fence to gain access to and from the worksite is not measured.
- g. Temporary Guardrail. By the linear foot, including end treatments, as shown on an approved TCP.

BASIS OF PAYMENT

710-5.1 Use the following table for unit rates of pay for Contingent Sum:

Highway Traffic Control Device	Pay Unit	Unit Rate
Construction Signs	Each/Day	\$5.00
Special Construction Sign	Square Foot	\$20.00
Type II Barricade	Each/Day	\$3.00
Type III Barricade	Each/Day	\$10.00
Traffic Cone or Tubular Marker	Each/Day	\$1.00
Drums	Each/Day	\$3.00
Watering	M-Gallon	\$20.00
Plastic Safety Fence	Foot	\$2.50
Temporary Sidewalk Surfacing	Square Foot	\$1.15
Flexible Markers	Each	\$50.00
Temporary Guardrail	Foot	\$21.00

HIGHWAY TRAFFIC CONTROL RATE SCHEDULE

Traffic Control Rate Schedule 03/2011	Pay Unit	Unit Rate
Construction Signs	Each/Day	<u>\$ 6.50</u>
Special Construction Signs	<u>Sq Ft</u>	<u>\$28.00</u>
Type II Barricade	Each/Day	<u>\$ 3.30</u>
Type III Barricade	Each/Day	<u>\$11.00</u>
Traffic Cone or Tubular Marker	Each/Day	<u>\$ 1.10</u>
Drums	Each/Day	<u>\$ 3.30</u>
Sequential Arrow Panel	Each/Day	<u>\$55.00</u>
Portable Concrete or Steel F Shape Barrier	<u>Each</u>	<u>\$80.00</u>
Temporary Crash Cushion / Sand or Water		
filled Barrels or barrier (all required per end)	Each	<u>\$1,250.00</u>
Temporary Crash Cushion / Redirective	<u>Each</u>	<u>\$2,500.00</u>
Pilot Car	<u>Hour</u>	<u>\$73.00</u>
Pilot Car w/sequential arrows	Hour	<u>\$76.00</u>
Watering	<u>M-Gallon</u>	<u>\$25.00</u>
Street Sweeping (Regenerative Sweeper,		
Broom with vacuum)	Hour	\$175.00
40.000 GVW Truck with Crash Attenuator	Hour	\$ 97.00
Plastic Safety Fence	Foot	\$ 1.00
Portable Changeable Message Board Sign	Calendar Dav	\$130.00
Temporary Sidewalk Surfacing	Sa Ft	\$ 2.00
Flexible Markers (Flat Whip, Reflective)	Each	\$ 60.00
Removal of Pavement Markings	Lineal Foot	\$ 1.25
Temporary Guardrail	Lineal Foot	\$25.00
Interim Pavement Markings		<u> </u>
Painted Markings	Lineal Foot	\$ 0.30
Preformed Pavement Marking Tape		
(removeable or nonremoveable)	Lineal Foot	<u>\$ 1.75</u>
Temporary Raised Pavement Markers	<u>Each</u>	<u>\$ 1.00</u>
Word or Symbol Markings	<u>Each</u>	<u>\$40.00</u>
Temporary Cover Markings	Lineal Foot	\$ 4.00

a. Highway Traffic Maintenance. The contract price includes all resources required to provide the Worksite Traffic Supervisor, all required TCPs and public notices, monthly open house meetings, the Construction Phasing Plan, and the maintenance of all roadways, approaches, crossings, intersections and pedestrian and bicycle facilities, as required. This item also includes any Highway Traffic Control Devices required but not shown on the bid schedule.

Items required by the Contract that are not listed on the bid schedule or not included in other items are subsidiary to Item G-710a Highway Traffic Maintenance, except Highway Traffic Price Adjustment.

- **b.** Highway Traffic Control Device Items. The contract price in the Highway Traffic Control Rate Schedule includes all resources required to provide, install, maintain, move, and remove the specified devices. Warning lights, vertical panels, and sign supports required for highway traffic control devices are subsidiary.
- c. Highway Flagger. The contract price includes all required labor, radios, flagger paddles, and transportation to and from the worksite. The Engineer will pay for item G-710b Highway Flagger at the contract unit price for each Highway Flagger per hour. The hourly rate for Highway Flagger is set at \$38.00\$48.00 per hour for this contract. The Engineer does not require a change order/directive for this pay item. Additional flagging added by change order will be paid according to subsection 40-02 Changes.
- **d.** Watering. The contract price in the Highway Traffic Control Rate Schedule includes all resources required to provide watering, as directed.
- e. Highway Traffic Price Adjustment. If Item G-710c, Highway Traffic Price Adjustment, is shown on the bid schedule, the total value of this contract will be adjusted, for unauthorized lane closures or lane reductions at the rate stated as a pay deduction.
- f. Highway Traffic Control. Payment for Item G-710d Highway Traffic Control will be made at the unit rate value contained in the Highway Traffic Control Rate Schedule for the accepted units of highway traffic control devices. The Engineer does not require a change order/directive for this pay item.
- **g. Plastic Safety Fence.** The contract price in the Highway Traffic Control Rate Schedule includes all resources required to install, maintain, and remove the fence.
- **h. Temporary Sidewalk Surfacing.** The contract price in the Highway Traffic Control Rate Schedule includes all resources required to construct, maintain, and remove the surfacing.
- **i. Temporary Guardrail.** The contract price in the Highway Traffic Control Rate Schedule includes all resources required to construct, maintain, and remove the guardrail.

Payment will be made under:

Item G-710a	Highway Traffic Maintenance – per lump sum
Item G-710b	Highway Flagger – per contingent sum
Item G-710c	Highway Traffic Price Adjustment - per contingent sum
Item G-710d	Highway Traffic Control – per contingent sum

ITEM L-100 RUNWAY AND TAXIWAY LIGHTING

DESCRIPTION

100-1.1 This item consists of furnishing and installing runway and taxiway lighting systems as indicated on the Plans and as specified herein.

EQUIPMENT AND MATERIALS

100-2.1 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 5 complete listings 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. This AC, the latest certified equipment list, and the address list of certified airport lighting equipment manufacturers are available on the Internet page for the FAA Office of the Associate Administrator for Airports (ARP). The internet address is 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.	5345-10
(2)	Runway Edge Light, Bi-directional High-Intensity, L-862, and Threshold Light, L-862E, with lamp, support column, metal frangible coupling, stainless steel bolts, and upper plug and cord assembly. The lens shall be clamp band style. Complete with lens coloration, lamp wattage, and specified support column height.	5345-46
(3)	Runway Edge Light, Medium Intensity, L-861, and Threshold Light, L-861E, with incandescent- <u>LED</u> 6.6 A lamp and Lexan lens with support column, metal frangible coupling with stainless steel hex head set screws, and 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, L861T , with incandescent <u>LED</u> 6.6 A lamp and Lexan lens, with support column, metal frangible coupling with stainless steel hex head set screws, and upper plug and cord assembly with separable connector and stainless steel lens encircling clamp band.	5345-46
(5)	Airport Signs, L-858, internally lighted.	5345-44
(6)	Airport Signs, L-858, unlighted.	5345-44
(7)	Airport Light Base, L-867, transformer housing, Class I, Size B or D, 24 inches deep, one piece with internal grounding lug, gasket, steel cover, base extension, drain opening, and conduit.	5345-42
(8)	Airport Light Base, L-867, <u>Class IIA or IIB,</u> Watertight, transformer housing, shall be 12 inch x 24 inch, non-steel light bases, meeting the requirements for non-vehicle	
Tununak A	irport	
Tununak A	irport Relocation 5/09 (DOT rev.	5/3/10)

loading light bases, type L-867. The bases shall be 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 D 3350. A conduit stub 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, Steel, Size B, 12 inches deep, two section light base assembly with grooved and "O" ringed flange ring with concrete ring. Complete with any necessary spacer rings, internal grounding lug, mud plate, anti-rotational fins and conduit hubs.	5345-42
(10)Isolating Transformer, L-830, individual lamp type, series-to-series, 5000 V, 6.6 A to 6.6 A, 30/45 W or 200 W	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. Transformers shall have leads of the length shown on the plans.	5345-47
(12)Isolating Transformer, L-830-1, individual lamp type, series-to-series, 5000 V, 6.6 A to 6.6 A, 30/45 W.	5345-47
(13)Isolating Transformer, L-830-6, individual lamp type, series-to-series, 500 V, 6.6 A to 6.6 A, 200 W.	5345-47
(14)Isolating Transformer, L-830-8, series-to-series, 6.6 A Primary to 20 A Secondary, 300 Watt.	5345-47
(14)(15)Isolating Transformer, L-830-17, individual lamp type, series-to-series, 5000 V, 6.6 A to 6.6 A, 20/25 W.	5345-47
(15)(16)Radio Control Equipment, L-854, Type I, with enclosure for surface mounting, antenna and feedline and 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
(16)(17)Flush Taxiway Centerline Light Fixture, Uni or Bi-Directional, Type L-852A, or L-852B, Class 2, Mode 1, Style 3, a flat fixture with 1/4 inch or less clearance above finish surface, with 30 W lamps and color filters, plug and cord assembly, 1/2 inch watertight connector, stainless steel bolts, vibration proof fasteners, "Dry" system with the optical assembly sealed above and below with "O" rings.	5345-46
(17)(18)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 80 W lamps, color filters, a single 100 or 200 W transformer, plug and cord assembly, 1/2-inch watertight connector, stainless steel bolts, vibration proof fasteners, "Dry" system with the optical assembly sealed above and below with "O" rings.	5345-46
(18)(19) Primary Handhole, L-868, class 1, size B, steel, 24 inches deep x 12 inches diameter, 1-3/8 inch N.P.T. conduit hubs (with number and location of hubs as indicated, 4 inch bottom drain hole, steel cover and gasket, internal ground lug with connector and other misc. items. Handhole and cover shall be suitable for vehicle and aircraft wheel loading.	5345-42
(19)(20)Wind Cone Primary Handhole, L-867, class 1, size D, steel, 24 inches deep x 16 inch diameter, one piece with internal ground lug with connector, steel cover with	

gasket, 4 inch drain hole, 2-1/8 inch N.P.T. and 1-3/8 inch N.P.T. conduit hubs with number and location of hubs indicated, and other misc. items.

5345-42

(20)(21)Handhole, L-867, Size B, Class IIA or IIB, Watertight, transformer housing shall be 12 inch x 24 inch, non-steel light bases, meeting the requirements for non-vehicle loading light bases, type L-867, with ½ inch galvanized steel cover and gasket. The bases shall be 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 D 3350. A conduit stub 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

- **b.** Sealer. Adhesive sealant shall be a self-leveling silicone sealer.
- **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 13-3/4 inch high prefabricated steel, 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 other 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.
- 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.
- i. **Soft Gasket.** Gaskets to be installed between the base plate and base in watertight lighting systems 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.
- I. Concrete. Conform to Item P-610 Structural Portland Cement Concrete, 1-inch maximum size coarse aggregate.
- m. Junction Box, Type 1A. 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.

n. Junction Box, Type 1B. Junction boxes shall be pre-cast polymer concrete with fiberglass reinforcing, with gasketed cover of the size and details shown on the Plans. Junction boxes shall be <u>UL-listed for electrical installations.</u>

CONSTRUCTION METHODS

100-3.1 GENERAL. All work in connection with the airport lighting system shall be according to the applicable provisions of the current NEC of the National Fire Protection Association 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.

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.

100-3.2 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. If the light base is placed in the structural section (P-154, P-208, 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. The material shall be compacted to the requirements of the material into which it is placed. The light base shall be placed to between 3/8 inch and 3/4 inch of finished grade. The base shall be level to within $\pm 1/4$ inch.

Connect the insolating 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 a 14 inch (extended height) 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.

Label each edge light assembly with the letter and number designation as indicated on the Plans. Label by permanently die-stamping the letter and number designation onto the light base and base cover plate with 1/4 inch figures.

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.

100-3.3 INSTALLATION OF FLUSH LIGHTS. Install flush light fixtures according to the Plans and specifications.

Install flush runway edge and centerline light fixtures and taxiway centerline light fixtures after the old pavement has been cold planed, and before the asphalt is placed. Install flush taxiway and runway centerline

and touchdown zone light fixtures on new runways or taxiways after the first asphalt lift and before the final lift.

Core remaining asphalt at the runway centerline light base locations a minimum diameter of 24 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 6 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 rigid steel conduit system, using rubber grommets or waterproof nipples and couplings. Usually one waterproof sealtite flexible coupling will suffice for each two-hubbed light base.

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. Allow a 3 inch thickness of asphalt pavement over the PCC and over the light base mudplate.

After the PCC has cured at least 72 hours, 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 (\pm 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 18-8, 410, or 416 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 180 inch-pounds, or as recommended by the manufacturer. Set the outboard edge of the fixture 1/4 to 3/8 inch below the adjacent finished pavement.

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.

100-3.4 INSTALLATION OF WATERTIGHT EDGE LIGHTS. <u>Place the light base on a layer of bedding</u> 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-208, 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 $\frac{10-5}{10}$ psi for a minimum of 10 minutes.

Base assemblies shall be sealed watertight and conduit openings and any holes shall be caulked with duct seal to prevent any water from entering the base assemblies. 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.** 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.
- **c.** 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.
- **d.** 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.
- e. 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.

100-3.5 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.

100-3.6 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. Asbuilt 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.

100-3.7 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.

100-3.8 SPARE PARTS. Provide a quantity of spare light fixtures and transformers equal to 10 percent (rounded down) of the installed quantity of each type of fixture and size of transformer, but not less than one of each size or type. Deliver spare parts to airport maintenance as directed by the Engineer.

METHOD OF MEASUREMENT

100-4.1 METHOD OF MEASUREMENT.

- 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, or the number of units acceptably removed.

BASIS OF PAYMENT

100-5.1 ITEMS OF WORK PAID IN OTHER SECTIONS. All work and materials required to install cable, <u>and</u> conduit, <u>and ground rods</u> is paid for under Items L-108, and L-110. <u>Ground rods installed as part of a edge</u> and threshold light, or hand hole unit are subsidiary to the light or hand hole unit.

All work and materials required to install remote relay assembly and remote control panel are paid for under item L-109.

100-5.2 ITEMS OF WORK PAID IN THIS SECTION. At the contract lump sum or unit prices for the completed and accepted job.

<u>Refer to Item P-610 for requirements regarding all work and materials to place portland cement concrete.</u> Portland cement concrete is subsidiary to L-100 items requiring its use.

Item L-100a, 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 L-100b, Regulator, L-828: Includes mounting, electrical connection (with all input control and output circuits), painting and stenciling. Size as indicated on Plans.

Item L-100c, High Intensity Runway Edge and Threshold Light, L-862 and L-862E: Includes L-868 base assembly, gasket, frangible coupling, L-830-6, 200 W isolating transformer, and L-823 cable connectors.

Item L-100d, Medium Intensity Runway Edge and Threshold Light, L-861 and L-861E: Includes L-867 base assembly, grounding lug and connector, <u>ground rod</u>, cover, gasket, support column, frangible coupling, 30/45 W L-830-1 isolating transformer, transformer mounting platform (when shown on Plans), and L-823 cable connectors.

Item L-100e, Taxiway Edge Light, L-861T: Includes L-867 base assembly, grounding lug and connector, <u>ground rod, cover</u>, gasket, support column, frangible coupling, <u>30/45 W L-830-1</u> 20/25 W L-830-17 isolating transformer, transformer mounting platform (when shown on Plans), and L-823 cable connectors.

Item L-100f, Wind Cone Handhole, L-867, Size D: Includes steel cover and gasket, grounding lug and connector, <u>ground rod</u>, L-823 primary and secondary cable connectors, and <u>transformer or PA-4</u> power adapter (when specified on the Plans).

Item L-100g, Primary Handhole, L-868, Size B: Includes traffic rated steel cover and gasket, grounding lug and connector, and ground rod.

Item L-100h, Remove existing Runway and Taxiway Light: Includes removal of fixtures, transformers, and bases.

Item L-100i, Flush Runway Centerline Light, L-850A or L-850B: Includes L-868 base assembly, spacer rings, flange ring, steel cover, concrete work, asphalt patching and sealing.

Item L-100j, Flush Taxiway Centerline Light, L-852A, L-852B, L-852E or L-852G: Includes L-868 base assembly, spacer rings, flange ring, L-830 isolating transformer, L-823 Cable connectors, concrete work, asphalt patching and sealing.

Item L-100k, 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 L-100l, Relocate Existing Airport Sign, Type L-858: Includes L-867 base, frangible couplings, transformer, concrete base, and sign faces as shown.

Item L-100m, Runway Guard Light, L-804: Includes L-867 base assembly.

Item L-100n, Airport Sign, Type L-858: Includes sign, L-867 base, frangible couplings, transformer, concrete base, sign faces as shown.

Item L-1000, Power or Communications Pedestal: Includes anchor stake and conduits as shown.

Item L-100p, Handhole, L-867, Size B: Includes grounding lug, ground rod, steel cover, and gasket.

Item L-100q, Junction Box, Type II.

Item L-100ap, Spare Parts: Includes spare light fixtures and transformers.

Item L-100aq. Junction Box, Type 1A.

Item L-100ar. Junction Box, Type 1B.

Payment will be made under:

Item L-100a	Airport Lighting - per lump sum
Item L-100b	Regulator, L-828 - per each
Item L-100c	High Intensity Runway Edge and Threshold Light, L-862 and L-862E - per each
Item L-100d	Medium Intensity Runway Edge and Threshold Light, L-861 and L-861E - per each
Item L-100e	Taxiway Edge Light, L-861T - per each
Item L-100f	Wind Cone Handhole, L-867, Size D - per each
Item L-100g	Primary Handhole, L-868, Size B – per each
Item L-100h	Remove existing Runway and Taxiway Light - per each
Item L-100i	Flush Runway Centerline Light, L-850A or L-850B - per each
Item L-100j	Flush Taxiway Centerline Light, L-852A, L-852B, L-852E or L-852G - per each
Item L-100k	Flush Runway Edge Light, L-850C - per each
Item L-100I	Relocate Existing Airport Sign, Type L-858 - per each
Item L-100m	Runway Guard Light, L-804 - per each
Item L-100n	Airport Sign, Type L-858 - per each
Item L-100o	Power or Communications Pedestal – per each
Item L-100p	Handhole, L-867, Size B – per each
Item L-100q	Junction Box, Type II – per each
Item L-100ap	<u>Spare Parts – per lump sum</u>
Item L-100aq	Junction Box, Type 1A, per each
ltem I -100ar	Junction Box Type 18, per each

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

ASTM D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb. Rammer and 18-in Drop

ITEM L-101 ROTATING BEACON

DESCRIPTION

101-1.1 This item shall consist of furnishing and installing airport rotating beacons. This work shall include the mounting, leveling, wiring, painting, servicing, and testing of the beacon and 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.

EQUIPMENT AND MATERIALS

101-2.1 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 Internet home page for the FAA Office of the Associate Administrator for Airports (ARP). The internet address is 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 meet the requirements of AC 150/5345-12, Specification for Airport and Heliport Beacons. The beacon shall be a L-801A or L-802A, Class II, with metal-halide lamp(s).

- 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 150 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 PANEL BOARDS AND BREAKERS. Panel boards and breakers shall conform to the requirements of Fed. Spec. W-P-115.

101-2.4 WEATHERPROOF CABINETS. The weatherproof cabinets shall conform to NEMA Standards and shall be constructed of steel not less than No. 16 USS gauge.

101-2.5 WIRE. Wire in conduit rated up to 5,000 V shall conform to AC 150/5345-7, Specification for L-824 Underground Electrical Cable for Airport Lighting Circuits, for Rubber Insulated Neoprene Covered Wire, or Fed. Spec. J-C-30, Type RHW, for rubber insulated fibrous covered wire. For ratings up to 600 V, the thermoplastic wire conforming to Fed. Spec. J-C-30, Types TW, THW, and THWN, shall be used. The wires shall be of the type, size, number of conductors, and voltage shown in the Plans or in the specifications.

101-2.6 CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of UL Standard 6, 514, and 1242.

101-2.7 PAINT.

- **a.** Priming paint for ungalvanized metal surfaces shall be a high solids alkyd primer conforming to Fed. Spec. TT-P-664D.
- **b.** Priming paint for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-P-24441/19B. If necessary, add not more than 1/2 pint of turpentine to each gallon of paint.
- **c.** Orange paint for the body and the finish coats on metal and wood surfaces shall consist of a readymixed non-fading 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 body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to Commercial Item Description A-A-3067.
- **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.

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 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 <u>on an equipment storage</u> <u>building, refer to specification S-142</u> 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.

If underground cable for the power feed from the transformer vault to the beacon site and duct for this cable installation under paved areas is required, the cable and duct shall be installed according to L-108, Underground Cable, and Item L-110, Underground Electrical Duct. No separate measurement or payment will be made for underground wire or conduit.

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.

If lightning protection is specified in the Plans or specifications as a part of this item, it shall be according to subsections 103-2.3, 2.4, 2.5, 2.6, and 3.4 in Item L-103, Beacon Tower.

101-3.8 PANEL AND CABINET. Unless otherwise specified, 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 1/2 inch galvanized rigid steel conduit. 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 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. 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 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 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 contract 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 include beacon (except glass surfaces), beacon base, breaker cabinet, all 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. 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 readymixed 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 taking megger and voltage readings. The insulation resistance to ground of the beacon supply circuit shall be not less than 50 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 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

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. When the rotating beacon is installed on an equipment storage building, the beacon mounting platform is measured and paid for under item S-142. This unit is for a complete, functioning beacon, installed as shown on the plans. All conduit, wire, junction boxes, ground rods, and other items required for the complete installation are subsidiary to and shall be paid under this unit.

BASIS OF PAYMENT

101-5.1 Payment will be made at the contract unit price for each completed and accepted job. <u>When the rotating beacon is installed on an equipment storage building, the beacon mounting platform is specified and paid for under item S-142.</u>

Payment will be made under:

Item L-101a	Rotating Beacon, High Intensity, L-802A - per each
Item L-101b	Rotating Beacon, Medium Intensity, L-801A - per each

MATERIAL REQUIREMENTS

AC 150/5345-7	L-824 Underground Cable for Airport Lighting Circuits
AC 150/5345-12	Airport and Heliport Beacons
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

ITEM L-107 WIND CONE

DESCRIPTION

107-1.1 This item shall consist of 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, the furnishing and installing of the specified wire from the wind cone to the electrical control panel, and a concrete foundation. The item shall also include all cable connections, the furnishing and installing of the conduit and conduit fittings from the wind cone base to the first hand hole, 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.

EQUIPMENT AND 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 Internet home page for the FAA Office of the Associate Administrator for Airports (ARP). The internet address is <u>http://www.faa.gov/airports_airtraffic/airports/construction/</u>.
- **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 shall be a steel pole hinged in the middle.

a. Type L-807, Style I-<u>A</u>, Size 1, externally lighted wind cone.
b. Type L-807, Style 1-B, Size 1, internally lighted wind cone.
b.c. Type L-807, Style I-<u>A</u>, Size 2, externally lighted wind cone.
d. Type L-807, Style I-B, Size 2, internally lighted wind cone.
e.e. Type L-807, Style II, Size 1, unlighted wind cone.
d.f. Type L-807, Style II, Size 2, unlighted wind cone.

107-2.3 WIRE. Wire in conduit rated up to 5,000 V shall conform to AC 150/5345-7, Specification for L-824 Underground Cable for Airport Lighting Circuits, Type C cross-linked polyethylene insulated wire. For ratings up to 600 V, cross-linked polyethylene insulated wire type XHHW, 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 CONCRETE. Design the foundation based on the soil bearing capacity of the soils located at the pole site, pole mechanics, and wind loads. Provide a foundation that will allow adjustment of the pole with a wrench by tightening or loosening bolts and a pole adjustment range of 5 degrees minimum without compromising the pole wind rating.

Design the foundation as necessary to resist pole lateral, uplift, and overturning forces. Submit calculations stamped by a Professional Engineer to the Engineer for approval. The concrete for foundations shall be proportioned, placed, and cured according to Item P-610, Structural Portland Cement Concrete.

107-2.6 PAINT.

- **a.** Primer for ungalvanized metal surfaces shall be a high solids alkyd primer conforming to Federal Specification TT-P-664D.
- **b.** Primer for galvanized metal surfaces shall be zinc dust-zinc oxide primer paint conforming to MIL-P-24441/19B. If necessary, thin with not more than 1/2 pint of turpentine per gallon of primer.
- **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.

107-2.7 WIND CONE. The wind cone fabric shall be standard international orange.

CONSTRUCTION METHODS

107-3.1 INSTALLATION. The hinged pole shall be installed on the concrete foundation as shown in the <u>Plans</u> 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 hinged pole
- **b.** Backfill. Material used as backfill around the footing of the lighted wind cone 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.

If underground cable from the transformer vault to the wind cone site and duct for this cable installation under paved areas is required, the cable and duct will be paid for as part of the wind cone pay item.

107-3.4 BOOSTER TRANSFORMER. If shown in the Plans or specified in the Special Provisions, 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 Special Provisions. If the booster transformer is required for installation in the transformer vault, 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 of the diameter and length specified in the Plans 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. 8 AWG bare stranded copper wire or larger and shall be firmly attached to the ground rod by means of a ground connector or clamp. 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.

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. The wind cone assembly, if painted on receipt, shall be given 1 finish coat of paint in lieu of the 3 coats specified above.

107-3.7 LAMPS. The Contractor shall furnish and install <u>lamps, as required, conforming to the following</u> requirements and as indicated on the drawings:

- **a. Incandescent.** Provide four 200-W, 115-V general lighting service lamps in the reflectors for the 12foot cone or four 150-W, 115-V lamps for the 8-foot cone. A clear 100-W, 107-W, or 116-W, 115-V traffic signal lamp with a medium screw base, or a 100-W. A 69 W, L-810, 115 V, medium prefocus base lamp shall be furnished and installed in the obstruction light as required.
- **b.** LED. Provide LED fixtures with independent lamp circuits for general illumination of the wind cone. Furnish and install an L-810, LED, 120-V obstruction light as required.

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 on the 8-foot wind cone for securing the hinged top section to the fixed lower section. 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 50 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 10 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.

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.

a. The 107a(1) Primary Wind Cone pay unit shall include the wind cone, tower, foundation, ground rod, disconnect switch and post, and installation of all conduits, conductors, and other materials required to the first jbox from the wind cone, as shown on the plan sheets. The conduit system and conductors from this jbox to the EEB shall be paid for under other appropriate units. b. The L-107a(2) Supplemental Wind Cone pay unit shall include the installation of the wind cone. tower, foundation, ground rod, conduit and conductors to the 24-inch wind cone hand hole, The hand hole, transformer, conduits, conductors, connectors, and other materials needed to connect to the 6.6 Amp airport lighting circuit shall be paid for under other appropriate units.

BASIS OF PAYMENT

107-5.1 Payment will be made at the contract unit price for each completed and accepted job.

Payment will be made under:

Item L-107a <u>(1)</u>	Primary 8-foot Lighted Wind Cone, in place - per each
Item L-107a(2)	Supplemental 8-foot Lighted Wind Cone, in place - per each
ltem L-107b	12-foot Lighted Wind Cone, in place - per each
Item L-107c	8-foot Unlighted Wind Cone, in place - per each
Item L-107d	12-foot Unlighted Wind Cone, in place - per each

MATERIAL REQUIREMENTS

AC 150/5345-7	L-824 Underground Cable for Airport Lighting Circuits
AC 150/5345-27	Wind Cone Assemblies
ASTM A 615	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. 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

ITEM L-108 UNDERGROUND CABLE

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.

EQUIPMENT AND 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 Internet home page for the FAA Office of the Associate Administrator for Airports (ARP). The internet address is 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 or 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, <u>Type XHHW-2</u>, with stranded annealed copper conductor, rated 190 °F, with cross-linked polyethylene insulation classified as UL type-2 and FAA type C.

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, copper 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, 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 BARE COPPER WIRE (COUNTERPOISE OR GROUNDING). Bare copper wire for counterpoise or grounding installations shall be solid or stranded wire conforming to ASTM B 3 and B 8.

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.

- **a.** Cast Splice. A cast splice, employing a plastic or metal mold and using epoxy resin manufactured by Minnesota Mining and Manufacturing Company, "Scotchcast" Kit No. 82B, or approved equal, is to be used for potting the splice. This means of splicing is the only type approved for telephone control cable.
- b. Vulcanized Splice. A vulcanized splice with proper molds for various cable sizes shall be used.
- c. Field-attached Plug-in Splice. Figure 3 of AC 150/5345-26, Specification for L-823 Plug and Receptacle, Cable Connectors, employing connector kits, is approved for field attachment to single conductor cable. 600 V cord sets shall include a Type II, Class A, Style I plug on a 16/2 SJO cord. 600 V secondary receptacles shall be Type II, Class B, Style II. 600 V plugs shall be Type II, Class B, Style 4. 5000 V plugs shall be Type I, Class B, Style 3. 5000 V receptacles shall be Type I, Class B, Style 10.
- **d.** Factory-Molded Plug-in Splice. Specification for L-823 Connectors, Factory-Molded to Individual Conductors, are approved.
- e. 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 D 4388 and the plastic tape should comply with Mil. Spec. MIL-I-24391 or Commercial Item Description A-A-55809. In all the above cases, connections of cable conductors shall be made using crimp connectors utilizing a crimping tool designed.—T_to make a complete crimp before the tool can be removed. No. 19 AWG telephone control wires may be connected by means of wrapped and soldered splice, 3M Company Moisture Proof UR Type Connector, or approved equal, or by a method approved by the Engineer. Electrical insulating tape shall be "Scotch" No. 88 or approved equal.

108-2.5 CONCRETE. Concrete for cable markers shall conform to Specification Item P-610, "Structural Portland Cement Concrete."

108-2.6 MARKER TAPE. Marker tape shall be APWA-ULCC compliant, red polyethylene plastic, printed "Caution - Buried Electric Line Below".

108-2.7 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).

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.

Label the circuit conductors in each manhole or handhole by attaching a heat stamped nylon identification tag bearing the circuit designation "R" or "T", as required.

Cable connections between lights will be permitted only at the light locations for connecting the underground cable to the primary leads of the individual insulating 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.

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.

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. 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.

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.

Where runway and taxiway series lighting circuit conductors are to be installed together through the same conduit, identify the individual conductors at both ends of the duct by applying identification ties which have been heat stamped with the circuit identification "R", "T1" or "T2" as needed.

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 1 foot above grade.

108-3.3 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:

- **a.** When off the airport or crossing under a roadway or driveway, the minimum depth shall be 3 feet unless otherwise specified.
- **b.** Minimum cable depth when crossing under a railroad track, shall be 3.5 feet unless otherwise specified.

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.

108-3.4 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 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.

108-3.5 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 1-4-inch sieve. This layer shall not be compacted 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.

108-3.6 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.

108-3.7 CABLE MARKERS. 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.

108-3.8 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. Vulcanized Splices. These shall be made by using crimp connectors for joining conductors. The splice shall be made, using compounds furnished by the manufacturer, according to their instructions and to the satisfaction of the Engineer.
- c. 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 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.
- **d.** 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 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.
- e. 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 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 Tununak Airport **Tununak Airport Relocation** 5/09 (DOT rev. 2/16/10) Project 51791/AIP 3-02-0486-001-2012 (PDC rev. 3/16/11)

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 D 4388, 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.

108-3.9 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. <u>8-6</u> 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 <u>distance-minimum</u> of <u>approximately 4</u> inches from the insulated cable. The counterpoise wire shall <u>not</u> be securely attached to each light fixture base, or mounting stake. The counterpoise wire shall <u>also</u> be securely attached to copper or copper-clad ground rods installed not more than <u>1,000-500</u> feet apart around the entire circuit. The ground rods shall be of the length and diameter specified in the Plans, but in no case shall they be less than 8 feet long nor less than 5/8 inch in diameter. Counterpoise conductor shall be connected to the ground rod using exothermic or irreversible connections.

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.

108-3.10 GROUNDING SYSTEM. A safety ground shall be installed at each light fixture. The safety ground must be a No. 6 AWG stranded bare copper wire connected to the ground lug at the light base or stake and to a ground rod installed beside each light base and lighting circuit hand hole. Grounding conductor connection to the ground rod shall be by exothermic or irreversible connections. The ground rods shall be of the length and diameter specified in the Plans, but in no case shall they be less than 8 feet long nor less than 5/8 inch in diameter. If shown in the Plans or specified in specifications, a stranded bare copper wire, No. 8 AWG minimum size, shall be installed as grounding for the lighting system. The bare ground wire shall be installed in the same trench for the entire length of the insulated cables or conduit it is designed to protect, and shall be placed at a distance of approximately 4 inches from the insulated cable or conduit. The ground wire shall be securely attached to each light fixture base. The ground 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 ground rods shall be of the length and diameter specified in the Plans, but in no case shall they be less than 8 feet long and rods installed not more than 1,000 feet apart around the entire circuit. The ground rods shall be of the length and diameter specified in the Plans, but in no case shall they be less than 8 feet long nor less than 5/8 inch in diameter.

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.

108-3.11 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 50-<u>2,000</u> megohms. Where additions to existing circuits, only the new section shall be tested. The resistance to ground of 600 V capacity shall be 10-<u>1,000</u> megohms for the insulation test.
- **d.** That the insulation resistance to ground of all nongrounded conductors of multiple circuits is not less than 50-2,000 megohms.
- 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. <u>Ground rods installed as part of another unit are subsidiary to that unit and paid for under that unit.</u>

108-4.5 Lump sum items will not be measured for payment.

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 L-108a	Underground Cable <u>#8</u> AWG, Copper, 5 kV FAA type "B" or type "C" (as specified on Plans), L-824 - per linear foot*	
Item L-108b	Underground Cable [Gauge] AWG, Copper, 5 kV FAA type "B" or type "C" (as specified on Plans), L-824 - per lump sum	
Item L-108c	<u>#6</u> Bare Copper Ground Conductor - per linear foot*	
Item L-108d	[Gauge] Bare Copper Ground Conductor - per lump sum	
Item L-108e	Underground Cable, <u>#10 AWG</u> Copper, 600 V, Type "C", L-824 - per linear foot*	
Item L-108f	Underground Cable, [Gauge] AWG Copper, 600 V, Type "C", L-824 - per lump sum	
Item L-108g	Ground Rod - per each	
Item L-108h	Underground cable #14 AWG, 2 Conductor, copper, 600V, Type "SOOW-A/SOOW", - per linear foot*	

ltem L-108i	Underground cable #14 AWG, 2 Conductor, copper, 600V, Type "SOOW-A/SOOW", - per lump sum
ltem L-108j	Interstice Filler - per linear foot*
Item L-108k	Interstice Filler - per lump sum

* For payment purposes, 4% will be added to the straight line measurements for cable and ground conductor wire.

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 B 3	Soft or Annealed Copper Wire
ASTM B 8	Concentric-Lay-Stranded Cooper Conductor, Hard, Medium-Hard, or Soft
ASTM D 4388	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 TRANSFORMER VAULT AND VAULT EQUIPMENT

DESCRIPTION

109-1.1 This item shall consist of 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, potheads, 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.

EQUIPMENT AND MATERIALS

109-2.1 GENERAL. Obtain approval of all materials and equipment proposed for the work. Submit to the Engineer 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 Internet home page for the FAA Office of the Associate Administrator for Airports (ARP). The internet address is 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.

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 C 62, Grade SW.

109-2.5 ASBESTOS CEMENT DUCT. Asbestos cement duct and fittings shall be according to Fed. Spec. W-C-571.

109-2.6 RIGID STEEL AND INTERMEDIATE 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.
109-2.7 LIGHTING. Vault, metal-housing or electrical enclosure light fixtures shall be of a vaporproof type.

109-2.8 OUTLETS. Convenience outlets shall be heavy-duty duplex units designed for industrial service. Outlets shall be specification grade NEMA performance receptacles, 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 NEMA Specification Grade Standard, 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 ungalvanized metal surfaces shall be an <u>high solids</u>-alkyd primer <u>without lead and</u> <u>chromate pigments</u> conforming to <u>TT-P-644DSSPC-Paint 25</u>.
- **b.** White paint for body and finish coats on metal and wood surfaces shall be ready-mixed paint conforming to Commercial Item Description A-A-3067 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 according to Fed. Spec. TT-E-487<u>a urethane-modified alkyd floor enamel</u>. 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 D 2823.

109-2.11 HIGH-VOLTAGE BUS. High-voltage bus shall be standard weight 3/8-inch IPS copper tubing or it may be insulated copper cable of the size and voltage rating specified.

109-2.12 BUS CONNECTORS. Connectors shall be similar to Burndy Type NT (or approved equal) for copper tubing. Connectors for insulated bus cable shall be of the proper size and type for the service intended.

109-2.13 BUS SUPPORTS. Bus supports shall be similar to Westinghouse No. 527892 (or approved equal), insulated for 7,500 volts, single clamp type for 2-bolt flat mounting.

109-2.14 GROUND BUS. Ground bus shall be 1/8 x 3/4 inch copper bus bar.

109-2.15 SQUARE DUCT. Duct shall be square similar to that manufactured by the Square D Company (or approved equal), or the Trumbull Electric Manufacturing Company (or approved equal). The entire front of the duct on each section shall consist of hinged or 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.

109-2.16 GROUND RODS. Ground rods shall be copper-cladsteel, 3/4 inch x 10 feet, with copper alloy hex bolt type ground clamps.

109-2.17 POTHEADS. Potheads shall be similar to G&W Type NT, Shape C (or approved equal), unless otherwise specified. Potheads shall be furnished with plain insulator bushings and conduit couplings. Potheads shall have a rating not less than the circuit voltage.

109-2.18 PREFABRICATED METAL HOUSING. The prefabricated metal housing shall be a commercially available unit.

109-2.19 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

109-2.20 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 or 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.

109-2.21 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 rubber insulated neoprene-covered wire, or Fed. Spec. J-C-30<u>A-A-59544</u>, Type RHW, for rubber insulated fibrous-covered wire. For ratings up to 600 volts, thermoplastic wire conforming to Fed. Spec. J-C-30, Types TW, THW, and THWN<u>XHHW-2</u>, 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. 6 AWG or larger and insulated for at least 600 volts.
 - (2) 3,000 volts maximum: Wire shall be No. 6 AWG or larger and insulated for at least 3,000 volts.
 - (3) Over 3,000 volts: Wire shall be No. 6 AWG or larger and insulated for at least the circuit voltage.

109-2.22 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 A-123. The building shall be anchored with soil anchors meeting the requirements of Item P-650.

109-2.23 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 1/2 inch plywood on the interior surface. The exterior surface may be either 1/2 inch plywood with 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 coreto-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 E 84.
- **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 a 12-inch x 12-inch louvered vent installed in one endwall.
- 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, Kason Industries No. 1053, or approved equal. Provide neoprene weather-stripping. The door(s) shall be provided with a refrigerator safety lock with pushrod from interior, Kason Industries, No. 56L, 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 24 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. Mount cabinet above desk on wall. Cabinet and desk shall be a McMasters-Carr #5041T14 and #4894T26 respectively, or approved equal.

109-2.24 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.

109-2.25 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.

109-2.26 DOORS. Doors, unless otherwise specified, shall be metal-clad fireproof class a doors conforming to requirements of the NEC and local electrical codes.

109-2.27 RADIO CONTROL EQUIPMENT, L-854. Radio Control Equipment, shall be L-854, Type 1, with a 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.

109-2.28 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 and shall be located on the Snow Removal Equipment Building as shown on the Plans. The antenna ground planes shall be a minimum of 4 feet above the top of the rotating beacon's lamp shields. Antenna mountings shall be fabricated as shown and noted.

109-2.29 APRON FLOODLIGHT. Apron floodlight shall be Hubbell Quartzliter Mod. QL-503 or approved equal, 300 W, 120 V, with wire guard .

109-2.30 PHOTO ELECTRICAL CONTROL. Photo electrical control shall be a SPST, 120 V, Tork No. 2100 or approved equal.

109-2.31 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 door-inlockable 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-and meet the appropriate classifications of Federal Specifications W-A-375a. 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.

109-2.32 TRANSFER SWITCH. Transfer switch shall be Heavy-duty, 2-pole, 3-wire, S/N, double-throw, non-fusible type in a NEMA I enclosure.

109-2.33 IDENTIFICATION TIES. Identification ties shall be self-locking, heavy duty nylon ties and shall be labeled by heat stamp.

109-2.34 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 (under ground) load type, 125 A, 120/240 V, single phase, with 2-pole, 100 A, Q0M2100VH 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. <u>The service entrance shall be mounted on the Snow Removal Equipment Building as shown on the Plans.</u>

The <u>A</u> service entrance disconnect switch shall be mounted on the <u>Snow RemovalElectrical</u> 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.

109-2.35 PLUG CUTOUT. The plug cutout shall be a 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.

109-2.36 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.

109-2.37 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.

109-2.38 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.

109-2.39 INDOOR LIGHTING FIXTURES. Indoor lighting fixtures shall be incandescent type with clear prismatic lens, surface mounted with steel extension box, and 100-W lamp.

109-2.40 HARDWARE. All miscellaneous hardware items, nails, bolts, and screws shall be galvanized steel.

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 C 90 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 AND HIGH-VOLTAGE BUS 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. For the incoming and outgoing high voltage load circuits, the Contractor shall furnish and install rigid metallic vi conduit risers, surmounted by potheads, from floor level to the level as shown in the Plans.

The incoming high-voltage power supply service to the vault shall enter below the floor of the vault and shall rise from the floor level in a rigid metallic conduit riser, surmounted by a pothead, as described above. Using insulated high-voltage cable, the incoming power service shall be connected from the pothead to the oil-fused cutouts or to the specified disconnecting switch or equipment. From the oil-fused cutouts or disconnecting device, the insulated service conductors shall be connected to the overhead voltage bus

system of the vault. The high-voltage bus system shall utilize the materials specified and shall be mounted and installed according to the requirements of the NEC or the local code agency having jurisdiction.

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.

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 stencil identifying labels on the cases of regulators, breakers, and distribution and control relay cases with white oil paint as designated by the Engineer. The letters and numerals shall be not less than 1 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 <u>(L-109c)</u> The quantity of electrical enclosures to be paid for under this item <u>L-109c</u> shall consist of the number of enclosures constructed in place and accepted as a complete unit. <u>This unit is for a complete</u>, <u>functioning system</u>, installed as shown on the plans.

109-4.4 (L-109d): The quantity of electrical equipment installed in <u>an a new or existing structure</u> (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. <u>This item shall include</u> all conduit, wire, junction boxes, ground rods, and other items required for the complete installation This unit also includes the electric service entrance and all service conductors, conduit, and jboxes required to supply power to the Electrical Equipment Building as shown on the plans.

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.

Payment will be made under:

Item L-109a	Transformer Vault in Place - per each
Itom L_100b	Profabricated Metal Housing and Foundation in Place - per each
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Item L-109C	Electrical Enclosure and Foundation in Place - per each
Item L-109d	Installation of Electrical Equipment in New or Existing 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 150/5345-13A	L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits	
ANSI/ICEA S-85-625	Aircore, Polyethylene Insulated, Copper Conductor, Telecommunications Cable	
ASTM C 62	Building Brick (Solid Masonry Units Made from Clay or Shale)	
ASTM C 90	Concrete Masonry Units, Loadbearing	
ASTM D 2823	Asphalt Roof-Coating	
Commercial Item Description A-A-3067	Paint: Alkyd, Exterior, Low VOC	
Fed.Spec. J-C-30 A-A-5	29544 Cable and Wire, Electrical (Power, Fixed Installation)	
Fed. Spec. TT-E-487	Enamel, Floor and Deck	
Fed.Spec.W-C-571	Conduit and Fittings, Nonmetal, Rigid; (Asbestos-Cement or Fire-Clay Cement), (For Electrical Purposes)	
SSPC-Paint 25	Zinc Oxide, Alkvd, Linseed Oil Primer for Use Over Hand Cleaned Steel	

ITEM L-110 UNDERGROUND ELECTRICAL DUCT

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. It shall also include all trenching, marking, backfilling, removal, and restoration of any paved areas; manholes, concrete encasement, mandreling installation of steel drag wires 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.

EQUIPMENT AND 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 BITUMINOUS FIBER DUCT. Bituminous fiber duct and fittings shall conform to the requirements of UL Standard 543.

- **a.** Type I, for concrete encasement.
- **b.** Type II, for direct burial.

110-2.3 ASBESTOS CEMENT DUCT. Asbestos cement duct and fittings shall conform to the requirements of Fed. Spec. W-C-571 and shall be one of the following, as specified in the proposal:

- **a.** Type I, for concrete encasement.
- **b.** Type II, for direct burial.

110-2.4 STEEL CONDUIT. Rigid steel conduit and fittings shall conform to the requirements of UL Standard 6, 514, and 1242.

110-2.5 CONCRETE. Concrete shall conform to Item P-610, Structural Portland Cement Concrete, 1 inch maximum size coarse aggregate.

110-2.6 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 514 and NEMA TC-3.
- b. Underground Plastic Duct shall be Type III, rigid, HDPE pipe, <u>schedule 40</u>. The material shall have a cell classification of 334420C or better according to ASTM D 3350, and shall have a third party, nationally recognized testing lab listing. The nominal size shall be as indicated on the Plans-with a minimum wall thickness of 5/32 inch. <u>HDPE conduit sections must be straight before installation. If shipped on a reel, conduit shall be run through a straightener prior to installation. All fittings such as saddle fittings, elbows, couplings, connectors, adapters, etc., used in the installation shall be HDPE and shall be of the same material as the duct. <u>Couplings shall be of the electrofusion type or the "Double E-Lock" type.</u></u>

110-2.7 FLEXIBLE METAL CONDUIT. Flexible metal 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.

110-2.8 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.

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 3 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 Teflon pipe sealing tape 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 No. 10 gauge galvanized iron or steel drag wire for pulling the permanent wiring. Sufficient length shall be left in manholes or handholes to bend the drag wire back 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.

All ducts, except steel conduit, installed under runways, taxiways, aprons, and other paved areas 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 as shown on the Plans. 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 2 4 inches minimum of below duct or conduit bedding as shown on the

Plans, plus adequate over excavation depth as required to slope and grade all duct or conduit installations to drain toward light bases or hand holes.

The bottom of all trenches shall be sloped and lined with a layer of bedding material of minus 1/4-inch material that is not less than 2 inches in depth, before placing any duct or conduit in the trenches. Bedding material shall be, sand, gravel, crushed aggregate, or other suitable material containing no organic, frozen, or other deleterious material.

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.

When clay or soapstone ducts are specified, they shall be installed with concrete encasement as described above. Clay conduit shall be of the single-bore type. Where the self-centering socket-joint type of single clay duct is used, conduit shall be built up, tier by tier, and separated only by sufficient mortar or fine aggregate concrete to bed the ducts evenly and fill all voids between ducts. Single ducts shall be jointed together and the joints grouted with Portland cement mortar. A suitable gasket (of rubber or other approved material) shall first be placed in the receptacle end of the duct, prior to the joining operation, in order to exclude all mortar from the duct.

Where the square bore butt joint type of clay duct, single or multicell, is used, sections shall be aligned with at least 4 steel dowel pins and joints wrapped with duct tape 6 inches wide and lapped 6 inches. All joints in a bank of single-bore ducts shall be staggered, beginning evenly from the manhole or handhole, by means of short lengths 6, 8, 9, 12, and 15 inches long. Cement mortar shall be troweled around each and every joint. Voids in the duct bank, caused by the external shape of the corners of the conduit, shall also be filled with mortar. The joining and joints of soapstone duct shall be done according to the manufacturer's recommendations.

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 PE (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-208, P-209) except that 100% of the bedding material will pass a 1 inch sieve.

A <u>Where conduit other than PE 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.</u>

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.

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.

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 stiff bristle brush through the entire length of the conduit run immediately prior to the cable being installed.

110-3.6 DUCT MARKERS. Place marker tape 0.5 foot below final grade or below bottom of Crushed Aggregate Base Course in paved areas for the full length of the trenches above all ducts installed as indicated on the Plans.

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-208, 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, sand-bedding material shall be placed around the ducts and carefully tamped around and over them with hand tampers. Sand shall be non frost susceptible with no particle larger than 1/4 inch. Use bedding material that conforms to the requirements specified in subsection 110-3.3 for the type of conduit that is used. Sand-Bedding material shall be placed to provide a minimum of -2.4 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-208, 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. The Contractor shall be held responsible for maintaining all disturbed surfaces and replacements until final acceptance.

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.

Items shown as lump sum will not be measured for payment.

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, and for all labor, equipment, tools, and incidentals necessary to complete this item.

Payment will be made under:

Item L-110a	2-1/8-2-inch Rigid Steel Conduit - per linear foot
Item L-110b	2-1/8-2-inch Rigid Steel Conduit - per lump sum
Item L-110c	2-inch PVC Conduit - per linear foot
Item L-110d	2-inch PVC Conduit - per lump sum
Item L-110e	1-1/4 inch PVC Conduit - per linear foot
Item L-110f	1-1/4 inch PVC Conduit - per lump sum
Item L-110g	2-inch HDPE Conduit - per linear foot
Item L-110h	2-inch HDPE Conduit - per lump sum
Item L-110i	Multi-Way Duct in Concrete (# of conduit) - per linear foot
Item L-110j	Multi-Way Duct in Concrete (# of conduit) - per lump sum
<u>Item L-110x</u>	1-1/4-inch HDPE Conduit - per linear foot
ltem L-110y	3-inch Rigid Steel Conduit - per linear foot
	MATERIAL REQUIREMENTS

Fed. Spec. W-C-571	Conduit and Fittings, Nonmetal, Rigid; (Asbestos-Cement or Fire-Clay Cement), (For Electrical Purposes)
Fed. Spec. W-C-1094	Conduit and Fittings; Nonmetallic, Rigid, (Plastic)
UL Standard 6	Rigid Metal Conduit
UL Standard 514	Fittings for Conduit and Outlet Boxes
UL Standard 543	Impregnated-Fiber Electrical Conduit

UL Standard 1242 Intermediate Metal Conduit

ITEM P-152 EXCAVATION AND EMBANKMENT

DESCRIPTION

152-1.1 This item consists of <u>clearing</u>, 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.

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.
- **Rock Lining.** Screened gravel or rock with no rocks greater than 8 inches in the greatest dimension, no more than 10% passing the 1-inch sieve, and no more than 5% passing the No. 200 sieve.

152-2.2 UNSUITABLE MATERIAL. Material that doesn't meet the testing criteria 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 Subsection GCP 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 Subsection GCP 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.

CONSTRUCTION METHODS

152-3.1 GENERAL. Perform all necessary clearing and grubbing, 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.

Minor clearing of shrubs and willows will be required in deep drainages. Maintain the integrity of the surface vegetation mat on all areas to be cleared and to receive borrow embankment.

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 Subsection GCP 70-11.d. 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 defined in AC 150/5300-13, Subsection 306).

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. <u>When the Contractor is required to locate a</u> <u>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.</u>

b. Utility Work. Utility work shall be performed, and compensation claims for utility work made, according to Subsection GCP 50-06. If it is necessary to work thorough 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.

c. Bridge Earthwork. Place borrow and other roadway materials within 50 feet of the bridge abutments not less than two weeks before installing bridge piles.

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 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 <u>an off Airport Property site</u>. If the Contractor choose to use the material sites as a waste area, all disposal shall comply with any conditions stipulated in the Material Sites Agreement; see Appendix N-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, or to the depth directed by the Engineer, below the top of subgrade. 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 refilled with suitable material, obtained from the grading operations or borrow areas and thoroughly compacted as specified. Where rock cuts are made and refilled 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 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. The Engineer shall determine if the displacement of such material was unavoidable and their decision shall be final. All overbreak shall be graded or removed by the Contractor and disposed of as directed; however, payment will not be made for the removal and disposal of overbreak which the Engineer determines as avoidable. Unavoidable overbreak that must be removed will be paid as 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 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 100% for non-cohesive soils (95% for cohesive soils) 95% of the maximum density as determined by WAQTC FOP for AASHTO T 99/T 180 or ATM 212. The in-place field density and moisture content shall be determined according to WAQTC FOP for AASHTO T 310. The in-place moisture shall be determined by WAQTC FOP for AASHTO T 255/T 265 when using other than the nuclear gauge method for density. 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 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 Subsection GCP 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 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 NOTAMs 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 on airport property, the Safety Plan and the Blasting Plan shall conform to Executive Order 7400.2<u>G</u> *E 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 and records, and has authority to review and reject plans.

152-3.3 BORROW SOURCES. Borrow sources within the airport property are 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 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 fills; unsuitable material shall be placed in waste areas or as directed. 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.

152-3.5 PREPARATION OF EMBANKMENT AREA. Where an embankment is to be constructed to a height of 4 feet or less, or where the embankment supports asphalt or concrete paving, all sod and vegetable matter shall be removed from the surface upon which the embankment is to be placed, and the cleared surface shall be completely broken up by plowing or scarifying to a minimum depth of 6 inches. Compact this area as indicated in Subsection 152-3.2.e.

When new embankment is placed against existing embankments or 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 <u>constructed of thawed material</u> 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.

Frozen material shall not be placed in the embankment except under the following conditions:

- Prior to placement of frozen material, all snow accumulations and/or ice shall be removed. Snow berms
 or side cast ice shall be considered in the Contractors SWPPP.
- Frozen material may be placed in the embankment 6 feet below the finish surface; all material in the top 6 feet of embankment shall be placed unfrozen. Not more than 4 feet total thickness of frozen material may be placed in the embankment.
- Frozen material shall not include any material with visible ice.
- Frozen material pieces shall be less than 6 inches in size.
- Frozen material shall be placed in lifts not exceeding 8 inches. Each lift shall be compacted with at least three coverages with a static 20,000 pound or larger grid or sheeps-foot roller. Any wetting of the material to enhance placement is prohibited.
- Any material placed frozen shall be thawed to the bottom of the material placed frozen and the surface shall be recompacted prior to placement of subsequent unfrozen material. The Contractor may choose to remove snow in the spring of the year to accelerate the thawing of the material. Contractor shall place thermistors at the bottom of any frozen material placed in the embankment on a 200-foot spacing along centerline to determine the depth of thaw. This work will not be paid for separately but will be considered subsidiary. Surface compaction of the thawed material shall be at least four full coverages with a minimum of 20,000 pound static rubber-tired roller.

<u>Thermistor strings shall be installed after the embankment has been placed.</u> Thermistors shall be able to determine temperature at 32° F to within $\pm 0.2^{\circ}$ F. Each string shall consist of singer thermistors (Yellow Springs

Instrument Series 44034, or equivalent) wired and sealed to a Teflon-sheathed conductor cable at 1.0-foot intervals from the bottom to the surface. Each string should have a minimum lead three feet long. The end of the lead wires should be fabricated with a standard multi-line 50-pin telephone plug by 3M, or equivalent. Provide manufacturer's literature for Engineer's approval. Reflective markers to cover each thermistor string casing shall be UV-stabilized fluorescent orange markers with 4-inch retroreflective collars.

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. 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 <u>Material placed thawed shall be</u> 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 of thawed material shall be continued until the embankment is compacted to not less than 95% of maximum density as determined by WAQTC FOP for AASHTO T 99/T 180 or ATM 212. Under all areas serving aircraft or vehicle traffic loadings, the embankment shall be compacted to the depth shown on the Plans and to a density of not less than 10095% of the maximum density as determined by WAQTC FOP for AASHTO T 99/T 180 or ATM 212. The in-place field density and moisture content shall be determined according to WAQTC FOP for AASHTO T 310. The in place moisture shall be determined by WAQTC FOP for AASHTO T 255/T 265 when using other than the nuclear gauge method for density. 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 2 feet of the top of finished subgrade.

Rock or boulders larger than 2 feet in thickness shall either 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 RESERVED

152-3.9 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.

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. Pay quantities will be computed to the neat lines staked, by the method of average end areas of materials acceptably excavated, including material removed by clearing. 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.

Installation of thermistor strings will be subsidiary to excavation and embankment pay items.

BASIS OF PAYMENT

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, <u>clearing</u>, grading, and other necessary operations for construction of embankments, or waste disposal, are subsidiary and shall be included in the contract unit prices.

152-5.1 For "Unclassified Excavation" payment will be made at the contract unit price per cubic yard.

152-5.2 For "Common Excavation" payment will be made at the contract unit price per cubic yard.

152-5.3 For "Rock Excavation" payment will be made at the contract unit price per cubic yard.

152-5.4 For "Muck Excavation" payment will be made at the contract unit price per cubic yard.

152-5.5 For "Drainage Excavation" payment will be made at the contract unit price per cubic yard.

152-5.6 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.

152-5.7 For "Rock Lining" payment will be made at the Contract unit price per ton.

Payment will be made under:

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Item P-152a	Unclassified Excavation - per cubic yard
Item P-152a(1)	Common Excavation - per cubic yard
Item P-152b	Rock Excavation - per cubic yard
Item P-152c	Muck Excavation - per cubic yard
Item P-152d	Drainage Excavation - per cubic yard
Item P-152e	Reserved
Item P-152f	Reserved
Item P-152g	Reserved
Item P-152h(1)	Borrow measured at Source- per cubic yard
Item P-152h(2)	Borrow measured in Final Position- per cubic yard
Item P-152i	Borrow - per ton
Item P-152ae	Rock Lining – per ton

TESTING REQUIREMENTS

ATM 212	Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 309	Relative Standard of Density of Soils by the Control Strip Method
WAQTC FOP for AASHTO T 99/T 180	Moisture-Density Relations of Soils
WAQTC FOP for AASHTO T 255/T 265	Moisture Content of Aggregate and Soils
WAQTC FOP for AASHTO T 310	In-place Density and Moisture Content of Soil and Soil- Aggregate by Nuclear Methods

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. The coarse aggregate shall have a minimum degradation value of 40 when tested according to ATM 313 and a percent of wear not more than 50 at 500 revolutions as determined by AASHTO T 96. Pit-run material may be used, provided the material meets the requirements specified.

Aggregate gradation shall meet the requirements of Table 1, determined according to WAQTC FOP for AASHTO T 27/T11.

Sieve designation (Square opening)	Percentage by weight passing sieves
3 inch	<u>90-</u> 100
<u>No. 4</u>	<u>20-55</u>
No. 8	30-70
No. 50	0-30
No. 200	0-6

TABLE 1. AGGREGATE GRADATION REQUIREMENTS

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 WAQTC FOP for AASHTO T 89 and T 90.

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 finegrained 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 <u>100%-95%</u> of the maximum density, as determined according to WAQTC FOP for AASHTO T 99/T 180 or ATM 212. According to The in-place field density and moisture content shall be determined according to WAQTC FOP for AASHTO T 310. 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.

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 Subbase Course will be weighed by the ton or measured by the cubic yard in final position according to Subsection GCP-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 P-154a	Subbase Course - per cubic yard
Item P-154b	Subbase 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
ATM 212	Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 309	Relative Standard of Density of Soils by the Control Strip Method
ATM 313	Degradation Value of Aggregate
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
WAQTC FOP for AASHTO T 89	Liquid Limit of Soils
WAQTC FOP for AASHTO T 90	Plastic Limit and Plasticity Index of Soils
WAQTC FOP for AASHTO T 99/T 180	Moisture-Density Relations of Soils
WAQTC FOP for AASHTO T 310	In-Place Density and Moisture Content of Soil and Soil- Aggregate by Nuclear Methods

ITEM P-157 EROSION, SEDIMENT, AND POLLUTION CONTROL

157-1.1 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 Construction General Permit.

157-1.2 DEFINITIONS. These definitions apply only to Section P-157.

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 "gualified personnel" required by the CGP. An AK-CESCL must be recertified every three years.

Alaska Department of Environmental Conservation (ADEC). The state agency authorized by EPA to administer the Clean Water Act's National Pollutant Discharge Elimination System.

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.).

Consent Decree. The decree entered by the United States District Court for the District of Alaska on September 21, 2010, regarding compliance with the CWA and implementation of the CGP, to which the United States and the Department are parties.

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 construction materials or equipment storage or maintenance (e.g. material piles, borrow area, concrete truck chute washdown, fueling); and other industrial storm water 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 stormwater 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.

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 section as it is defined in 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 stormwater inspector.

Multi-Sector General Permit (MSGP). The Alaska Pollutant Discharge Elimination System 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 stormwater associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:

- 1. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- 2. 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, 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 Department by the Contract and are directly related to the Contract.

Support Activities including 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.

Records. Any record, report, information, document, or photograph required to be created or maintained pursuant to the requirements of the Consent Decree, the CGP, the CGP storm water requirements of the Clean Water Act: and applicable local, state, and federal laws and regulations regarding document preservation.

Storm Water Discharges From Municipal Separate Storm Sewer Systems (MS4s). A conveyance or system of conveyances including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains that discharges into waters of the United States and is owned or operated by a public agency.

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 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 Support 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.

Support Activities. See ADEC CGP definition. Further defined as construction activities in which the Department is not an operator and the activity is outside the Project Zone.

SWPPP Amendment. A revision or document that adds to, deletes from, or modifies the SWPPP.

SWPPP Manager. The Contractor's gualified representative who conducts Inspections 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.

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.

157-1.3 PLAN AND PERMIT SUBMITTALS. For plans listed in Subsection GCP-80-03, paragraph f. (SWPPP and HMCP) use the Contractor submission and Department review deadlines identified in Subsection 157-1.3.

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.

1. 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 157-2.1, paragraph 2.

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.

- 2. Hazardous Material Control Plan. 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.
- 3. Spill Prevention, Control and Countermeasure Plan. When a SPCC Plan is required under Subsection 157-2.3, 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.
- 4. CGP Coverage. The Contractor is responsible for permitting of Contractor and subcontractor Construction Activities related to the Project. The Contractor cannot use the SWPPP for Support Activities outside the Project Zone where the Department is not an operator.

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 acknowledgement letter to the Engineer when the eNOI is submitted to ADEC.

Do not begin Construction Activity until the conditions listed in Subsection 157-3.1, paragraph 1 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 acknowledgment letter, for inclusion in the SWPPP.

- 5. Ending CGP Coverage. Submit an eNOT to ADEC, and submit both a copy of the signed eNOT and ADEC's acknowledgement letter to the Department, within 30 days after the Engineer has determined the conditions listed in Subsection 157-3.1, paragraph 6 have been met.
- 6. ADEC SWPPP Review. When CGP, Part 2.1.3 requires ADEC SWPPP review:
 - a. Transmit a copy of the Department-approved SWPPP to ADEC using delivery receipt confirmation:
 - b. Transmit a copy of the delivery receipt confirmation to the Engineer within seven days of receiving the confirmation: and
 - c. Retain a copy of delivery receipt confirmation in the SWPPP.
- 7. Local Government SWPPP Review. When local government or the CGP Part 2.1.4 requires local government review:
 - a. Transmit a copy of the Department-approved SWPPP and other information, as required, to local government, with the required fee using delivery receipt confirmation;
 - b. Transmit a copy of the delivery receipt confirmation to the Engineer within seven days of receiving the confirmation;

- c. Transmit a copy of any comments by the local government to the Engineer within seven days of receipt:
- d. 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;
- e. Include a copy of local government SWPPP review letter in the SWPPP; and
- f. Before ending permit coverage file a project ending notification with local government and allow them to inspect the work.
- 8. Modifying Contractor's eNOI. When required by The CGP Part 2.7, modify your eNOI to update or correct the information. Reasons for modification include change to the start or end dates, small changes in number of acres to be disturbed, change in decision to use or not use treatment chemicals, or changed 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, the original eNOI indicates disturbed area less than five acres and the project will disturb more than five acres, or a project over five disturbed acres grows by more than 50 percent.

157-1.4 PERSONNEL QUALIFICATIONS. The SWPPP Preparer 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

For Projects disturbing more than 20 acres, the SWPPP Preparer must also have completed a Department approved SWPPP Preparation course. Approved courses will be posted on the Department's D&ES, Environmental website.

The Superintendent must meet the following qualifications:

- a. Current certification as AK-CESCL; and
- b. Duly authorized representative, as defined in the CGP. Appendix A. Part 1.12.3

The SWPPP Manager (identified in the CGP as the Storm Water Lead) and the Storm Water Inspector must have current certification as AK-CESCL, and be knowledgeable in the requirements of that position as defined in the CGP, Appendix C, Qualified Person. The SWPPP Manager has authority to work in each position concurrently.

The Active Treatment System (ATS) operator must have current certification as AK-CESCL, and be knowledgeable in the principals and practices of treatment systems in general, and the operation of the ATS in particular. Minimum experience to be 6 months field experience or completion of an ATS manufacturer's training course.

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:

- a. CPESC, Certified Professional in Erosion and Sediment Control;
- b. CISEC, Certified Inspector in Sediment and Erosion Control; or
- c. CESCL, Washington Department of Ecology Certified Erosion and Sediment Control Lead (Through Nov. 30, 2011 only. Will not be accepted as an equivalent substitution after Nov. 30, 2011).

157-1.5 SIGNATURE/CERTIFICATION REQUIREMENTS AND DELEGATIONS.

- 1. eNOI and eNOT. The eNOI and eNOT must be signed and certified by a responsible corporate officer according to CGP Appendix A, Part 1.12.2. Signature and certification authority for the eNOI and eNOT cannot be delegated.
- 2. 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 Engineer will provide the Department's delegation Form 25D-107, which the Contractor must include in the SWPPP.
- 3. Subcontractor Certification. Subcontractors must certify that they have read and will abide by the CGP and the conditions of the project SWPPP.

157-1.6 RESPONSIBILITY FOR STORM WATER PERMIT COVERAGE.

- 1. The Department and the Contractor are jointly responsible for permitting and permit compliance within the Project Zone.
- 2. The Contractor is responsible for permitting and permit compliance outside the Project Zone for Support Activities. The Contractor has sole responsibility for compliance with ADEC and other applicable federal, state, and local requirements, and for securing all necessary clearances, rights, and permits. Subsection GCP-70-02 describes the requirement to obtain permits, and to provide permit documents to the Engineer.
- 3. An entity that owns or operates, a commercial plant (as defined in Subsection GCP-80-01, paragraph c) 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. Subsection GCP-70-02 describes the requirement to obtain permits, and to provide permit documents to the Engineer.
- 4. The Department is not responsible for permitting or permit compliance, and is not liable for fines resulting from noncompliance with permit conditions:
 - a. For areas or Support Activities outside the Project Zone: and
 - b. For commercial plants, commercial material sources, and commercial disposal sites.

157-1.7 UTILITY RELOCATION COVERAGE. A Utility company is not an Operator when utility relocation is performed concurrently with the Project, as outlined in Subsection GCP-5-06. The Department maintains operational control over the Utility's plans and specifications for coordination with project construction elements, and the Contractor has day-to-day control over the various utility construction activities that occur in support of the Project. A Utility company is considered a subcontractor for concurrent relocation.

After the Contractor has an active NOI for the Project, a Utility Company performing advance relocation work under a separate SWPPP no longer has Operator status and files the NOT for the Utility Company's SWPPP covering only the completed utility work. Remaining utility relocation work is included in and performed under the Project SWPPP.

157-2.1 STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS.

1. 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. 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 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:

- a. Opportunities to phase construction activities;
- b. Appropriate BMPs and their sequencing; and
- c. 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.

2. Developing the SWPPP. Use the Department's ESCP and other Contract documents as a starting point for developing the SWPPP. The approved SWPPP replaces the ESCP.

Develop the SWPPP framework according to the ADEC SWPPP template with additional information as required. Include information required by the CGP, Part 5, and this specification.

When using the SWPPP template:

- In Section 3 (Good Housekeeping), add a subsection to describe dedicated asphalt plants and/or dedicated concrete plants, give their locations and identify the BMPs that will be used to minimize pollutants from them. If there are no dedicated asphalt or concrete plants, then state that in the SWPPP.
- Include the following appendices:
- Appendix A Site Maps and Drawings •
- Appendix B BMP Details •
- Appendix C Project Schedule •
- Appendix D Supporting Documentation: TMDLs, Endangered Species, & Historical Properties •
- Appendix E Project Permits
- Appendix F Delegation of Authority •
- Appendix G – Subcontractor Certifications/Agreements
- Appendix H Construction General Permit
- Appendix I Notice of Intent and Delivery Confirmation, Letter from ADEC, Notice of • Termination (Include both Department's and Contractor's)
- Appendix J Monitoring Plan (If Applicable) and Reports •
- Appendix K SWPPP Preparer's Site Visit
- Appendix L Hazardous Material Control Plan (HMCP)
- Appendix M- Personnel Qualifications and Training Certificates for:
 - Superintendent
 - 0 SWPPP Preparer
 - SWPPP Manager/Storm Water Lead/Inspector
 - Contractor's ATS Operator
 - Department's Project Engineer and Inspector(s) 0
 - Qualified personnel must be described in a list with names and dates in positions 0
- Appendix N Training Log
- Appendix O Corrective Action Log
- Appendix P Grading and Stabilization Activities Log
- Appendix Q Rain Record

- Appendix R Inspection Reports
- Appendix V Monitoring Reports
- Appendix W– Antidegradation Analysis
- Appendix X Dewatering Permit

Obtain the following forms after they have been completed by the Department and include them in the SWPPP:

- SWPPP Delegation of Signature Authority DOT&PF (25D-107)
- SWPPP Certification for DOT&PF (25D-109)
- SWPPP Delayed Action Item Report (25D-113)

Use the following Department forms for recording information in the SWPPP:

- SWPPP Amendment Log (25D-114) .
- SWPPP Certification for Contractor (25D-111)
- SWPPP Construction Site Inspection Report (25D-100)
- SWPPP Corrective Action Log (25D-112) .
- SWPPP Daily Record of Rainfall (25D-115)
- SWPPP Delegation of Signature Authority Contractor (25D-108)
- SWPPP Grading and Stabilization Activities Log (25D-110)
- SWPPP Pre-Construction Site Visit (25D-106)
- SWPPP Project Staff Tracking (25D-127)
- . SWPPP Subcontractor Certification (25D-105)
- SWPPP Training Log (25D-125)

SWPPP Forms are 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.

3. SWPPP Considerations and Contents.

The SWPPP must provide erosion and sediment control measures for all Construction Activity within the Project Zone. Support Activities outside the Project Zone must have permit coverage, using separate SWPPP2s, and separate Contractor Inspections.

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.

For work outside the Project Zone the SWPPP must identify the entity that has stormwater permit coverage, the operator, and the areas that are:

- Dedicated to the Project and where the Department is not an operator; and
- b. Not dedicated to the project, but used for the project.

Develop the SWPPP according to the requirements of the CGP and this specification, and account for the Contractor's construction methods and phasing.
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 all temporary and permanent stabilization measures. Describe the design, placement, installation, and maintenance of each BMP, using words and drawings as appropriate. Provide a citation to the BMP Manual or publication used as a source for the BMP, including the title of the BMP Manual or publication, the author (individual or agency), and date of publication. 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."

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.

Identify in the SWPPP whether Inspections are conducted:

- a. Areas where the mean annual precipitation is between 14 and 40 inches: once every seven (7) davs:
- b. Areas where the mean annual precipitation is 40 inches or greater: once every seven (7) days, and twice every seven days during periods of relatively continuous precipitation or sequential storm events.

Linear Project Inspections, as per CGP 6.5, are prohibited unless permitted by the Project Engineer.

The SWPPP must cite and incorporate applicable requirements of the Project permits, environmental commitments, and commitments related to historic preservation. Make additional consultations or obtain permits as necessary for Contractor specific activities which were not included in the Department's permitting and consultation.

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 Consent Decree, CGP and this specification. See Subsection 157-3.3 for more information.

4. Recording Personnel and Contact Information in the SWPPP.

Include in the SWPPP, Records of the AK-CESCL cards or certificates for the Superintendent and SWPPP Manager/Storm Water Lead, 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, Records of the AK-CESCL cards or certificates of storm water inspectors, and ATS operators. Record their beginning and ending dates.

The Department will provide Records of AK-CESCL cards or certificates for the Project Engineer and the Stormwater Inspectors, and names and dates they are acting in that position. Include the Department's Records in the SWPPP.

157-2.2 HAZARDOUS MATERIAL CONTROL PLAN (HMCP) REQUIREMENTS. Prepare the HMCP 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.

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.

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.

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, and under equipment during maintenance or repairs.

Use secondary containment under all stationary equipment (equipment that does not have a seat for driving) that contains petroleum products. Use secondary containment under pumps, compressors, and generators.

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.

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 of spills or contaminated surfaces must be initiated immediately and completed as soon as practicable.

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.

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.

157-2.3 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
- Total above ground storage capacity for oil and any petroleum products is greater than 1,320 b. 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.

157-2.4 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 and the Consent Decree, except the NOI and NOT. The Superintendent may not delegate the task or responsibility of signing and certifying the SWPPP submitted under Subsection 157-1.3, paragraph 1, Inspection Reports, and other reports required by the CGP and the Consent Decree.

The Superintendent may assign certain duties to the SWPPP Manager; those duties may include:

- 1. Ensuring Contractor's and subcontractor's compliance with the SWPPP and CGP;
- 2. Ensuring the control of erosion, sedimentation, or discharge of pollutants;
- 3. Directing and overseeing installation, maintenance, and removal of BMPs;
- 4. Performing Inspections; and
- 5. Updating the SWPPP including adding amendments and forms.

The SWPPP Manager has authority to work in the following positions named in the CGP, Appendix C, Qualified Person: Storm Water Lead (CGP position equivalent to SWPPP Manager), and Storm Water Inspector. The SWPPP Manager has authority to work in all the position of ATS Operator if they meet the knowledge and experience gualifications listed in Subsection 157-1.4.

The Superintendent and SWPPP Manager shall be knowledgeable in the requirements of this Section P-157, 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.

157-2.5 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.

- Use the temporary seed mixture as specified in Section T-901, or use annual rye grass if no • temporary seed mix is specified.
- Use soil stabilization material as specified in Section T-908. •
- Use silt fences as specified in Section P-680.
- Use straw that is certified as free of noxious weed by the United States Department of Agriculture, Natural Resources Conservation Service, Local Soil and Water Conservative District. Alaska Weed Free Forage Certification Program must be used when available. Hay may not be substituted for straw.
- Use Oregon Scientific RGR126 wireless rain gauge with temperature, or Taylor 2751 Digital Wireless Rain Gauge with Thermometer, or approved equivalent.

157-2.6 CONTRACTOR REQUIREMENTS. The Contractor must be familiar with the requirements of the CGP because Contractor's employees will be conducting duties that relate to compliance with the CGP.

157-3.1 CONSTRUCTION REQUIREMENTS. Comply with the SWPPP and CGP requirements.

- 1. Before Construction Activity may Begin.
 - a. Confirm the following:
 - 1) The SWPPP Preparer must visit the Project, the visit must be documented in the SWPPP, and the SWPPP must be developed (or amended) with findings from the visit;
 - 2) The SWPPP must be approved by the Engineer;

- 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; and
- 5) The Department approved SWPPP must be submitted to ADEC and Local Government (when required).
- b. Post notices containing the following information:
 - 1) Copy of all eNOIs related to this project;
 - 2) Name and 24 hour phone number of SWPPP Manager; and
 - 3) 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 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, for instance if the location of the SWPPP or contact person changes during the winter.

- c. Install an outdoor rain gauge per manufacturer's guidance, in a accessible location on the Project.
- d. Delineate the site for both land disturbing activities and areas that will be left undisturbed. Install sediment controls and other BMPs that must be placed prior to the initiation of Construction Activity.

The CGP Part 4.10.2 allows winter construction of ice roads or the placement of sand or gravel on frozen tundra with no excavation or potential to pollute waters of the U.S., without submitting an eNOI. The Contractor is responsible for resulting erosion or sediment runoff during spring thaw and summer. The CGP Part 4.10.3 allows cutting of trees and brush while the ground is frozen, without disturbing the vegetative mat, prior to submitting an eNOI.

2. During Construction.

Make copies of the applicable portions of the SWPPP available to subcontractors and utility companies before they begin soil disturbing activities. Inform subcontractors and utility companies of amendments that affect them in a timely manner. Ensure all subcontractors who engage in soildisturbing activities understand and comply with the SWPPP and the CGP, and have signed a SWPPP Subcontractor Certification. Form 25D-105, before they conduct the activity. Include SWPPP Subcontractor Certifications as an appendix to the SWPPP. Provide SWPPP information to utility companies. Coordinate with subcontractors and utility companies doing work in the Project Zone so that BMPs, including temporary and permanent 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. Training must be given at a frequency that will be adequate to ensure proper implementation and protection of control measures. 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 Subsection GCP-70-11 Protection and Restoration of Property and Landscape. Do not install concrete washout containment within 100 feet of wetlands and/or other water bodies.

Fuel in designated areas. Place absorbent pads or other suitable containment under fill ports while fueling, and under equipment during maintenance or repairs. Install secondary containment under all stationary equipment that contains petroleum products.

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 157-2.1, paragraph 3, SWPPP Considerations and Contents)

3. Pollutant and Hazardous Materials Reporting Requirements.

If there has been an incident of non-compliance with the CGP that may endanger health or the environment, immediately report the incident to ADEC according to the CGP, Appendix A, Part 3.0. Notify the Engineer immediately and to the extent possible coordinate reports to ADEC with the Engineer. The report must include:

- A description of the noncompliance and its causes; •
- The exact dates and times of noncompliance ;
- If not yet corrected the anticipated time the project will be brought back into compliance; and •
- The corrective actions taken, or planned, to reduce, eliminate and prevent reoccurrence.

Report spills of petroleum products or other hazardous materials to the Engineer and other agencies as required by law. Use the HMCP and SPCC Plan (if available) for contact information to report spills to regulatory agencies. See CGP Part 4.8.

4. Corrective Action and Maintenance of BMPs.

- a. Implement corrective action:
 - 1) If an incident of non-compliance with the SWPPP, or CGP is identified;
 - 2) If an Inspection identifies the SWPPP or any part of the SWPPP is ineffective in preventing erosion, sedimentation or the discharge of pollutants;
 - 3) If the Engineer determines the SWPPP or any part of the SWPPP is ineffective in preventing the erosion, sedimentation, or the discharge of pollutants;
 - 4) If a required BMP was never installed, was installed incorrectly, or not in accordance with the CGP Part 4.0;
 - 5) If any BMP is not operating as intended, or has not been maintained in an effective operation condition, or is unable to effectively perform the intended function;
 - 6) Before sediment or debris fills a BMP to the percentage of design capacity or available storage allowed by the CGP (or manufacturer's specifications or SWPPP requirements. whichever is lower);
 - 7) Whenever there is a change in conditions, design, construction, operation, or maintenance that could result in erosion, sedimentation, or the discharge of pollutants;
 - 8) If a prohibited discharge as specified in CGP Part 4.6 is occurring or will occur; or
 - 9) If there are accumulations and tracking of sediment or other pollutants, in or near any storm water conveyance channels, on roadways or parking lots within and adjacent to the project zone, in the immediate vicinity of control measures, at discharge points or entry points into the storm sewer system, or in other areas within the project zone.
- b. Implement corrective actions so that all of the following time requirements are satisfied:
 - 1) 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:
 - 2) Corrective action is completed before the next storm event;

- 3) Corrective action is completed in time to protect water quality; and
- 4) Corrective action is completed no later than the Complete-by-Date that was entered in an Inspection Report (see Subsection 157-3.3, paragraph 2 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.

Train subcontractors to identify conditions that require corrective action. Subcontractors are required to notify the Contractor within 24 hours of becoming aware of a condition(s) that requires corrective action.

5. Stabilization.

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. As soon as practicable;
- b. As soon as necessary to avoid erosion, sedimentation, or the discharge of pollutants; and
- c. As identified in the SWPPP.

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.

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, non-erodible cover, dust palliatives, or other approved methods.

Temporary or Permanent Seeding.

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 gallon 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.

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.

Apply permanent seed according to Section 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.

Stream Bypass.

When installing a culvert or other drainage structure where stream bypass is not used, install temporary or permanent 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 and permanent 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.

Before deactivating a stream bypass or stream diversion used for construction of a bridge, culvert, or drainage structure, install permanent stabilization:

- 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.
- 6. Ending CGP Coverage and BMP Maintenance.

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 (including at Department furnished material sources, disposal sites, staging areas, equipment areas, etc.); and
- c. Temporary BMPs have been removed.

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 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 30 days of receiving them.

7. Transmit final SWPPP.

Transmit one copy of the final SWPPP, including all amendments and appendices, 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 hard copy.

157-3.2 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 and the Consent Decree. 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, but this will require updating on-site posted notices. 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. 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 Parts 5.10, 6.6 and 9.4.

157-3.3 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, SWPPP Amendment Log, SWPPP Grading and Stabilization Activities Log, and SWPPP Daily Record of Rainfall forms. For active projects update the Records daily.

1. Inspection during Construction.

Conduct Inspections according to the schedule and requirements of the SWPPP and CGP:

- a. Every seven (7) days in areas where the mean annual precipitation is between 15 and 40 inches,
- b. Areas where the mean annual precipitation is 40 inches or greater, once every seven (7) days, and twice every seven days during periods of relatively continuous precipitation or sequential storm events.

Inspections required by the CGP and SWPPP must be performed by the Contractor's SWPPP Manager and the Department's stormwater inspector jointly, unless impracticable. For this paragraph, "impracticable" means when both inspectors must fly to a remote area in the winter or when one inspector is sick or unable to travel to the site due to weather. 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.

2. 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.

Unless otherwise directed by the Engineer, insert a Complete-by-Date for each corrective action listed that is (1) a date that complies with the time requirements listed in Subsection 157-3.1. paragraph 4, or (2) seven days from the date of the Inspection, whichever is sooner. Provide a copy of the completed, unsigned Inspection Report to the Engineer by noon of the day after 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 addendum that addresses only the omitted or erroneous portions of the original Inspection Report. The Superintendent and the Engineer must both sign and certify the addendum.

3. 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.

4. 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.

Inspection frequency during winter work or seasonal suspension of work may be reduced to at least one Inspection every 30 days if approved by the Engineer and the entire site is temporarily stabilized.

The Engineer may waive winter Inspection requirements 14 days after the freeze-up. Inspections must resume inspections 21 days before thawing conditions are expected to result in a discharge, if all the following requirements are met:

- a. Frozen conditions are anticipated to continue for more than one month; and
- b. Soil disturbing or soil stabilizing activities have been suspended.

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.

5. Stabilization before Seasonal Thaw.

Construction Activities within the Project Zone must be stabilized with appropriate BMPs prior to seasonal thaw. Seasonal thaw is the annual (first) recurrence of snow and ice melting after a prolonged period of freezing conditions.

6. 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.

7. Items and Areas to Inspect.

Conduct Inspections of the areas required by the CGP and SWPPP.

8. 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:

- a. 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:
- b. If an Inspection identifies that any portion of the SWPPP is ineffective in preventing erosion, sedimentation, or the discharge of pollutants;
- c. Whenever an Inspection identifies a problem that requires additional or modified BMPs
- d. Whenever a BMP is modified during construction, or a BMP not shown in the original SWPPP is added:
- e. If the Inspection frequency is modified (note beginning and ending dates); or
- f. When there is a change in personnel who are named in the SWPPP, according to Subsection 157-2.1, paragraph 4.

Do not record removal of BMPs as amendments to the SWPPP. See Subsection 157-3.3, paragraph 9 for documenting removal of BMPs.

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 157-2.1, paragraph 3.

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.

9. 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.

10. 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 discovery.

Modification or replacement of a BMP, installation of a new BMP not shown in the original SWPPP, or overdue maintenance (after a sediment trap exceeds 50% of design capacity) is a corrective action and must be documented on the Corrective Action Log. Do not record removal of BMPs on the Corrective Action Log.

After each Inspection Report has been signed and certified, update the corrective action log with the date of inspection and include all proposed corrective actions noted on the Inspection Report. After the corrective action has been accomplished, note the action taken, if a SWPPP amendment was needed, and 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.

11. 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 as an appendix to the SWPPP.

12. 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.

157-3.4 FAILURE TO PERFORM WORK. The Engineer has authority to suspend work and withhold monies, for an incident of non-compliance with the CGP, Consent Decree or SWPPP, that may endanger health or the environment. If the suspension is to protect workers, the public, or the environment 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. 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.

- 1. If the Contractor fails to take the corrective action within the specified time, the Engineer may:
 - Suspend the work until corrective action is completed: a.
 - Withhold monies due the Contractor until corrective action is completed; b.
 - Assess damages or equitable adjustments against the Contract Amount; and C.
 - d. Employ others to perform the corrective action and deduct the cost from the Contract amount.
- 2. Reasons for the Engineer to take action under this section include, but are 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 this Section P-157; or
 - h. Meet requirements of the CGP, SWPPP, or other permits, laws, and regulations related to erosion, sediment, or pollution control.

No additional Contract time or additional compensation will be allowed due to delays caused by the Engineer's suspension of work under this subsection.

157-4.1 METHOD OF MEASUREMENT. Section GCP-90.

157-5.1 BASIS OF PAYMENT. See Subsection 157-3.4 Failure to Perform Work, for additional work and payment requirements.

The total value of this Contract will be adjusted as specified herein. Withholding will be determined by the Department and assessed under Pay Item P-157f SWPPP Price Adjustment, as follows:

TABLE 157-1 BMP VALUES - RESERVED -

TABLE 157-2 EROSION, SEDIMENT AND POLLUTION CONTROL – LIQUIDATED DAMAGES - RESERVED -

- 1. Fines and Penalties: A Price adjustment equal to any penalties and fines levied against the Department by local, state, or federal agencies for pollutant violations, including violations of the CWA and the CGP, except when due to Department negligence. An amount equal to the anticipated penalties and fines for the violation or violations, excluding any due to negligence by the Department, will be withheld until the actual cost of the penalties and fines is known. Anticipated penalties and fines will be determined by the Engineer. The Contractor is also responsible for the payment of penalties and fines levied against the Contractor.
- 2. Failure to perform Inspections: By each 24 hour period, that a required SWPPP inspection is delaved or is not signed, certified, or completed in accordance with the schedule identified in the approved SWPPP a price adjustment of \$750 will be assessed.
- 3. Failure to perform Corrective Action. By each 24 hour period following 24 hours after written notice by the Engineer, per occurrence, a price adjustment of \$750 will be assessed where the Contractor:
 - fails to complete SWPPP administrative requirements as identified in the Contract or the CGP.
 - fails to initiate work required by the SWPPP, or •

fails to initiate corrective action to respond to a deficiency noted during an inspection or by the Engineer.

The same deficiency remaining uncorrected will be considered an additional occurrence for each additional 24 hour period, without requiring additional written notice by the Engineer.

Item P-157a 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 Manager (when not included as a separate pay item under P-157g) 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.

Work required by the HMCP and SPCC Plan including hazardous material storage, containment, removal, cleanup and disposal, are subsidiary to Pay Item P-157a Erosion, Sediment, and Pollution Control Administration.

Item P-157b 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.

Item P-157c 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.

Item P-157d 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. 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.

Item P-157e 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 be by time and materials according to Subsection GCP-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.

Item P-157f SWPPP Price Adjustment. Withholding according to Subsection 157-3.4, equal to any penalties and fines levied against the Department by local, state, or federal agencies for pollutant violations, including violations of the CWA, CGP, and any other Permit, except when due to the Department's sole negligence. The Contractor is also responsible for the payment of any and all penalties and fines levied against the Department or Contractor by entities (including agencies) other than the Department.

The Department will not release performance bonds until penalties and fines, assessed according to Section P-157, are paid to the Department; and all requirements, according to Subsection GCP-30-05, are satisfied.

Item P-157g SWPPP Manager. At the Contract lump sum price for a SWPPP Manager that conforms to this specification. When Item P-157g appears in the Bid Schedule, the SWPPP Manager must be a different person than the superintendent, and must be on-site during construction activity with duties and authority described in Subsection 157-2.4. When Item P-157g does not appear in the Bid Schedule, the SWPPP Manager is subsidiary to Item P-157a.

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 P-157a Erosion, Sediment, and Pollution Control Administration.

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 Section P-157. This work includes but is not limited to:

- a. Dewatering;
- b. Shoring;
- c. Bailing;
- d. Permanent seeding;
- e. Installation and removal of temporary work pads;
- f. Temporary accesses:
- g. Temporary drainage pipes and structures;
- h. Diversion channels;
- i. Settling impoundment; and
- Filtration. j.

Permanent erosion, sediment and pollution control measures will be measured and paid for under other Contract items, when shown on the bid schedule.

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 P-157a Erosion, Sediment, and Pollution Control Administration – per Lump Sum Item P-157b Temporary Erosion, Sediment, and Pollution Control – per Contingent Sum Item P-157c Temporary Erosion, Sediment, and Pollution Control – per Lump Sum Item P-157d Temporary Erosion. Sediment, and Pollution Control Additives - per Contingent Sum Item P-157e Temporary Erosion, Sediment, and Pollution Control by Directive – per Contingent Sum Item P-157f SWPPP Price Adjustment – per Contingent Sum Item P-157g SWPPP Manager – per Lump Sum

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. Do not disable existing power, communications, or remove any part of existing structures until after replacement structures, power, and communication facilities have been installed and accepted. Excavate, load, and haul these items to a suitable disposal site according to applicable Federal and State regulations. Backfill all excavations with approved embankment or excavated materials and compact in accordance with item P-152.

Offer the following items to the Owner (ADOT&PF) for salvage. Any items not accepted claimed by the owner will become property of the Contractor to be disposed of in a manner approved by the Engineer.

- 1. Runway and taxiway lights.
- Runway and taxiway edge markers.
- 3. Threshold markers.
- 4. Airport beacon.
- 5. Snow removal equipment.
- 6. Wind cones.
- 7. Regulator.
- 8. Conduits, cables, junction boxes.

Remove and dispose of the two Snow Removal Equipment Buildings at the existing airport and the sheds shown near the beginning of the airport access road as indicated on the plans.

- 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.
- b. Removed Structures Designated for Salvage. Removed structures designated for salvage remain the property of the State. Move to a location on airport property as directed by the Engineer.

METHOD OF MEASUREMENT

165-3.1 This item will not be measured for payment. The Engineer's acceptance constitutes measurement.

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.

Central Region Spec 5/09 (PDC rev. 3/31/11)

Payment will be made under:

Item P-165a Removal of Structures - per lump sum

ITEM P-170 SOIL TESTING

DESCRIPTION

170-1.1 Characterize and test soils for hydrocarbon fuel and lubricant contamination at the project site. The purpose of the testing is to assure the proper disposal of contaminated materials and to determine what soil will or will not need special handling. Employ an independent environmental consulting firm with Alaska Department of Environmental Conservation (ADEC) approved personnel meeting 18 AAC 78 qualifications to perform work under this item.

REQUIREMENTS

170-2.1 GENERAL. The Engineer will direct implementation of the soil testing work at the existing airport if contaminated soils are encountered. Prior to commencing with soils excavation, submit a field sampling work plan for the soil sampling and testing procedures. Ensure that a qualified environmental consulting firm representative is available to perform work in accordance with ADEC procedures during pavement/concrete removal, soil removal, and stockpiling.

The testing program as outlined requires cooperation between the Contractor and Consultant to achieve the results required by the Airport. If the Consultant deems that there is a safety problem, it will be the right of the Consultant to notify the Contractor of the issue. If corrective actions are not instituted by the Contractor, the Consultant must notify the State for corrective actions and negotiations to take place with the Contractor.

170-2.2 WORK PLAN. Based on the site's historical information prepare a site specific field sampling plan for work to be performed under this item. Submit the plan to the Engineer and ADEC, allowing a minimum of 10 work days for review and approval of the field sampling plan. For planning purposes, classify fuel contaminated materials as:

- **a.** Clean. Diesel range organics (DRO) 0 to 250 parts per million (ppm) or gasoline range organics (GRO) 0 to 300 ppm.
- **b. Contaminated.** DRO greater than 250 ppm or GRO greater than 300 ppm. Further classify DRO contaminated materials as:
 - (1) Warm. Contaminated soil greater than 250 ppm DRO and less than or equal to 12,500 ppm DRO.
 - (2) Hot. Contaminated soil greater than 12,500 ppm DRO.

170-2.3 SOIL TESTING AND DOCUMENTATION PROCEDURES. For areas that are excavated, determine if excavated soil is contaminated with hydrocarbon fuel and/or lubricants and classify the fuel contaminated materials for segregation and disposal as necessary.

Use ADEC approved methods in accordance with the ADEC Underground Storage Tank (UST) Procedures Manual, ADEC Underground Storage Tank Regulations (18 AAC 78), and ADEC Contaminated Site Regulations (18 AAC 75) to perform the following:

- a. Sampling Based on Field Screening Results. For excavated areas, use visual observation and conduct field screening using a photo-ionization detector (PID) or flame-ionization detector (FID) to determine the location of areas that could be contaminated and will require additional screening and sampling.
 - (1) Field Screening. From these areas with suspected contamination, determine sampling locations by field screening at a predetermined frequency for excavated soils and field

screening the bottom of the excavation on a minimum 25-foot by 25-foot grid and the sidewalls at 25-foot intervals half way between the top and bottom of the excavation except that trench excavations for storm drains, fueling systems, utilities, etc. may be field screened at the centerline and both side walls at 25 foot intervals.

- (2) Analytical Sampling and Testing. If soil is to be left in place, collect samples for laboratory analysis from 25% of the field screening locations with the highest reading. Analyze the samples for DRO and GRO/BTEX. Samples can also be analyzed for glycols per the field sampling plan. Collect one duplicate sample for every 10 samples collected. Locate and document all excavation samples by field surveying. Trench soils excavated for storm drains, fueling systems, utilities, etc. may be characterized prior to excavation using borings. Perform borings at 25-foot intervals along the proposed trench centerlines. Return test results to the Engineer within a minimum of 5 days after sampling.
- (3) Storage Pile Sampling and Testing. Store potentially warm or hot soil in 30 to 50 cubic yard segments prior to determination of final disposal. Collect a soil sample from each segment of storage pile soil to be analyzed for DRO. Collect one duplicate sample per every 10 soil samples collected. Additional soil samples can be collected to be analyzed for glycols per the field sampling plan. Return test results to the Engineer within a minimum of 5 days after sampling.

Submit field and laboratory results to ADEC (original hard copy, two copies, and electronic format) and the Engineer (one copy). Brief the Engineer on a daily basis as required. Submit a final project report to include all field and lab results to the ADEC and the Engineer (original in hard copy and electronic format and six copies to ADEC, one copy to the Engineer).

170-2.4 TRENCH PLUGS. Where required to inhibit fuel contamination migration, provide minimum 4-foot vertical trench plugs, extending 2 feet below and 2 feet above the utility installation, and bentonite/sand ratio of 20% bentonite to 80% sand by weight. Comply with the following material requirements:

- a. Bentonite. Pulverized, 55 lbs/ft³, 75% 90% passing 75 micro-meter sieve, supplied in bags clearly marked to show weight, grade, and supplier.
- b. Sand. Meet ASTM C 144 Mason Sand.

170-2.5 DISPOSITION OF SOILS.

- a. Clean Soils. Clean soils meeting material requirements may be re-used in the project. Move any excess clean soils without organics to the disposal area shown in the Plans. Move excess clean soils with organics to an off-airport disposal site in accordance with P-152.
- b. Hot Soils. Haul soil classified as hot to Alaska Soil Recycling facility located at 2301 Spar Avenue, Anchorage for thermal remediation. As an alternative, the Engineer may direct hot soil to be stockpiled in accordance with item P-171. When hot soil is identified, immediately contact the ANC Environmental manager through the Engineer. Prior to and after delivery of contaminated soils to the thermal remediation facility, weigh haul vehicles at Carlile Enterprises, 1813 E 1st Avenue, Anchorage. Present a certified invoice to the Engineer and a copy to the ANC Environmental manager. Coordinate delivery of contaminated soils with the remediation facility prior to the haul. The remediation facility will not accept soil without ANC Environmental and ADEC's approval. Coordinate with remediation and weigh facilities to determine limitations on the type of haul vehicle and comply with any limitations.
- c. Warm Soils. Segregate and store warm contaminated soil removed from the excavations separate from other project storage piles. Transport soil classified as contaminated warm directly to the landspreading area at the direction of the Engineer, unless re-used in accordance with ADEC screening and analytical sampling requirements.

170-2.6 LANDSPREADING AND TEMPORARY CONTAMINATED SOIL STOCKPILE AREAS. Determine dimensions for temporary stockpiles. Clearly mark, map, and document soil lots within landspreading and temporary stockpile areas. Identify and delineate the stockpile and landspreading areas by field markings that are unaffected by the elements and designed for long term storage. Identify, document, and correlate all field markings to test results in the report document. Estimate and document quantities of material placed in the landspreading and temporary stockpile areas using truck counts.

METHOD OF MEASUREMENT

170-3.1 Subsection 90-05 and measured as specified in the directive authorizing the work.

BASIS OF PAYMENT

170-4.1 As specified in the directive authorizing the work and as follows.

For Soil Testing Program, payment for all labor (including the environmental consultant), equipment, and materials necessary to conduct sampling and testing, the screening of the area to be excavated, field testing and screening of excavated material including laboratory correlation, locating and documenting all excavation samples by field surveying, stockpile marking, mapping, and documentation to correlate soil lots to test results will be made in accordance with subsection 90-05 Compensation For Extra Work On Time And Materials Basis.

For Supplemental Laboratory Test, payment will be made in accordance with subsection 90-05 Compensation for Extra Work On Time and Materials Basis to furnish all labor, equipment, and materials necessary for additional composite or discrete sample tests ordered by the Engineer.

For "Hot" Material Offsite Transportation and Disposal, payment will be made in accordance with subsection 90-05 Compensation for Extra Work On Time and Materials Basis to furnish all labor, equipment, and materials necessary to transport and dispose of contaminated "hot" soil.

Field surveying to locate and document excavation samples will be paid for under the Soil Testing Program pay item. Field surveying to locate and document additional sample tests ordered by the Engineer will be paid for under the Supplemental Laboratory Test pay item.

Payment will be made under:

tem P-170e	Soil Testing Program – per contingent sum
tem P-170f	"Hot" Material Offsite Transportation and Disposal – per contingent sum
tem P-170g	Supplemental Laboratory Test – per contingent sum
tem P-170i	Utility Trench Plugs – per contingent sum

ITEM P-208 AGGREGATE SURFACE COURSE

DESCRIPTION

208-1.1 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

208-2.1 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.

208-2.2 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 WAQTC FOP for AASHTO TP 61 T 335.

If necessary to meet this requirement, or to eliminate an excess of fine, uncrushed particles, the gravel shall be screened before crushing.

208-2.3 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.

208-2.4 GRADATION. The gradation of the uncrushed or crushed material shall meet the requirements of the gradations indicated in Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11.

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

TABLE 1. AGGREGATE GRADATION REQUIREMENTS

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 25 and a plasticity index not more than 6, when tested according to WAQTC FOP for AASHTO T 89 and T 90.

208-2.5 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

208-3.1 (Not Used)

208-3.2 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.

208-3.3 METHODS OF PRODUCTION.

- **a. Plant Mix.** When selected by the Contractor and approved by the Engineer, the material shall be uniformly mixed in an approved plant.
- **b. Travel Plant.** When the use of a traveling plant is approved by the Engineer, the plant shall mix the materials in a single pass. If needed to achieve optimum moisture, water shall be thoroughly mixed with the aggregates during this operation.

If using a windrow-type of travel plant, the windrows shall be placed parallel to the embankment centerline. The windrow volume shall be sufficient to cover exact areas as planned. The windrow contents shall produce a mixture of the required gradation and bonding qualities.

If using a travel plant that mixes previously spread aggregates in-place, the material shall have been spread in such thickness and proportions as may be handled by the machine to develop a course of the thickness of each layer and of the gradation required.

c. Materials of Proper Gradation. Material which meets the requirements for quality, gradation, and consistency, and which contains approximately the proper moisture for compaction, may be placed directly on the grade, without further mixing.

Any minor deficiency or excess of moisture may be corrected by surface watering or by aeration. Some mixing or manipulation may be required immediately preceding compacting to obtain the required moisture content.

208-3.4 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.

The Contractor shall install test strips of aggregate surface course with minimum dimensions of 100 feet by 16 feet by typical section thickness in an area heavily traveled by construction equipment, as approved by the Engineer. The stability and compaction characteristics of the material will be observed. The percentage of material passing the No. 200 sieve will be varied within the limits specified in the gradation in the Special Provisions while the stability and compaction are investigated.

The test strip results will be used to define the final gradation to be placed on the project based on the stability characteristics. Once the optimum percentage of fines passing the No. 200 sieve has been determined, it shall not vary more than ±2% from the optimum. Separate test strips are required for aggregate surface course from each materials source, if more than one source is used.

No aggregate surface course shall be placed on the project, other than in the test strips, until the Engineer has determined which percentage of fines performs most satisfactorily and results in the best stability. Test strip material accepted by the Engineer will be measured for payment.

208-3.5 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 approximately that required to obtain maximum density.

208-3.6 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 WAQTC FOP for AASHTO T99/T 180 or ATM 212. The in-place field density and moisture content will be determined according to WAQTC FOP for AASHTO T 310. If the specified density is not attained, the material shall be reworked and/or recompacted until the specified density is reached.

208-3.7 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.

208-3.8 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.

208-3.9 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.

208-3.10 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

208-4.1 Aggregate Surface Course will be weighed by the ton or measured by the cubic yard in final position according to Subsection GCP-90-02.

BASIS OF PAYMENT

208-5.1 Aggregate Surface Course will be paid for at the contract price, per unit of measurement, accepted in place.

Payment will be made under:

	Item P-208a Crushed Aggregate Sur Item P-208b Uncrushed Aggregate Sur Item P-208c Crushed Aggregate Sur Item P-208d Uncrushed Aggregate S	face Course - per cubic yard Surface Course - per cubic yard face Course - per ton Surface Course - per ton
	TESTIN	IG 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
İ	ATM 212	The Standard Density of Coarse Granular Materials Using the Vibratory Compactor
	ATM 309	Relative Standard of Density of Soils by the Control Strip Method
	ATM 313	The Degradation Value of Aggregates
	WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
	WAQTC FOP for AASHTO T 89	Liquid Limit of Soils
	WAQTC FOP for AASHTO T 90	Plastic Limit and Plasticity Index of Soils
	WAQTC FOP for AASHTO T 99/T 180	Moisture-Density Relations of Soils
	WAQTC FOP for AASHTO T 310	In-Place Density and Moisture Content of Soil and Soil- Aggregate by Nuclear Methods
	WAQTC FOP for AASHTO-TP-61_T 335	Percentage of Fracture in Coarse Aggregate

ITEM P-610 STRUCTURAL PORTLAND CEMENT CONCRETE

DESCRIPTION

610-1.1 This item shall consist of plain or reinforced structural portland cement concrete, prepared and constructed according to these Specifications, at the locations and of the form and dimensions shown on the Plans.

MATERIALS

610-2.1 GENERAL. Only approved materials, conforming to the requirements of these Specifications, shall be used in the work. They may be subjected to inspection and tests at any time during the progress of their preparation or use. The source of supply of each of the materials shall be approved by the Engineer before delivery or use is started. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be scored and handled to insure the 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 therein.

In no case shall the use of pit-run or naturally mixed aggregates be permitted. Naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregates shall be stored separately and kept clean. The mixing of different kinds of aggregates from different sources in one storage pile or alternating batches of different aggregates will not be permitted.

610-2.2 COARSE AGGREGATE. The coarse aggregate shall meet the requirements of AASHTO M 80. <u>Class B</u>.

Coarse aggregate shall be well graded from coarse to fine, and shall meet AASHTO M 43, Number 57 or 67, when tested according to WAQTC FOP for AASHTO T 27/T 11.

610-2.3 FINE AGGREGATE. The fine aggregate shall meet the requirements of AASHTO M 6, Class A.

The fine aggregate shall be well graded from fine to coarse, and shall meet the requirements of AASHTO M 6, Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11.

Blending will be permitted, if necessary, in order to meet the gradation requirements for fine aggregate. Fine aggregate deficient in the percentage of material passing the No. 50 sieve may be accepted, provided that such deficiency does not exceed 5% and is remedied by the addition of pozzolanic or cementitious materials other than portland cement, as specified in 610-2.6 on admixtures, in sufficient quantity to produce the required workability as approved by the Engineer.

610-2.4 CEMENT. Cement shall conform to the requirements of AASHTO M 85.

The Contractor shall furnish manufacturer's certified test reports for each carload, or equivalent, of cement shipped to the project. The report shall be delivered to the Engineer before permission to use the cement is granted. All such test reports shall be subject to verification by testing sample materials received for use on the project.

610-2.5 WATER. The water used in concrete shall be potable and free from sewage, oil, acid, strong alkalies, vegetable matter, and clay and loam. If the water is of questionable quality, it shall be tested according to AASHTO T 26.

610-2.6 ADMIXTURES. The use of any material added to the concrete mix shall be indicated on the mix design approved by the Engineer. Before approval of any material, the Contractor shall be required to submit

the results of complete physical and chemical analyses made by an acceptable testing laboratory. Subsequent tests shall 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.

Pozzolanic admixtures shall be fly ash or raw or calcined natural pozzolans meeting the requirements of AASHTO M 295.

Air-entraining admixtures shall meet the requirements of AASHTO M 154. Air-entraining admixtures shall be added at the mixer in the amount necessary to produce the specified air content.

Water-reducing, set-controlling admixtures shall meet the requirements of AASHTO M 194, Type A waterreducing, or Type D water-reducing and retarding. Water-reducing admixtures shall be added at the mixer separately from air-entraining admixtures according to the manufacturer's printed instructions.

610-2.7 PREMOLDED JOINT MATERIAL. Premolded joint material for expansion joints shall meet the requirements of AASHTO M 213.

610-2.8 JOINT FILLER. The filler for joints shall meet the requirements of Item P-605.

610-2.9 STEEL REINFORCEMENT. Reinforcing shall consist of Deformed and Plain Billet-Steel Bars conforming to the requirements of AASHTO M 31, Welded Steel Wire Fabric conforming to the requirements of AASHTO M 55, Welded Deformed Steel Fabric conforming to the requirements of AASHTO M 221, or Bar Mats conforming to the requirements of AASHTO M 54, as shown on the Plans.

610-2.10 COVER MATERIALS FOR CURING. Curing materials shall conform to one of the following specifications:

AASHTO M 171	Waterproof Paper for Curing concrete
AASHTO M 171	Polyethylene Sheeting for Curing Concrete
AASHTO M 171	Sheet Materials for Curing Concrete
AASHTO M 148, Type 1 or 2	Liquid Membrane-Forming Compounds for Curing Concrete

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 herein. All machinery and equipment owned or controlled by the Contractor, which they propose to use on the work, shall be of sufficient size to meet the requirements of the work, and shall be such as to produce satisfactory work; all work shall be subject to the inspection and approval of the Engineer.

610-3.2 CONCRETE COMPOSITION. The concrete shall develop a minimum compressive strength of 3,600 psi in 28 days as determined by test cylinders made according to WAQTC FOP for AASHTO T 23 and tested according to AASHTO T 22. The concrete shall contain not less than 564 pounds of cement per cubic yard. The concrete shall contain 5% of entrained air, plus or minus 1%, as determined by WAQTC FOP for AASHTO T 152 and shall have a slump of not more than 4 inches as determined by WAQTC FOP for AASHTO T 119.

610-3.3 ACCEPTANCE SAMPLING AND TESTING. Concrete for each structure will be accepted on the basis of the compressive strength specified in Subsection 610-3.2. The concrete will be sampled according to WAQTC TM 2. Compressive strength specimens will be made according to WAQTC FOP for AASHTO T 23 and tested according to AASHTO T 22.

The Engineer will make the actual tests on the specimens at no expense to the Contractor.

610-3.4 PROPORTIONING AND MEASURING DEVICES. When package cement is used, the quantity for each batch shall be equal to one or more whole sacks of cement. The aggregates shall be measured separately by weight. If aggregates are delivered to the mixer in batch trucks, the exact amount for each mixer charge shall be contained in each batch compartment. Weighing boxes or hoppers shall be approved by the Engineer and shall provide means of regulating the flow of aggregates into the batch box so that the required and exact weight of aggregates can be readily obtained.

610-3.5 CONSISTENCY. The consistency of the concrete shall be checked by the slump test specified in WAQTC FOP for AASHTO T 119.

610-3.6 MIXING. Concrete may be mixed at the construction site, at a central point, or in truck mixers. The concrete shall be mixed and delivered according to the requirements of AASHTO M 157.

610-3.7 MIXING CONDITIONS. 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 permission of the Engineer. If permission 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 their expense.

Retempering of concrete by adding water or any other material shall not be permitted.

The delivery of concrete to the job shall be in such a manner that batches of concrete will be deposited at uninterrupted intervals.

610-3.8 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 designed 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 Contractor shall bear responsibility for their adequacy. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes.

The internal ties shall be arranged so that, when the forms are removed, no metal will show in the concrete surface or discolor the surface when exposed to weathering. All forms shall be wetted with water or with a nonstaining mineral oil which shall be applied shortly before the concrete is placed. Forms shall be constructed so that they can be removed without injuring the concrete or concrete surface. The forms shall not be removed before the expiration of at least 30 hours from vertical faces, walls, slender columns, and similar structures; forms supported by falsework under slabs, beams, girders, arches, and similar construction shall not be removed until tests indicate that at least 80% of the design strength of the concrete has developed.

610-3.9 PLACING REINFORCEMENT. All reinforcement shall be accurately placed, as shown on the Plans, and shall be firmly held in position during concreting. 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.

610-3.10 EMBEDDED ITEMS. Before placing concrete, any items that are to be embedded shall be firmly and securely fastened in place as indicated. All such items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The embedding of wood shall be avoided. The concrete shall be spaded and consolidated around and against embedded items.

610-3.11 PLACING CONCRETE. All concrete shall be placed during daylight, unless otherwise approved. The concrete shall not be placed until the depth and character of foundation, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved. Concrete shall be placed as soon as practical after mixing and in no case later than 1 hour after water has been added to the mix. The method and manner of placing shall be such to avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. Dropping the concrete a distance of more than 5 feet, or depositing a large quantity at one point, will not be permitted. Concrete shall be placed upon clean, damp surfaces, free from running water, or upon properly consolidated soil.

The concrete shall be compacted with suitable mechanical vibrators operating within the concrete. When necessary, vibrating shall be supplemented by hand spading with suitable tools to assure proper and adequate compaction. Vibrators shall be manipulated so as to work the concrete thoroughly around the reinforcement and embedded fixtures and into corners and angles of the forms. The vibration at any joint shall be of sufficient duration to accomplish compaction but shall not be prolonged to the point where segregation occurs. Concrete deposited under water shall be carefully placed in a compact mass in its final position by means of a tremie, a closed bottom dump bucket, or other approved method and shall not be disturbed after being deposited.

610-3.12 CONSTRUCTION JOINTS. When the placing of concrete is suspended, necessary provisions shall be made for joining future work before the placed concrete takes its initial set. For the proper bonding of old and new concrete, such provisions shall be made for grooves, steps, keys, dovetails, reinforcing bars or other devices as may be prescribed. The work shall be arranged so that a section begun on any day shall be finished during daylight of the same day. Before depositing new concrete on or against concrete which has hardened, the surface of the hardened concrete shall be cleaned by a heavy steel broom, roughened slightly, wetted, and covered with a neat coating of cement paste or grout.

610-3.13 EXPANSION JOINTS. Expansion joints shall be constructed at such points and of such dimensions as may be indicated on the drawings. The premolded filler shall be cut to the same shape as that of the surfaces being joined. The filler shall be fixed firmly against the surface of the concrete already in place in such manner that it will not be displaced when concrete is deposited against it.

610-3.14 DEFECTIVE WORK. Any defective work disclosed after the forms have been removed shall be immediately removed and replaced. If any dimensions are deficient, or if the surface of the concrete is bulged, uneven, or shows honeycomb, which in the opinion of the Engineer cannot be repaired satisfactorily, the entire section shall be removed and replaced at the expense of the Contractor.

610-3.15 SURFACE FINISH. All exposed concrete surfaces shall be true, smooth, free from open or rough spaces, depressions, or projections. The concrete in horizontal plane surfaces shall be brought flush with the finished top surface at the proper elevation and shall be struck-off with a straightedge and floated. Mortar finishing shall not be permitted, nor shall dry cement or sand-cement mortar be spread over the concrete during the finishing of horizontal plane surfaces.

When directed, the surface finish of exposed concrete shall be a rubbed finish. If forms can be removed while the concrete is still green, the surface shall be pointed and wetted and then rubbed with a wooden float until all irregularities are removed. If the concrete has hardened before being rubbed, a carborundum stone shall be used to finish the surface. When approved, the finishing can be done with a rubbing machine.

610-3.16 CURING AND PROTECTION. All concrete shall be properly cured and protected by the Contractor. The work shall be protected from the elements, flowing water, and from defacement of any nature during the building operations. The concrete shall be cured as soon as it has sufficiently hardened by covering with an approved material. Water-absorptive coverings shall be thoroughly saturated when placed and kept saturated for a period of at least 3 days for Type III Portland Cement and at least 7 days for Type I or Type II Portland Cement Concrete. All curing mats or blankets shall be sufficiently weighted or tied down to keep the concrete surface covered and to prevent the surface from being exposed to currents of air. Where wooden forms are used, they shall be kept wet at all times until removed to prevent the opening of joints and drying out of the concrete. Traffic shall not be allowed on concrete surfaces for 7 days after the concrete has been placed.

610-3.17 DRAINS OR DUCTS. Drainage pipes, conduits, and ducts that are to be encased in concrete shall be installed by the Contractor before the concrete is placed. The pipe shall be held rigidly so that it will not be displaced or moved during the placing of the concrete.

610-3.18 COLD WEATHER PROTECTION. When concrete is placed at temperatures below 40 °F, the Contractor shall provide satisfactory methods and means to protect the mix from injury by freezing. The aggregates, or water, or both, shall be heated in order to place the concrete at temperatures between 50 and 100 °F.

610-3.19 FILLING JOINTS. All joints which require filling shall be thoroughly cleaned, and any excess mortar or concrete shall be cut out with proper tools. Joint filling shall not be started until after final curing and shall be done only when the concrete is completely dry. The cleaning and filling shall be carefully done with proper equipment and in a manner to obtain a neat looking joint free from excess filler.

METHOD OF MEASUREMENT

610-4.1 Portland cement concrete will be measured by the number of cubic yards of concrete complete in place and accepted. In computing the volume of concrete for payment, the dimensions used will be those shown on the Plans or ordered by the Engineer. No measurements or other allowances will be made for forms, falsework, cofferdams, pumping, bracing, expansion joints, or finishing of the concrete. No deductions will be made for the volumes of reinforcing steel or embedded items. When the pay items shown below are absent from the bid schedule, no measurement for payment will be made.

610-4.2 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.

BASIS OF PAYMENT

610-5.1 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. All work, materials, and equipment required to complete the work will be subsidiary to those items referencing item P-610.

Payment will be made under:

Item P-610a	Structural Portland Cement Concrete - per cubic yard
Item P-610b	Steel Reinforcement - per pound

TESTING REQUIREMENTS

AASHTO T 22

Compressive Strength of Cylindrical Concrete Specimens

AASHTO T 26 Quality of Water to be used in Concrete Tununak Airport **Tununak Airport Relocation** Project 51791/AIP 3-02-0486-001-2012

5/09 (DOT rev. 5/1/09)

WAQTC FOP for AASHTO T 23	Making & Curing Concrete Test Specimens in the Field
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
WAQTC FOP for AASHTO T 119	Slump of Freshly Mixed Concrete
WAQTC FOP for AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method

WAQTC TM 2 Sampling Freshly Mixed Concrete

MATERIAL REQUIREMENTS

- AASHTO M 6 Fine Aggregate for Portland Cement Concrete
- AASHTO M 31 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- AASHTO M 43 Sizes of Aggregate for Road and Bridge Construction
- AASHTO M 54 Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
- AASHTO M 55 Steel Welded Wire Reinforcement, Plain, for Concrete
- AASHTO M 80 Coarse Aggregate for Portland Cement Concrete
- AASHTO M 85 Portland Cement
- AASHTO M 148 Liquid Membrane-Forming Compounds for Curing Concrete
- AASHTO M 154 Air-Entraining Admixtures for Concrete
- AASHTO M 157 Ready-Mixed Concrete
- AASHTO M 171 Sheet Materials for Curing Concrete
- 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 221 Steel Welded Wire Reinforcement, Deformed, for Concrete
- AASHTO M 295 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- AWS D12.1 Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction

ITEM P-640 SEGMENTED CIRCLE

DESCRIPTION

640-1.1 This item consists of furnishing and installing an airport segmented circle, according to the dimensions, design, details, and location shown on the Plans. Construct barrel-type or panel-type, as shown in the bid schedule.

If shown on the Plans, the segmented circle includes landing direction indicator, landing strip indicators, or traffic pattern indicators.

MATERIALS

640-2.1 Barrel-Type.

- **a.** Barrels. Cylindrical, steel, 55-gallon, undamaged, contaminant-free, and rust-free.
- **b.** Primer Paint. Zinc Oxide, raw linseed oil, and alkyd primer, meeting SSPC-Paint 25.
- c. Finish Paint. Aviation Gloss Orange, No. 12197, meeting Federal Standard 595.

640-2.2 Panel-Type.

- **a. Panels.** Sheet aluminum with a reflective covering and meeting the following requirements:
 - (1) Use 0.080 inch thick, alloy 6061-T6, 5052-H36, 5052-H38, or recycled aluminum meeting alloy 3105, as specified in ASTM B 209.
 - (2) Make each panel a continuous sheet for the length and width shown on the Plans. Furnish 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.
 - (3) Treat the aluminum base metal sheets with chromate conversion coating for aluminum conforming to the requirements of ASTM B 449, Class 2. After cleaning and coating operations, protect the panels at all times from contact or exposure to greases, oils, dust or other contaminants.
 - (4) Cover one side of each panel with orange reflective sheeting, meeting the requirements of AASHTO M 268, Type III.
- **b. Stanchions.** Perforated, galvanized, square steel tubing with the dimensions shown on the Plans and meeting the following requirements:
 - (1) Fabricate tube with cold-rolled carbon steel sheets, 12 gage, commercial quality, meeting ASTM A 653, coating designation G 90. Form tubes, roll to size, and weld in the corner.
 - (2) Perforate all members for their entire length with 7/16 inch diameter holes on 1 inch centers.
 - (3) Furnish members that are straight and with a smooth, uniform finish with no splices.
 - (4) Ensure that all perforations and cut off ends are free from burrs.
- c. Hardware and Fasteners. Hardware and fasteners shall meet the following requirements:
 - (1) Gusset and splice plates shall be 1/4-inch thick steel, ASTM A 36, galvanized.
 - (2) Fasteners shall be hot dip galvanized, Grade 2, 3/8-inch diameter bolts; with two 1-inch diameter washers and one nut, each bolt. Provide bolt lengths as required to fasten members.

CONSTRUCTION METHODS

640-3.1 GENERAL. The site may be either on a prepared pad constructed for that purpose under separate item or on natural ground, whichever is shown on the Plans.

If the segmented circle is to be placed on original ground, clear the site of all brush and vegetation to the limits shown on the Plans and level the site.

Use material excavated for installation of barrels or stanchions as backfill. Spread excess material evenly over ground adjacent to the barrels, stanchions, or pad so as to leave the site in a neat condition.

640-3.2 BARREL-TYPE. Clean the outside of each barrel with an approved solvent and paint with 1 coat of primer paint and 2 coats of finish paint.

Cut hole maximum of 6 inches in bottom of barrel. Fill barrel one third with clean sand or gravel. Bury the bottom one third of barrel at the location and in the configuration shown on the Plans.

640-3.3 PANEL-TYPE. Prepare and assemble panels, perforated steel tubes, and hardware as shown in the Plans. Bury stanchions to the depth, at the location, and in the configuration shown on the Plans.

640-4.1 METHOD OF MEASUREMENT. Segmented circle will not be measured for payment.

640-5.1 BASIS OF PAYMENT. Payment will be made at the contract lump sum price shown on the bid schedule. Clearing of the site is paid for under Item P-151. If Item P-151 is not included in the bid schedule, clearing is subsidiary.

Payment will be made under:

Item P-640a Item P-640b	Segmented Circle (Barrel-Type) - per lump sum Segmented Circle (Panel-Type) - per lump sum		
MATERIAL REQUIREMENTS			
AASHTO M 268	Standard Specification for Retroreflective Sheeting		
ASTM A 36	Structural Steel		
ASTM A 653	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc- Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process		
ASTM A 924	Standard Specification for General Requirements for Steel Sheet, Metallic- Coated by the Hot-Dip Process		
ASTM B 209	Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate		
ASTM B 449	Standard Specification for Chromates on Aluminum		
Federal Standard 595	Colors Used in Government Procurement		
SSPC – Paint 25	Specification for Zinc Oxide, Raw Linseed Oil, and Alkyd Primer (Without Lead and Chromate Pigments)		

5/09

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. Anchor assemblies shall have a minimum tensile breaking strength of 6,000 pounds and minimum field pull-out capacity of 3,000 pounds. Provide manufacturer's certification of minimum breaking strength. The Contractor shall field test the installed anchors to the minimum pull-out force and certify that this requirement has been met for each anchor.

Meet the strength and/or capacity requirements of this section for the type of anchor specified.

Each anchor assembly shall include a 1-1/2 inch inside diameter by 3/8 inch lap link connector attached to a 3/8-inch galvanized chain.

When driven toggle or rock anchor tie-downs are 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.

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. Soil anchors shall be Provide Duckbill model 88138-DB1-SSC or Manta Ray model MR-488, as manufactured by Foresight Products, Commerce City, CO, or an approved equal. 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 43 high test hot galvanized steel chain with two 3/8-inch removable coupling links, one at each end of the chain.
- b. Buried Plate. For each anchor, provide a 24-inch square by 1/4-inch hot galvanized steel plate with 5/8-inch hot galvanized drop-forged eyebolt and galvanized flat washer installed through a 5/8-inch hole in the center of the plate. Provide a 3/8-inch grade 43 high test hot galvanized steel chain of sufficient length to extend several links above finish grade. Provide two 3/8-inch removable coupling links, one at each end of the chain with one end connected to the eyebolt. Provide an anchor assembly with a minimum working load capacity of 3,500 pounds.

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. <u>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.</u>

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 in shallow 8-inch diameter by 2-inch deep depressions. If the anchor is set in pavement, the depression shall be sealed with a 1-inch thickness of two-component sealant that meets Section P-606. After the anchor has been installed, attach a chain and trim it to leave only two links above the surface of the sealant. Attach the <u>lap link chain coupling link to the end of the chain</u>.

Field-test installed driven toggle and rock anchor tie-downs to the minimum pull-out force and certify that this requirement has been met for each anchor.

650-3.2 SOIL ANCHOR TIE-DOWNS.

- a. Driven Toggle. Soil anchors shall be driven 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 inches 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.** 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.

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.

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 By each set, consisting of 3 anchors, completed and accepted in final position.

BASIS OF PAYMENT

650-5.1 At the contract price, per set, for each of the pay items shown in the bid schedule.

Payment will be made under:

Item P-650a	Soil Anchor Tie-down, Buried Plate - per set
Item P-650b	Rock Anchor Tie-down - per set
Item P-650c	Temporary Tie-down – per set

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 150/5345-39x, "Specification for L-853. Runway and Taxiway Lighting 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 150/5345-39x. 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 rubber traffic cone, 18 inches in height, orange color. Traffic cone model number 18-AOR, as manufactured by Radiator Specialty Company, P.O. Box 34689, Charlotte, N.C. 28234-6080 or approved equal. Fit each cone with a 7-inch wide band of retro-reflective sheeting centered on the cone. Use pressure sensitive, flexible, high intensity retroreflective sheeting, conforming to AASHTO M 268, Type III-A. Use retroreflective sheeting 3M #3800 or approved equal. 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 150/5345-39x 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 The method of measurement will be by the number of markers or cones furnished and installed of the specified type, at locations approved by the Engineer.

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.

Central Region Spec 5/09

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.

Payment will be made under:

Item P-660aReflective Marker, Type I - per eachItem P-660bReflective Marker, Type II - per eachItem P-660cCone, 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 chromate conversion coating for aluminum to meet ASTM B 449, 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 AASHTO M 268, for the type specified.
- c. Sign Posts. Use the type and size of posts designated on the plans.
 - (1) Perforated Steel Posts.

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.

Perforate all members for their entire length with 7/16-inch diameter holes on 1-inch centers.

Furnish members that are straight and with a smooth, uniform finish, with no splices.

Ensure that all perforations and cut off ends are free from burrs.

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.

Use commercial grade concrete for sign foundations with a minimum 28-day compressive strength of 2,500 psi or an approved, pre-mixed, sacked concrete.
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.

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

TABLE 661-1 DECAL COLORS

Central values and tolerance limits for each color, as referenced in the 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 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 P-661a Standard Sign – per square foot

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 section 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 oz/yd², 70% closed mesh allowing water to flow through. Use 3.0 oz/yd² woven polyester fabric, coated after weaving with 6.0 oz/yd² coating of poly vinyl chloride, color traffic yellow. Minimum tensile strength 230x200 lbs grab method and 200x140 lbs strip method. Meet ASTM D 471 for water absorption, 7 days @160 degrees F, 5.0% maximum weight gain and ASTM D 750 for weathering, 2500 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)
 - (a) 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.

CONSTRUCTION REQUIREMENTS

671-3.1 Meet the following requirements.

a. Vinyl Mesh Panel. Secure by driving anchors into the embankment through all grommets.

Central Region Spec 5/09 (PDC rev. 8/5/10) **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.

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 P-671a	Runway Closure Marker, <u>Snow Fence</u> - per each
Item P-671b	Taxiway Closure Marker, [Type] - 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 surfaces and furnish and place geotextiles for embankment separation and/or stabilization as shown on the Plans.

MATERIALS

681-2.1 Use geotextiles and sewing thread that conform to the following:

- a. Separation. Meet AASHTO M 288 for Separation, except provide a minimum permittivity of 0.05 sec^{-1} .
- b. Stabilization. Meet AASHTO M288 for Stabilization, except provide a minimum permittivity of 0.08 sec^{-1} .

CONSTRUCTION REQUIREMENTS

681-3.1 Surface Preparation. Prepare surface by removal of stumps, brush, boulders, and sharp objects. Fill holes and large ruts with material shown on the Plans or as approved.

681-3.2 Geotextile Placement. Unroll geotextile directly onto the prepared surface. Stretch geotextile to remove any creases or wrinkles. Do not expose geotextiles to the elements for longer than 5 days after removal of protective covering.

a. Separation. Lay geotextile for embankment separation parallel to the embankment centerline. On horizontal curves, place in segment lengths not exceeding those listed in Table 1, with butt ends cut to match and sewn or overlapped. On tangents, straighten the geotextile and sew or overlap butt ends.

b. Stabilization. Lay geotextile for embankment stabilization perpendicular to the embankment centerline. Join segments by sewing or an approved bonding or attachment process.

681-3.3 Joining. Join geotextile for embankment separation by sewing or overlapping. Join geotextile for stabilization by sewing. Use other attachment methods, if approved.

a. Sew seams with a butterfly or j-seam. Use 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- $\frac{1}{4}$ inches (\pm $\frac{1}{4}$ -inch) from the folded edge of the seam and at least 1/2-inch from the free edge of the geotextile.

b. Overlapped sections must overlap a minimum of 3 feet.

Degree of Curve	Maximum Segment Length (ft.)
1	125
2	90
3	75
4	65
5	55
6	50

TABLE 1GEOTEXTILE PLACEMENT ON CURVES

681-3.4 Material Placing and Spreading. During placing and spreading, maintain a minimum depth of 12 inches of cover material at all times between the fabric and the wheels or tracks of the construction equipment.

Spread the material in the direction of the fabric overlap. Maintain proper overlap and fabric 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 spread the cover material simultaneously with dumping to minimize the potential of a localized subgrade failure.

Compact using a smooth drum roller. Do not allow construction equipment to make sudden stops, starts, or turns on the cover material.

681-3.5 Geotextile Repair.

- **a.** Separation. Overlay torn area with geotextile with a minimum 3-foot overlap around the edges of the torn area. Ensure that the patch remains in place when material is placed over the affected area.
- **b. Stabilization.** Sew according to Subsection 681-3.3.

METHOD OF MEASUREMENT

681-4.1 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 at the unit price for the type of material used.

Payment will be made under:

Item P-681a	Geotextile, Separation - per square yard
Item P-681b	Geotextile, Stabilization - per square yard

SECTION P-684 FLOATING SILT CURTAIN

DESCRIPTION

684-1.1 Furnish, place, maintain, and remove temporary floating silt curtain as shown on the Plans for control of sediment and debris.

MATERIALS

684-2.1 GENERAL. Provide a silt curtain of commercial manufacture, with demonstrated ability to trap and hold sediment and debris.

684-2.2 SUBMITTALS AND APPROVAL. Submit for approval of the silt curtain that is proposed for use in the work. Obtain approval prior to shipment to the project site. Provide submittals that include certificates of compliance, manufacturer's printed instructions and/or shop drawings and proposed installation/removal procedures.

684-2.3 CURTAIN FABRIC. For curtains used in standing water, provide pervious geotextile meeting AASHTO M 288 for Temporary Silt Fence or impervious coated fabric such as nylon reinforced polyvinyl chloride, treated polypropylene/polyester fabric or approved equal adhering to the following:

Grab tensile strength	200 lb
(ASTM D4632 or equivalent)	
Maximum apparent opening size	0.008 in
(ASTM D4751 or equivalent)	
UV ³ Resistance	Required
Panel Lengths	100 ft or less (for depths less than 13 ft)

684-2.4 FLOTATION. Provide Flotation consisting of rigid, closed cell expanded polystyrene, ethafoam or polyethylene floats attached to the top of the silt curtain along its entire length. Provide flotation material with protection from mechanical damage and deterioration that would cause pollution. Employ flotation that provides the curtain with a minimum of free board without gaps. Ensure that the buoyancy ratio (weight of displaced fluid to barrier weight) is greater than 3 to 1.

Provide high visibility color fabric cover for the flotation devices with a 1-inch minimum width reflective band attached on the side of the flotation covering along the entire length of the boom. Ensure that the flotation is secured to the boom to prevent shifting or slipping. Provide manufacturer installed grommets or equivalents to reinforce stress points and provide attachment points.

684-2.5 LINES AND ATTACHMENT POINTS. Provide a curtain that incorporates anchor lines, top load lines and bottom load lines, as required, that are minimum ½-inch diameter nylon rope. Provide a curtain with anchor lines, additional ballast, and floats that are attached to the silt curtain at reinforced attachment points provided by the manufacturer.

684-2.6 ANCHOR/BALLAST. Provide anchor and ballast chain of minimum ½-inch diameter galvanized steel with ballast chain sewn into a hem at the bottom of the curtain and secured to the material of the hem to prevent shifting or accidental removal.

CONSTRUCTION REQUIREMENTS

684-3.1 GENERAL. Provide a curtain high enough to extend to the bottom of the water channel plus 10%. Weight the base of the curtain with ballast so that it will remain in continuous contact with the bottom to prevent sediment and silt migration.

Maintain the silt curtain in a basically vertical position. Allow a minimum of 6 inches free board at the top of the curtain for curtain depths less than 6.5 feet and 12 inches free board for curtain depths more than 6.5 feet at all times along its continuous length.

Central Region Spec 5/09 (PDC rev. 3/18/11) **684-3.2 JOINING PANELS/SECTIONS.** For ease of handling and transportation, individual panels/sections may be connected or sewn together in the field. Do not use heat welding methods to join panels. Join the panels in a manner that will prevent silt, sediment, debris or turbidity to migrate from the work area. If joints are sewn together, use heavy duty #350 polyester twine thread to make double row ¼-inch maximum stitches that will not unravel if broken.

684-3.3 CONDITIONS AND TIMING FOR INSTALLATION. Install silt curtain instead of silt fence when fence free board is anticipated to be less than 1-foot or as directed by the Engineer. Install as soon as open water appears in the spring and before the embankment begins to thaw.

684-3.4 ANCHORS. Provide anchors in the size and number required to maintain the curtain in position for proper and continuous operation once deployed. Mark the vertical position of the anchors with crown buoys to warn of their hazard and facilitate easy recovery.

Attach anchor chains between the anchor line and anchor to prevent line fouling, to lower the angle of load pulling on the anchor, and to act as a shock absorber.

Employ anchor line buoys to help prevent line entanglement and stress on the boom.

Equip each anchor with a minimum of 10 feet of anchor chain.

MAINTENANCE

684-4.1 After installation, maintain the floating silt curtain in proper working order until the embankment has 70% vegetative cover. Maintain curtain used to control other areas of the work until sediment in suspension has settled and floating debris has been removed. Removal must be approved by the Engineer. Conduct the removal during periods of calm weather. Remove the curtain carefully to minimize the release of trapped sediment and debris. Do not drag the curtain while in contact with the water channel bottom.

Maintain the integrity of the curtain as long as it is necessary to contain sediment. Inspect daily and correct deficiencies immediately. Remove and dispose of the curtain when adequate vegetative growth insures no further erosion of the slopes.

METHOD OF MEASUREMENT

684-5.1 Section 90. At the water line along the face of the flotation at the contract price per foot. No measurement will be made.

BASIS OF PAYMENT

684-6.1 Payment will be made as follows: 60% for installation. 25% for maintenance and repairs, prorated over the anticipated active construction period with a portion included as part of each interim payment. If the anticipated construction period changes, the remainder for maintenance will be prorated over the new period. 15% for removing it from the site. Floating Silt Curtain will be paid under P-157b, Temporary Erosion, Sediment, and Pollution Control.

Payment will be made under:

Item P-684a Floating Silt Curtain – per linear foot

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 L for work on the building and related systems. Wherever the words "this Contract" are found in the attached specifications, it is understood to denote "this work".

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 L except as specified in subsection 142-6.1. Comply with 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 142-6.1. Submit plans and working drawings in accordance with section 50-02.

TESTING

142-4.1 Perform testing in conformance with the plans and specifications outlined in the building technical specifications in Appendix L except as specified in subsection 142-6.1.

METHOD OF MEASUREMENT

142-5.1 This item will not be measured for payment. The Engineer's acceptance constitutes measurement.

BASIS OF PAYMENT

142-6.1 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 S-142p.

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 S-142p(1) Equipment Storage Building, <u>Heated</u> – per lump sum <u>Item S-142p(2)</u> Equipment Storage Building, <u>Unheated</u> – 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, <u>insulated</u>, aboveground steel tank, <u>rated UL 2085</u>. 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.
- 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-<u>Tank</u> 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 C-332 and ASTM C-495.

When a motor vehicle fuel-dispensing tank is specified, it <u>Tank</u> 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 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.

143-3.2 SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN (SPCC). Provide for Department use after tank installation, an EPA approved SPCC plan for the motor vehicle fuel or heating oil tank, that is certified by a licensed professional engineer. (See http://www.epa.gov/oilspill/lawsregs.htm for SPCC plan requirements).

Comply with 40 CFR 112 and address the following issues in the SPCC Plan:

- a. Operating procedures that prevent oil spills;
- **b.** Control measures installed to prevent a spill from reaching navigable waters; and
- c. Countermeasures to contain, clean up, and mitigate the effects of an oil spill.

The Contractor shall coordinate with the Department to identify oil spill response resources. The SPCC Plan shall take into account the Department's on-site equipment, oil spill containment material, cleanup material, and personnel; and shall make recommendations for future improvements in these areas.

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 S-143a	Heating Fuel Tank <u>, 1,000 Gallons</u> - per each
Item S-143b	Fuel - per lump sum
Item S-143c	Manual Dispensing System – per each
Item S-143d	Electric Dispensing System – per each
Item S-143e	Motor Vehicle Fuel-dispensing Tank <u>, 1,000 Gallons</u> – per each
Item S-143f	Spill Prevention Control and Countermeasure Plan - per lump sum



ITEM S-145 BRIDGE

DESCRIPTION

145-1.1 Furnish all labor, materials and equipment required to construct a new bridge at the location indicated on the plans. Comply with the technical specifications located in Appendix M for work on the bridge and related structures. Wherever the words "this Contract" are found in the attached specifications, it is understood to denote "this work."

This item will construct the new bridge on a new access road.

MATERIALS

145-2.1 Materials required to perform this work are outlined in the technical specifications in Appendix M except as specified in subsection 145-6.1. Comply with section 60-08 for submittals.

CONSTRUCTION REQUIREMENTS

145-3.1 Comply with the plans and specifications outlined in the technical specifications in Appendix M (to be provided by DOT&PF) except as specified in subsection 145-6.1. Submit plans and working drawings in accordance with section 50-02.

TESTING

145-4.1 Perform testing in conformance with the plans and specifications outlined in the building technical specifications in Appendix M except as specified in subsection 145-6.1.

METHOD OF MEASUREMENT

145-5.1 This item will not be measured for payment. The Engineer's acceptance constitutes measurement.

BASIS OF PAYMENT

145-6.1 Payment will be made at the contract lump sum price for construction of the bridge and related structures. This item provides full compensation for this work to include the bridge and abutments.

All required mobilization/demobilization, surveying required for this work, and standard signs are specified and paid for under items G-100, G-135, and P-661.

Earthwork associated with construction of the road, including the area within the bridge footprint, will be specified, measured, and paid for under the appropriate earthwork (P series) bid items. Excavation and backfill of bridge foundation and abutments will be subsidiary to item S-145a.

Payment will be made under:

Item S-145a Bridge – per 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. Furnish the seed mixture listed in the Special Provisions. The seed mixture shall consist of the following:

- 60% Arctared Red Fescue
- 20% Alyeska Polargrass
- 10% Norcoast Bering Hairgrass
- 10% Annual Ryegrass

Meet the applicable requirements of the State of Alaska Seed Regulations, 11 AAC 34, Articles 1 and 4.

Meet or exceed 95% pure seed and 74% germination.

Furnish 4 signed copies of a report for each lot of seed, certifying it has been tested by an approved laboratory within 9 months of date of seed application. Submit these certifications no later than 10 days prior to seeding. Include the following in each certification:

- **a.** name and address of laboratory
- **b.** date of test
- c. lot number
- d. seed name
- e. percent pure seed
- **f.** percent germination
- g. percent weed content
- h. percent inert matter

901-2.2 FERTILIZER. Furnish 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. Spread seed uniformly over the area at a rate of 40 pounds per acre. Fertilize in two applications, one application at the time of seeding and the other 30 to 45 days later. If the second application falls after September 20, fertilize after June 1 the following year. Spread fertilizer uniformly over the seeded area in two equal applications for a total rate of 450 pounds per acre.

Apply seed 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 <u>Add HECP as specified in Item T-908 at the specified rate</u> 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. Promptly 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. <u>Seeding may be deleted</u> by the Engineer in areas where final stabilization has been achieved in accordance with the Construction General Permit through temporary erosion and sediment controls.

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.

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 Engineer's approval.

METHOD OF MEASUREMENT

901-4.1 The work will be measured according to Subsection 90-02, and as follows:

- **a.** Seeding by the acre. By the area of ground surface acceptably <u>prepared</u>, seeded, fertilized, and maintained. Required reseeding is subsidiary.
- **b.** Seeding by the pound. By the weight of seed acceptably placed. <u>Fertilizer, surface preparation,</u> required reseeding, and any other work required are subsidiary. Fertilizer is subsidiary. Any other work required will be measured separately.
- **c.** Water for maintenance. By the M-gal (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 unit price per unit of measure for the pay items listed below that appear on the bid schedule.

Water for hydraulic application of seed mixtures is subsidiary. Water for maintenance is subsidiary except when it is listed in the bid schedule.

Mulching will be measured and paid for under Item T-908.

Payment will be made under:

Item T-901aSeeding - per acreItem T-901bSeeding - per poundItem T-901cWater for Maintenance - per M-gal

ITEM T-905 TOPSOILING

DESCRIPTION

905-1.1 This work consists of furnishing and spreading topsoil where shown on the Plans.

MATERIALS

905-2.1 TOPSOIL. <u>Unclassified excavation will be used as topsoil.</u> Furnish 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.</u>

Meet the grading requirements of Class B in Table 1 for the class of topsoil unless otherwise shown on the Plans:

TABLE 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 Construct slopes to the lines and 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 <u>Trackwalk the slopes prior to placing the topsoil</u> 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. <u>Topsoil placement</u> may be deleted by the Engineer in areas where final stabilization has been achieved in accordance with the Construction General Permit through temporary erosion and sediment controls,

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 overlay 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 <u>No measurement of topsoiling will be made.</u> By the square yard, according to Subsection GCP-90-02, acceptably placed.

BASIS OF PAYMENT

905-5.1 Payment will be made at the contract unit price per square yard. Placement of the unclassified excavation as topsoil is subsidiary to seeding.

Stockpiling and rehandling of topsoil are subsidiary.

Payment will be made under:

Item T-905a Topsoiling - per square yard

ITEM T-908 SOIL STABILIZATION

DESCRIPTION

908-1.1 This work consists of furnishing, placing, and maintaining soil stabilization material where shown on the Plansin all areas to be seeded.

MATERIALS

908-2.1 MULCH. 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. Furnish 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 <u>HECP-1 meeting the material requirements described under "a." above, In addition, provide evidence</u> that the HECP-2 has been shown to be at least 99% effective by testing at any of the following <u>laboratories:</u>
 - (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.

Provide Flexterra FGM as manufactured by Profile Products LLC, Flex Guard as manufactured by Mat, Inc., Earth Guard Fiber Matrix as manufactured by Terra Novo, Inc., or an approved equal. 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 REQUIREMENTS

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 mulch<u>, HECP</u>, or matting and the soil.<u>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 Section 901-3.1.</u>

908-3.2 APPLICATION.

- **a. Mulch and 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. 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 ³/₄ 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, <u>HECP</u>, or matting as required.

Maintain the mulch, <u>HECP</u>, or matting until all work on the project is complete and accepted.

METHOD OF MEASUREMENT

908-4.1 By the square yard, according to Subsection GCP-90-02, acceptably placed. Water, maintenance, and repair are subsidiary.

BASIS OF PAYMENT

908-5.1 At the contract unit price per unit of measure for the pay items listed below that appear on the bid schedule.

Payment will be made under:

Item T-908aMulching - per square yardItem T-908bRolled Matting - per square yardItem T-908nHydraulic Erosion Control Product (HECP) – per square yard

ITEM U-500 ELECTRICAL SYSTEM

DESCRIPTION

500-1.1 Supply and install equipment and materials needed to extend the existing AVEC overhead power line to the new airport snow removal equipment building. Perform work in conformance with the plans, Specifications of Appendix O and AVEC Specifications.

MATERIALS

500-2.1 Obtain approval of all materials or equipment proposed to be used or incorporated in the work prior to shipment to the project site. Submit to the Engineer 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 the Staking Sheets, Specifications of Appendix O, AVEC Specifications and RUS Detail Sheets.

CONSTRUCTION REQUIREMENTS

500-3.1 Comply with the plans and technical specifications of Appendix O and AVEC Standards and Specifications. The local utility companies can be contacted by calling the phone numbers listed in Section 50-06.

Perform all work with gualified personnel licensed for the work involved.

Perform construction work in a thorough and workmanlike manner in accordance with the Staking Sheets, plans and specifications, and the construction drawings.

Installer must be approved by AVEC.

Record exact locations of poles, guys and anchors. Record conductor sag and temperature when conductor was installed.

After installation is complete, test for continuity and faults. Correct any deficiencies. After testing is complete, demonstrate that work conforms with plans, specifications, and staking sheets and is a complete and operable system.

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:

Electrical Line Extension – per lump sum Item U-500b

Appendix A

Erosion and Sediment Control Plan (Not Used)

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

Tununak Airport Relocation

Project 51791/AIP 3-02-0486-001-2012 Erosion and Sediment Control Plan – October 27, 2011

Section 1: Site Evaluation, Assessment, and Planning

1.0 General

The total ground-disturbing activities for this project will impact more than 1 acre. Therefore, authorization to conduct construction activities under the Alaska Pollutant Discharge Elimination System (APDES) Construction General Permit (CGP) must be obtained from the Alaska Department of Environmental Conservation (ADEC).

This Erosion and Sediment Control Plan (ESCP) was developed based on general knowledge of construction sequencing, available materials, and other relevant factors. It contains information about the construction site that the Contractor may use in developing a Storm Water Pollution Prevention Plan (SWPPP) as required by Item P-157, Erosion, Sediment, and Pollution Control. Further information is available in the *Alaska Storm Water Pollution Prevention Guide*, published by the Alaska Department of Transportation and Public Facilities (DOT&PF) and available online at: http://www.dot.state.ak.us/stwddes/desenviron/resources/stormwater.shtml#. Additionally, the U.S. Environmental Protection Agency (EPA) site (http://cfpub.epa.gov/npdes/stormwater/swppp.cfm) provides support and guidance including SWPPP templates, sample inspection forms, and other resource information. This ESCP is formatted to follow the EPA SWPPP template for convenience and consistency in the eventual production of the SWPPP.

The specific plan details are the responsibility of the Contractor to develop based on his execution of the project. Building upon the ESCP, the Contractor's fully developed SWPPP shall provide a more comprehensive and more detailed plan for erosion, sediment, and pollutant control. The SWPPP shall provide details for erosion control and sediment management "systems." Providing "perimeter control" without also providing erosion control is not acceptable. Without fully developed pollutant control management "systems," the Draft SWPPP will be rejected.

Mandatory methods for erosion and sediment control are included in the project specifications. All control measures used must be installed and maintained per the manufacturer's specifications or an equivalent approved by the Engineer. Installation of these devices may be subject to Section 404 of the Clean Water Act. The Contractor shall maintain in good and effective operating condition any temporary erosion and sediment controls and remove them once permanent reclamation is complete. The Contractor shall also repair slopes and seeding until final acceptance is obtained from the Department.

The Contractor shall include revisions and/or additions to this ESCP in the SWPPP.

1.1 Project/Site Information

Project/Site Name:	Tununak Airport Relocation
Project Location:	Tununak, Alaska 99681 Tununak is located in a small bay, on the northwest coast of Nelson Island, 115 miles northwest of Bethel, and 519 miles northwest of Anchorage
County or Similar Subdivision:	Bethel Recording District

1.2 Contact Information/Responsible Parties

[This section is to be completed by the Contractor when the SWPPP is submitted.]

1.3 Nature and Sequence of Construction Activity

The Tununak Airport is expected to be completed in three stages: near-term (0 to 5 years), midterm (6 to 10 years), and ultimate (10 to 20 years). Construction to be completed in this project includes, but is not limited to, the following near term items:

- 3,300-foot primary runway and associated safety areas
- Apron
- Connecting taxiway
- Access road between the community of Tununak and the airport
- Equipment storage buildings
- Power extension to the airport
- Airport lighting
- Bridge to cross the North Fork Tununak River

The function of the construction activity is to relocate the Tununak Airport.

Earthwork is expected to take place in both the summer and winter. Winter work will primarily focus on the placement of frozen embankment for the airport access road, as well as some construction on the runway. Summer construction activities will primarily focus on the placement of unfrozen embankment material to bring the road and airport embankments up to the proposed grade. The Contractor will ultimately decide the specific division of activities between the winter and summer construction seasons. The Contractor will also be responsible for implementing Best Management Practices (BMP's), specific to and appropriate for their phased construction plans, that are adequate to prevent erosion and sedimentation between the winter and summer construction.

1.4 Soils, Slopes, Vegetation, and Current Drainage Patterns

1.4.1 Soil Types

The project area consists of fine-grained soils (mostly silt with a wide range of organic material), overlying coarse-grained soils (sand and gravel), overlying sedimentary bedrock (mudstone and sandstone).

The Ugchirnak Mountain material source (ESCP Plan Sheet 7) is composed of basalt or andesite (volcanic flow rock) at the surface with sedimentary rocks, sandstone, and siltstone underneath. The volcanic rock is the proposed source for surfacing materials for the airport

Appendix A Erosion and Sediment Control Plan Page 2 of 14 (DOT&PF Geotech Report, 03-12-2010). Material from this site was used to construct the communications tower access road. The Environmental Assessment for the airport project states that there are sufficient uplands present at Ugchirnak Mountain to allow material extraction without disturbing wetlands, so impacts to wetlands would be limited to the haul route. When the project is complete, the site will be sloped to drain.

Fresh to slightly weathered sandstone bedrock at the proposed borrow site (Nealruk Ridge), located southeast of the proposed airport site, is suitable for use as embankment fill. According to the March 2010 DOT&PF Geotechnical Recommendations report, mudstone bedrock and highly weathered portions of sandstone bedrock are less suitable for use as embankment-fill source material, and the siltstone material found at this site is very low quality rock that will degrade to silty soil once moved and placed.

1.4.2 Slopes

The embankment slopes for the project vary. The runway, taxiway, apron, and road embankment slopes will be 2:1 (H:V). The airspace terrain obstruction removal slopes will range from 7:1 to flat.

1.4.3 Drainage Patterns

Drainage on the project site generally flows to the west. Drainage from the Ugchirnak Mountain material source typically flows to the south and west. The airport access road crosses the valley of the North Fork of the Tanunak River, which generally flows to the west/northwest except when tidal influence reverses its flow.

1.4.4 Precipitation

Precipitation in Tununak averages 17 inches of rainfall and 28 inches of snowfall each year (Alaska Community Database Community Information Summary). The 5-year, 1-hour storm intensity is 0.45 inches per hour (Probable Maximum Precipitation and Rainfall-Frequency Data for Alaska, John F. Miller). According to the CGP, Appendix A, Tununak is considered semi-arid, because it receives an average annual rainfall of 10 to 20 inches.

1.4.5 Vegetation

Vegetation in the project area is typical of the PSS and PEM wetlands that are prevalent throughout the region, consisting of grasses, sedges, mosses, lichens, dwarf willows, and alders.

1.5 Construction Site Estimates

Ground will be disturbed for the construction of the airport access road, airport embankments, terrain obstruction removals, access road to Ugchirnak Mountain, and material site development. Approximate ground disturbance areas have been estimated at:

- Airport Access Road and Airport Embankments: 43 acres
- Ugchirnak Mountain Access Road:.....12.5 acres
- Airport Borrow Source (Nealruk Ridge):.....54 acres

The Contractor will be responsible for calculating the following:

- Percentage of impervious area before construction
- Runoff coefficient before construction
- Percentage of impervious area after construction
- Runoff coefficient after construction

1.6 Receiving Waters

The main receiving waters for this project are the Tanunak River, the North Fork Tanunak River, wetlands adjacent to the project area, and an unnamed stream that supplies drinking water to the village of Tununak. All of the receiving waters are tributaries to the Tanunak River, which flows into Tanunak Bay on the Bering Sea. Both the Tanunak River and the North Fork Tanunak River are anadromous fish streams and are considered Essential Fish Habitat. The unnamed water supply stream is of particular importance, because the Ugchirnak Mountain material site access road must cross this stream upstream of the drinking water collection point. Particular care will therefore need to be taken to ensure that construction activities and sedimentation do not affect the quality or availability of water to the community.

There are no impaired waters or waters subject to total maximum daily loads (TMDL) within the project area.

A bridge will be constructed to cross the North Fork Tanunak River.

1.7 Site Features and Sensitive Areas to Be Protected

All wetland areas outside the project area that are not permitted for disturbance will be protected. A vegetative buffer strip has been permitted for use as a perimeter control BMP to protect wetlands outside of the project area. Additional BMP's may be implemented as necessary in order to adequately protect the wetlands outside of the project area. As mentioned in Section 1.6, the unnamed stream that is one of the two community water supplies is a sensitive area that must be protected to prevent interference with the village's water supply.

1.8 Potential Sources of Pollution

1.8.1 Solid Waste

All project solid waste shall be properly disposed of in accordance with CGP 3.1.6. No solid materials shall be discharged into the waters of the United States except as authorized by a Section 404 permit. Solid waste may include, but is not limited to, concrete, wood, steel, old culverts, guard rail, creosote timbers, office rubbish, etc.

1.8.2 Concrete Washout

The Contractor is required to control and minimize the potential for discharge of storm water pollutants from washout areas for concrete mixers, paint, stucco, etc. There must be an established and signed concrete washout area and a plan for disposal of all waste. Concrete washout facilities must be sited and maintained to prevent runoff. The Contractor is responsible for proper disposal of the washout waste. This may include evaporating the water or mixing it with sand and disposing of it as solid waste to a permitted facility. Washout waste cannot be disposed of on-site or in a material site; the Contractor may need to backhaul it out or obtain a solid waste disposal permit.

1.8.3 Work Camp

If the Contractor establishes a camp, approvals for on-site sewage and drinking water facilities must be obtained from the ADEC.

1.8.4 Staging Area and Stockpile Area

[The SWPPP shall include additional erosion control measures to cover these areas.]

1.8.5 Vehicle Tracking Exits

When highly erodible soils are exposed and being worked, stabilized exits are required to comply with the permit. [*If there is no need for these stabilized exits, the reasons must be addressed in the SWPPP.*]

1.8.6 Non-Storm Water Discharges

The Contractor may need to use water to control dust and compact the embankments. No runoff is expected from these activities. If the Contractor chooses to dewater during material extraction or culvert installation, he will need to acquire a General Wastewater Disposal Permit for "excavation dewatering" during construction. ADEC manages this permit. The application requires detailed knowledge of specific operations, e.g., method of dewatering, daily flow rates, and rate of pumping, all of which depend upon a Contractor's equipment and mode of operation. Therefore, the Contractor will be the permittee.

1.9 Endangered Species Certification

There are no endangered species in the project area, according to the U.S. Fish and Wildlife Service (USFWS) website (March 17, 2011). The project Environmental Assessment states that consultation with the USFWS and the National Marine Fisheries Service (NMFS) determined that the project is not in an area of potential habitat for either the Steller's eider or spectacled eider, both of which are threatened species.

1.10 Historic Preservation

The Final Environmental Assessment (October 2011) states that no historical, architectural, or cultural resources have been identified in the Area of Potential Effect of the proposed action. The State Historic Preservation Officer concurred with the finding of No Historic Properties Affected on May 19, 2011.

1.11 Applicable Federal, Tribal, State, or Local Programs

A Coastal Project Questionnaire (CPQ) was completed for the project, however the Alaska Coastal Management Program was discontinued on July 1, 2011.

1.12 Maps

Site maps will be developed by the Contractor and included in the SWPPP for compliance with the APDES General Construction Permit. Preliminary site maps are included in the Plans as part of the overall ESCP (ESCP Plan Sheets 1-7).

Section 2: Erosion and Sediment Control BMP's

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

The Contractor will choose which areas to disturb during each phase of construction so as to protect natural features and soil and to minimize the amount of disturbed area at any given time throughout the construction process. The entire project area, with the exception of the Ugchirnak Mountain material site, is delineated wetlands, and the Contractor cannot exceed the area of impact authorized in the wetlands permit.

2.2 Phase Construction Activity

The Contractor shall modify the following sequence as required to accurately reflect his specific means and methods. Erosion, sediment, and pollutant control activities shall be listed and woven into the scheduled sequence of activities. They should be tied to and precede all grading/earth disturbing activities, to include all haul road, stockpile, and staging area development, use, and management for the duration of the project. The final sequence of work will be developed by the Contractor and presented in the Contractor's SWPPP. Final sequencing is dependent on multiple factors, including the Contractor's means and methods, logistics, weather, and timing.

The Contractor is expected to phase work to minimize the amount of time erodible soils are exposed. A general sequence of activities anticipated for this project is:

- Initiate erosion and sediment controls, including:
 - Mark project limits and environmental permit boundaries
 - Install perimeter control BMP's
 - Use other controls as appropriate based on Contractor's phasing plan
- Develop material sites and initiate screening and crushing operations
- Place frozen embankment material as allowed per the construction specifications
 - Stabilize frozen embankment material using BMP's adequate for spring breakup and the subsequent time required for the embankment to thaw prior to placement of remaining thawed embankment fill
- Complete excavation and placement of fill materials to construct facility embankments to proposed grade
- Roughen surfaces and rehabilitate disturbed areas as soon as possible after construction of each phase
- Grade and seed material site(s) and unusable excavation disposal areas
- Remove all temporary erosion and sediment controls except those specifically allowed to remain by approval of the DOT&PF Engineer

The following sections of the plan address the various controls that may be implemented for each of the major construction activities.

Permanent erosion and sediment controls, which will remain in place after project completion, are designed into this project. Permanent structural controls have been included as part of the design, as shown on the drawings and specifications. Surface runoff from the project is designed to flow away from the facility into undeveloped areas.

Temporary controls shall be the responsibility of the Contractor. Areas of particular concern include unvegetated slopes adjacent to wetlands, drainage ditches, the bridge site, and culvert installations.

Construction will require more than one season, and work will be performed year-round depending on conditions. The Contractor shall use BMP's required to accommodate spring runoff. The Contractor shall ensure all project areas are adequately stabilized to conform to EPA and ADEC clean water compliance from all project discharge points throughout spring thaw/breakup. When practicable, erosion and sediment control features adequate to ensure compliance during spring thaw/breakup should be installed prior to the ground freezing. During winter construction, weekly inspections and weekly maintenance (including any modifications needed) shall continue.

As a first choice for erosion and sediment control, the Contractor shall consider staging the project to integrate the controls and the construction schedule and to retain as much of the natural vegetation for as long as possible. Other possible BMP's could include (but are not limited to) one or more of the BMP's from the following sections.

2.3 Control Storm Water Flowing onto and Through the Project

2.3.1 Permanent Erosion Controls

Permanent erosion control BMP's to control storm water flowing onto and through the project could include (but are not limited to) one or more of the following:

- Installing culverts
- Installing culvert velocity dissipaters
- Preserving natural vegetation
- Seeding and re-establishing vegetation
- Lining areas of concentrated flows with rock

2.3.2 Permanent Sediment Controls

Permanent sediment control BMP's to control storm water flowing onto and through the project could include (but are not limited to) one or more of the following:

- Maintaining natural vegetative buffer strips
- Directing drainage to natural infiltration areas
- Minimizing ditch grades

A vegetative buffer strip, extending out from the toe of the proposed embankment, has been permitted (USACE 404) for use as a perimeter control BMP to catch silt and sediment. Site plans shall be developed to ensure existing vegetation is preserved where attainable.

The primary means of erosion control for this project are utilization of low erodible materials and re-vegetation of the embankment slopes. Seeding will be used as a permanent erosion control measure; utilizing slopes that have been roughened and seeded will minimize erosion. Seeding of the disturbed areas as soon as possible after construction will help to reestablish the vegetation, reduce the volume and velocity of runoff, and control the erosive action of storm runoff.

2.3.3 Temporary Erosion Controls

Temporary erosion BMP's to control storm water flowing onto and through the project could include (but are not limited to) one or more of the following:

- Rolled erosion control products (RECP)
- Snow removal prior to spring breakup
- Temporary seeding
- Snow berms
- Brow berms
- Fiber-filled tubes
- Reinforced fiber matrix
- Hydraulic erosion control product (HECP)
- Shoulder berms
- Track walking/surface roughening

Per the CGP, temporary erosion controls will be required at any portion of the project site that the Contractor elects to leave inactive for a period of 14 days or longer. The use of temporary erosion control BMP's will be of particular importance during the transition from winter to summer construction activities. Initial embankment material for the access road and/or runway may be placed frozen and then allowed to thaw before the remaining thawed material is placed during the summer. The use of temporary erosion control BMP's will be necessary to prevent erosion while the embankments undergo thawing, provided that construction on the embankments will cease for a period of 14 days or longer. Where stabilization by the 14th day is precluded by snow cover or frozen ground conditions, stabilization measures must be initiated as soon as practicable (CGP 3.1.8.2.1).

Snow removal prior to spring break-up conditions would help prevent excessive meltwaterinduced erosion. Temporary seeding of exposed embankment slopes could be used as a temporary stabilization measure. The Contractor may also elect to use an HECP to protect exposed embankments from erosion. Strong winds occur frequently in Tununak, so if the Contractor wishes to utilize RECP's or other BMP's that are susceptible to wind damage, additional care must be taken to implement them effectively. For example, sand bags may need to be placed on top of any RECP's to prevent wind damage.

The proper use and implementation of BMP's for winter construction is detailed in Sections 2.6 (Winter Construction) and 3.4.5 (Cold Climate Considerations) of ADEC's *Alaska Storm Water Guide*, available at: <u>http://www.dec.state.ak.us/water/wnpspc/stormwater/docs/AKSWGuide.pdf</u>.

2.3.4 Temporary Sediment Controls

Temporary sediment control BMP's to control storm water flowing onto and through the project could include (but are not limited to) one or more of the following:

- Open water sediment controls: fiber-filled tubes (winter) / floating silt curtain (summer)
- Brush bundles
- Sediment trap/pond
- Silt fence or fiber-filled tubes

During the summer, the Contractor shall use floating silt curtain or functional equivalent at any open water areas, in accordance with Specification P-684 and ESCP Plan Sheets 1-7.

2.4 Stabilize Soils

Per the CGP, the Contractor must initiate stabilization measures as soon as practicable, but after no more than 14 days, on all portions of the site where construction activities have temporarily or permanently ceased. Temporary controls made of rock or biodegradable products may be left in place as permanent controls with the authorization of the Engineer.

Possible BMP's to stabilize soils could include (but are not limited to) one or more of the following:

- Hydraulic erosion control product (HECP)
- Seeding with native seed
- Track walking

2.5 Protect Slopes

In accordance with Specification T-908-2.4, the Contractor shall use an HECP, such as Flexterra or an approved equivalent, to stabilize slopes until vegetative cover can become sufficiently established to prevent erosion. Examples of other BMP's to protect slopes could include (but are not limited to) one or more of the following:

- Track walking
- Seeding and fertilizer (temporary or permanent)
- Hydraulic erosion control product (HECP)
- Rolled erosion control products (RECP)
- Tackified mulch

2.6 Protect Storm Drain Inlets

There are no storm drain systems in the project area.

2.7 Establish Perimeter Controls and Sediment Barriers

Perimeter control and sediment barrier BMP's could include (but are not limited to) one or more of the following:

- Silt fence
- Fiber-filled tubes
- Vegetative buffer strips
- Floating silt curtain (summer)

Water may be diverted around the work area with diversion berms of fiber-filled tube, brush, overburden, or functional equivalent as approved by the Engineer.

2.8 Retain Sediment On-Site

BMP's to retain sediment on-site could include (but are not limited to) one or more of the following:

- Temporary sediment trap
- Sediment basin
- Rock check dam

2.9 Establish Stabilized Construction Exits

When highly erodible soils are exposed and being worked on the project, stabilized exits are required to comply with the permit. [*If there is no need for these stabilized exits, the reasons must be addressed in the SWPPP*.]

2.10 Additional BMP's

Additional BMP's will be implemented by the Contractor as necessary to provide adequate erosion and sediment control for the project as a whole. It is expected that the SWPPP will evolve as the project progresses and BMP's will be added if they are deemed necessary. An example of an additional BMP could include the stockpiling and storage of snow in a manner to prevent meltwater-induced erosion during spring breakup.

Section 3: Good Housekeeping BMP's

3.1 Material Handling and Waste Management

Material handling and waste management BMP's could include (but are not limited to) the following:

- Trash receptacles (with lids)
- Temporary sanitary facilities (portable toilets)
- Recycling dumpster
- Disposal of rubbish and construction waste materials
- Keeping the staging area and the project area clean; this includes proper storage and removal of empty boxes, packing materials, garbage, etc.

All project solid waste shall be properly disposed of in accordance with CGP 3.1.6. No solid materials shall be discharged into the waters of the United States except as authorized by a Section 404 permit. Solid waste may include concrete, wood, steel, wiring, light fixtures, old culverts, guard rail, creosote timbers, office rubbish, etc.

While the community of Tununak has a dump site, it does not have an ADEC permit for operations. The Contractor will either need to obtain any necessary ADEC permits for solid waste disposal in Tununak, or plan on removing solid wastes and hauling them to a permitted disposal facility.

3.2 Establish Proper Building Staging Areas

[Material staging areas will be designated by the Contractor.]

Stockpiles of soil must be stabilized and protected from water and wind erosion. The Contractor is required to cover the stockpiles with plastic, use perimeter controls at the base, seed the stockpiles, or use other functional equivalent BMP's as approved by the Engineer.

3.3 Designate Washout Areas

Washout area BMP's may include (but are not limited to) one or more of the following:

- Above-grade washout area
- Fiber-filled tubes (placed between the washout and any wetlands)

The Contractor is required to control and minimize the potential for discharge of storm water pollutants from washout areas for concrete mixers, paint, stucco, etc. There must be an

Tununak Airport Relocation Project 51791 AIP 3-02-0486-001-2012 Appendix A Erosion and Sediment Control Plan Page 10 of 14 established and signed concrete washout area and a plan for disposal of all waste. Concrete washout facilities must be sited and maintained to prevent runoff. The Contractor is responsible for proper disposal of the washout waste. This may include evaporating the water or mixing it with sand and disposing of it as solid waste to a permitted facility. Washout waste cannot be disposed of on-site or in a material site; the Contractor may need to backhaul it out or obtain a solid waste disposal permit.

3.4 Establish Proper Equipment/Vehicle Fueling and Maintenance Practices

Fueling and maintenance areas will be established by the Contractor. BMP's will begin at the start of the project. Proper equipment and vehicle fueling and maintenance BMP's may include (but are not limited to) one or more of the following:

- Secondary containment
- Drip pans
- Spill kits

3.5 Control Equipment/Vehicle Washing

[Vehicle washing at the construction site will be determined by the Contractor, and any BMP's will be implemented as necessary.]

3.6 Spill Prevention and Control Plan

Spill prevention and cleanup of hazardous materials will be in accordance with the Hazardous Material Control Plan (HMCP) provided by the Contractor.

Hazardous material management practices to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff may include (but are not limited to) one or more of the following:

- Store any hazardous materials on site in a neat, orderly manner in the appropriate containers
- Store only enough material required to do the job

Hazardous materials BMP's may include (but are not limited to) the following:

- Hazardous products will be kept stored in a covered area (such as a Conex)
- Products will be kept in original containers unless they cannot be resealed
- Hazardous and toxic materials will be labeled if not kept in the original containers
- Original labels and material safety data sheets will be retained
- Substances will not be mixed with one another unless recommended by the manufacturer
- All of a product will be used up before disposing of the container
- Manufacturer's recommendations for proper use will be followed

3.7 Any Additional BMP's

[Additional BMP's will be determined by the Contractor as deemed necessary.]

3.8 Allowable Non-Storm-Water Discharge Management

The Contractor may need to use water to control dust and compact the embankments. If done properly, no runoff is expected from these activities. The Contractor may choose to dewater during material extraction or culvert installation. In this case, he will need to acquire a General Wastewater Disposal Permit for "excavation dewatering" during construction. ADEC manages this permit. The application requires detailed knowledge of specific operations, e.g., method of

Tununak Airport Relocation Project 51791 AIP 3-02-0486-001-2012 Appendix A Erosion and Sediment Control Plan Page 11 of 14 dewatering, daily flow rates, and rate of pumping, all of which depend upon the Contractor's equipment and mode of operation. Therefore, the Contractor will be the permittee.

Section 4: Selecting Post-Construction BMP's

Post-construction storm water control measures are installed during the construction process to control storm water pollution after construction operations have been completed. They will be selected and implemented by the Contractor, subject to the Engineer's Approval. Examples include (but are not limited to) the following:

- Ditch dike
- Vegetative buffer strip
- Seeding with native seed
- Hydraulic erosion control product (HECP); e.g., Flexterra or functional equivalent
- Rolled erosion control products (RECP)
- Culvert inlet/outlet protection/velocity dissipater
- Rock ditch lining
- Culverts

Section 5: Inspections

5.1 Inspections

5.1.1 Inspection Personnel

[This is to be determined by the Contractor.]

5.1.2 Inspection Schedule and Procedures

Areas that are exposed to precipitation will be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion control measures will be maintained by the Contractor.

Inspections must include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors must look for evidence of, or the potential for, pollutants leaving the site. Sedimentation and erosion control measures must be observed to ensure proper operation. Discharge locations must be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.

The SWPPP manager will inspect at least once every 7 days and within 24 hours of the end of a storm event of 1/2 inch of rainfall or greater in a 24-hour period (as recorded on the project site). Preconstruction and monthly inspections will be made by **[appointed by the Contractor]**.

An inspector should look for the following when inspecting a pollution prevention measure:

- Visually monitor for water pollution (turbidity)
- Is the measure installed and performing correctly?
- Is there damage to the measure since it was installed?
- What should be done to correct any problems with the measure?

If any area (material site/staging area or project area) is no longer active and is stabilized, then SWPPP Grading and Stabilization Activity Logs will be filled out accordingly and this area will not need additional inspection.

5.2 Delegation of Authority

[Delegation of Authority will be determined by the Contractor.]

5.3 Corrective Action Log

Temporary measures will be maintained until permanent features are in place. They will be observed throughout construction, and corrective action will take place when deficiencies are noted and they will be recorded in the SWPPP Corrective Action Logs. When permanent measures are in place and temporary measures are no longer required, they will be removed.

Section 6: Record Keeping and Training

6.1 Record Keeping

Records will be retained for a minimum period of at least 3 years after the permit is terminated. [*This section of the SWPPP will detail the Contractor's methods for recording and retaining pertinent information regarding the timing of construction activities and stabilization measures.*]

6.2 Log of Changes to the SWPPP

[The Contractor will update this section of the project SWPPP as needed during the construction process.]

6.3 Training

[Implementation of training will be developed by the Contractor as applicable to the project SWPPP.]

Section 7: Final Stabilization

The Contractor will determine the final stabilization methods for each phase of the construction process, subject to the Engineer's approval. BMP's utilized to establish final stabilization may include (but are not limited to) one or more of the following:

- Permanent seeding with native seed mixture
- Coating slopes with HECP (particularly 2:1 slopes and material sites; see Specification T-908)
- Ditch dike
- Culvert inlet/outlet protection/velocity dissipater
- Ditch lining
- Culverts
The CGP (pages A-3 and A-4) defines Final Stabilization as:

- 1. All of the soil disturbing activities at the site have been completed and either of the two following are met:
 - A uniform (e.g., evenly distributed, without large bare areas) perennial vegetative cover with a density of 70 percent of the native background vegetative cover area has been established on all unpaved areas and areas not covered by permanent structures, or
 - Equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.
- 2. When background native vegetation will cover less than 100 percent of the ground (e.g., arid areas, beaches), the 70 percent coverage criteria is adjusted as follows: if the native vegetation covers 50 percent of the ground, 70 percent of 50 percent (0.70 X 0.50 = 0.35) would require 35 percent total cover for final stabilization. On a beach with no natural vegetation no stabilization is required.
- 3. In arid and semi-arid areas¹ only, all soil disturbing activities at the site have been completed and both of the following criteria have been met:
 - Temporary erosion control measures (e.g., degradable rolled erosion control product) are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years without active maintenance by the permittee.
 - The temporary erosion control measures are selected, designed, and installed to achieve 70 percent vegetative coverage within three years.

Section 8: Certification and Notification

[This section of the SWPPP is to be completed by the Contractor.]

¹ Note: Tununak receives an average annual rainfall between 10 and 20 inches and thus is considered semi-arid.

Appendix B

Construction Surveying Requirements

State of Alaska Department of Transportation and Public Facilities



Alaska Department of Transportation and Public Facilities

Alaska Construction Surveying Requirements (US Customary Units)

Alaska Construction Surveying Requirements (US Customary Units)

Table of Contents

Description	Page
1. Survey accuracy requirements	1
2. Survey frequency requirements	2
3. Typical section drawing	3
4. Survey point materials requirements	4
5. Typical alignment notes	5
6. Typical clearing notes	6
7. Typical level notes	7
8. Typical slope stake notes	8
9. Typical culvert notes	9
10. Typical culvert camber diagram	10
11. Typical blue or red tops and grade stake notes	11

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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.

	Stationing	HI	Closure	Horizontal Angle	Distance	Grade
				Aligic	center	
					line	
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

Table 1—Survey accuracy requirements (in feet)

* 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

	Tangents	Curves	Interchange ramps	Stake each per plan	See special instructions on sample notes
Additional cross sections	*	*	*		
Bench marks					Х
Blue tops	100	100**	25		Х
Blue tops within 100 feet both sides of railroad track crossings and bridge approaches	25	25	25		X
Bridges				Х	Х
Center line	100	100**	25		
Clearing	100	100**	25		Х
Culverts				Х	Х
Curb and gutter	25	25	25		
Grade stakes	100	100**	50		
Guardrail	25	25	25		
Manholes, catch basins & inlets				Х	
Monuments				Х	
Red tops	100	100**	25		Х
Riprap	50	50	50		
Signs				Х	
Slope stake / cross sections	100	100**	25		X
Under drains and sewers	50	25	25		

Table 2—Survey frequency requirements (in feet)

* 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.
- \checkmark 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	Х	X								
Centerline P.C., P.T., P.O.T.			Х	Х			X *			X*
Centerline reference points			Х	Х			X *			X *
Centerline station				Х				Х		
Clearing						Х				
Culvert stake			Х		Х	Х				
Culvert stake references			Х		Х	Х				
Curb and gutter			Х		Х		Х			
Guardrail								Х		
Major structures			Х	X *	X *	Х	X *			X *
Red tops	Х	X								
Signs						Х				
Slope stake					Х	X				
Slope stake references			Х		Χ	Х				

* 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.
- \checkmark Don't use swing ties for reference points.
- \checkmark 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.

ED WARDS	JONES											
Η	к 8											
			CL.RT.	215'	200'	216'	192'	200'				
1999	EAR			+12'								
AUG. 6,	80°± CL	CALM	CA TCH	203'	188'	204'	180'	188'				
= - SNIE												
CRUB			CA TCH	137'	152'	147'	155'	167'				
IRING &				+12'								
CLEA			CL.LT.	149'	164'	159'	167'	179'				
			STA.	5+50	6+00	6+50	7+00	7+50				

6. Typical level notes

- ✓ Balance back sights and foresights.
- ✓ Establish all benchmarks and take the centerline profile before doing any staking involving elevations.
- \checkmark Don't set benchmarks in utility poles.
- \checkmark 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.

074					45°±, CLE	Į AR				3
57A.	BS+	HI	FS-	ELEV.	WARM CA	LIVI		7		EDWARDS
					WILD 413	15 <i>79</i>	3-2	<u>3–90 </u>	\$	SMITH
<u>IBM #10</u>	17									
6+72				161.309		Nail in	base c	<u>f 12" S</u>	pruce	
							<u>85′10</u>	<u> </u>	6+72	
	<u>3.877</u>	165.186								
6+00			1.95	163.24						
6+25			2.32	162.87						
6+50			2.96	162.23						
			7.0.40	101.010						
1. <i>P</i> .			3.246	161.940						
	1.103	163.043	-							
6+75			2.31	160.73						
				100.10						
/+00			<i>2.56</i>	160.48						
<i>T.P.</i>			2.823	160.220						
	2.332	162.552								
						Nail in	base d	p <i>t 18″</i> :	stump	
TBM #10	p2		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.
- \checkmark 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

- \checkmark 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

- \checkmark Place blue and red tops at each break in typical section and on centerline.
- \checkmark Use blue tops for top of base course.
- \checkmark 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.
- \checkmark Place blue tops at the same interval as slope stakes.
- ✓ Stake all curve transitions.



Appendix C

Materials Sampling and Testing Frequency

State of Alaska Department of Transportation and Public Facilities

Units
Customary
SN
in
Airports
Frequency,
Testing
g &
Samplinç
Materials,
Table IX,

) -	-	-	Ň)
Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Excavation	Acceptance	(5)	Gradation, P.I., Moisture (or visual <mark>description</mark> if organic)	1 per 5,000 C.Y. waste or undesignated waste cut	Number consecutively EX-W-1. No need to test, if waste is designated on plans.
Embankment (4)	Acceptance	(5)	Standard Density Field Density (1)	As required by change in material 1 per 1,500 C.Y. or 1 per 3,000 Tons	Number consecutively B <mark>M</mark> -SD-1 or EX-SD-1 Number consecutively B <mark>M</mark> -D-1 or FX-D-1
			Gradation, P.I., and Deleterious (visual)	1 per 5,000 C.Y. or 1 per 10,000 Tons (4)	Number consecutively B <mark>M</mark> -G-1 or EX-G-1.
	Independent Assurance	(5)	Standard Density (2) Field Density (1) Gradation P1 and	1 per source 1 per 15,000 C.Y. or 1 per 30,000 Tons 1 per 50 000 C Y or	Use numbers that correspond to acceptance samples. Include field test results with sample.
			Deleterious (visual)	1 per 100,000 Tons	
Bedding and Backfill for	Acceptance	(5)	Standard Density	As required by change in material	Use numbers that correspond to acceptance samples. Include field test
Structures		·	Field Density (1)	(3)	results with sample.
(Urainage Items, Ducts, Conduits, etc.)			Gradation, P.I., and Deleterious (visual)	1 per source or <mark>as</mark> required by change in material	
General : Independ the specified test <i>n</i> personnel and equ	lent Assurance (IA) nethod. When DOT8 ipment than was use	Testing may be v kPF Regional Lal ed for the Accept	vaived when Acceptance boratories perform Accept ance Testing.	Testing is performed in DOT ance Testing, they may also	&PF Regional Laboratories accredited in perform the IA Testing if using different
 (1) If material proper den (2) Required w 	is impractical to test sity acceptance forr then Standard Dens	: for field density, m. <mark>IA Testing is n</mark> sitv test is run in t	document quantity and/or lot required when material the field.	area by reporting percent o <mark>(as shown by gradation test</mark>	versize and compactive effort used on a ing) is Too Coarse to Test (TCTT) .
(3) One densit trench (for	ty per structure (pipe pipes, conduits, bur	e, conduit, manho ied cables, etc.)	ole, catch basin, inlet, utilit installed. Perform densitie	y vault, etc.), with a minimur s within 18 inches of the stru	n of one density per 100 lineal feet of ucture or outside diameter of the pipe.

(4) P.I. tests shall be performed on the first five samples at the start of production from any source. If these tests indicate the material to be nonplastic, additional tests need only be performed on the IA samples. The Regional Quality Assurance Engineer (RQE) or Regional Materials Engineer (RME) may reduce the number of tests required if the source is known to have no value for liquid limit and be non-plastic. See the specified test method for minimum sample size. (2)

less frequency up to, but not than 1/10,000 cy or 1/20,000 tons is acceptable subject to the approval of the Quality large unclassified embankments, a field density testing Assurance/Regional Materials Engineer. 6. For

Table IX, Materials,	Sampling & Tes	ting Frequency	for Airports in US Custon	nary Units	Page 2 of 7
Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Subbase Course	Quality	150 lbs.	L.A. Wear, Degradation	1 per source prior to use	Allow minimum of 14 days for testing and transport. Number consecutively Q-SB-1
	Acceptance	(9)	Standard Density	 per source and as required based on changes in material 	Number consecutively SB-SD-1
			Field Density (1)	1 per 1,000 C.Y. or 1 per 2,000 Tons	Number consecutively SB-D-1
			Gradation, LL & P.I., and Deleterious	1 per 2,500 C.Y. or 1 per 5,000 Tons (3)	Number consecutively SB-G-1
	Independent	(9)	Standard Density (2)	1 per source	Use numbers that correspond to
	Assurance		Field Density (1)	1 per 10,000 C.Y. or 1 per 20,000 Tons	acceptance samples. Include field test results with sample.
			Gradation, LL & P.I., and Deleterious	1 per 25,000 C.Y. or 1 per 50,000 Tons	
Aggregate Surface	Quality	150 lbs.	L.A. Wear, Degradation,	1 per source prior to use	Allow minimum of 14 days for testing and
Course and Crushed			Soundness		transport. Number consecutively Q-SC-1 or Q-BC-1
Aggregate Base	Acceptance	(9)	Standard Density	1 per source and as	Number consecutively SC-SD-1 or
Course				required based on changes in material	BC-SD-1
			Field Density	1 per 500 C.Y. or 1 per 1,000 Tons	Number consecutively SC-D-1 or BC-D-1
			Gradation, LL & P.I., SE,	1 per 1,000 C.Y. or 1 per	Number consecutively SC-G-1 or
			Fracture, <mark>Deleterious</mark>	2,000 Tons (3) (4) (5)	BC-G-1
	Independent	(9)	Standard Density (2)	1 per source	Use numbers that correspond to
	Assurance		Field Density	1 per 5,000 C.Y. or 1 per 10 000 Tons	acceptance samples. <mark>Include field test</mark> results with sample.
			Gradation, LL & P.I., SE,	1 per 10,000 C.Y. or	
			Fracture, <mark>Deleterious</mark>	1 per 20,000 Tons	
(1) If material is	impractical to tes	t for field density	', document quantity and/or	area by reporting percent o	versize and compactive effort used on a
proper dens	ity acceptance for	m. <mark>IA testing is r</mark>	not required when material (as shown by gradation testi	ng) is TCTT.
(2) Required wt(3) P.I. tests sha	nen Standard Den all be performed c	sity is run in the on the first five sa	field. amples at the start of produc	tion from any source. If the	se tests indicate the material to be non-

- plastic, additional tests need only be performed on the IA samples. 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. Fracture: If the first ten tests indicate the fracture to be 5% or more above specification, additional tests need only be performed on the IA
 - samples. (4
- SE: If the first five tests indicate the material meets specification for Sand Equivalent (SE), additional tests need only be performed on the IA samples. The SE test is not required for Aggregate Surface Course. (2)
 - See the specified test method for minimum sample size. 9

Table IX, Materials	, Sampling & Te	sting Frequency	for Airports in US Custo	mary Units	Page 3 of 7
Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
<mark>Plant Hot Mix</mark> Asphalt and	Quality	150 lbs. Aggregate	L.A. Wear, Degradation, Soundness	1 per source prior to use	Allow 25 days for testing and transport
Asphalt Treated Base Course	Mix Design	500 lbs. (7) Aqqreqate	Mix Design (1) (2) Sand Equivalent (SE),	<mark>1 per source</mark> and as required by changes in	Allow 15 days or contract specified time for mix design and testing after receiving
		5 one gallon cans of AC	Flat & Elongated (F&E), Fracture	material	contractor's proposed gradation. Contact the Regional Materials Laboratory to see
		1 pint of Anti Strip			if submitting the asphalt cement or anti-strip is necessary.
	Acceptance	(1) (8)	MSG (Maximum Specific Gravity)	<mark>1 per Lot</mark> (1) (9)	From Mix Design for the first lot and then from the first sublot of each additional lot.
			Mat Density ,Gradation, Oil Content. LL & P.I	1 per 500 Ton sublot (3) (4) (5) (9)	Ross Count (AASHTO T 195, Coating Test) as required by RQE or RME.
			Fracture, F&E, SE, Deleterious, Thickness		
			<mark>Joint Density</mark>	<mark>(1) (9)</mark>	Top Lift (1)
	Independent Assurance	(8)	MSG	1 per project minimum	Required when MSG is run in the field.
			Mat Density, Gradation,	1 per 5,000 Tons	Use numbers that correspond to
			Oil Content, LL & P.I., Fracture. F&E. SE		acceptance samples. Include field test Results with sample.
	Information	<mark>30 lbs.</mark>	3-Marshall Biscuits or	1 per Mix Design Minimum (a)	Compare results to Mix Design
Asphalt Cement	Quality	<mark>See Remarks</mark>		1 per each grade and	Manufacturer's certification required
	Acceptance	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
(1) Refer to pro	iject specification	IS.			
(2) Recomment (3) D I tests sh	dations regarding	g anti-strip require	ments must be determined	I for each mix design.	sea tasts indicata tha matarial to ha non-
plastic, addi	tional tests need	l only be performe	d on the IA samples. The F	ROLE OF RME may reduce the	ender of tests required if the source is
known to he (4) Fracture If (<mark>tve no value for l</mark> the first ten tests	iquid limit and be indicate the fracti	non-plastic. Ire to he 5% or more abovi	e sner additional tests need	only he performed on the IA samples
(5) SE: If the fir	st five tests indic	ate the material m	neets specification for Sanc	d Equivalent (SE), additional	tests need only be performed on the IA
samples. (6) Flat and Elo	ngated (F&E) te	sts shall be perfor	med on the first five sample	es from any source. For knov	wn sources, the RQE or RME may waive
this requirer	nent.				
(7) For multiple	stockpiles, prop	ortion each stock of for minimum se	<mark>oile sample</mark> to the proposed mula size	d Job Mix Design blend ratio.	
(9) May not be	applicable to Asp	phalt Treated Bas	e Course. Refer to project	specifications.	

Table IX, Materials Sar	npling & Testin	ig Frequency fo	or Airports in US Customa	ıry Units	Page 4 of 7
Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Liquid Asphalt for: a. Prime Coat b. Tack Coat	Quality	<mark>See Remarks</mark>	Type and Grading	1 per each grade and source prior to use	Manufacturer's certification required
c. Seal Coats d. Asphalt Surface Treatment	Acceptance	1 Gallon in plastic jug	(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 Surface Treatments	Quality	<mark>150 lbs.</mark> Aggregate	L.A. Wear, Soundness, Degradation	1 per source prior to use	Allow 25 days for testing and transport Test for anti-strip if required by RQE or
					RME
	Acceptance	(4)	Gradation, Fracture, Flat & Elongated (F&E), Deleterious (visual)	1 per 500 Tons (2) (3)	May be taken from stockpile or production
	Independent Assurance		Gradation, Fracture, F&E, Deleterious <mark>(visual)</mark>	1 per 5,000 Tons	
Portland Cement Concrete (a) Cement	Quality (a) Cement	(a) Two <mark>1- gallon</mark> cans	<mark>See Remarks</mark>	1 per shipment (5)	Allow 40 days for testing and transport. Manufacturer's certification required.
(b) Water	(b) Water	(b) <u>½ gal. in</u> glass jar	<mark>See remarks</mark>	1 per source	Allow 20 days for testing or potable water accepted by Project Engineer
(c) (CA) Coarse Aggregate	(c) CA	(c) 100 lbs.	<mark>Deleterious Substances</mark> , L.A. Wear, Soundness	1 per source	Allow 25 days for testing and transport
(d) (FA) Fine Aggregate	(d) FA	(d) 25 lbs.	Deleterious Substances, Soundness	1 per source	Allow 25 days for testing and transport
Portland Cement Concrete	Mix Design Submittal	(a) 1 sack (b) None	Mix Design Verification	1 per source prior to use	Manufacturer's certifications and aggregate test reports required.
 (a) Cement (b) Water (c) Coarse Aggregate (d) Fine Aggregate (e) Admixtures 	(1) (6)	(c) 330 lbs. (d) <mark>110 lbs</mark> . (e) 1 qt. each	(0)		For verification of Contractor-furnished mix design, allow <mark>40</mark> days for testing and transport.
 (1) Refer to project (2) Fracture: If the f 	specifications. irst ten tests ind	licate the fracture	e to be 5% or more above s	specification, additional t	ests need only be performed on the IA
(3) Flat and Elonga	ted (F&E) tests	shall be perform	ed on the first five samples	from any source. <mark>For kr</mark>	lown sources, the RQE or RME may waive
 (4) See the specifie (5) Cement stored i (6) When 4x8 cylind 	ed test method fo in silos or bins o <mark>ders are used fo</mark>	or minimum sam ver six months, or r strength data, a	ple size. or in bags over two months, <mark>an average of 4 is required.</mark>	, may require re-testing,	see project specifications.

Table IX, Materials, Sar	npling & Testin	ig Frequency for Airpor	ts in US Customary Units		Page 5 of 7
Material	Type of Sample	Sample Size	Type of Tests	Frequency	Remarks
Concrete Continued:					
Coarse Aggregate	Acceptance	(4)	Gradation, <mark>Deleterious</mark> <mark>(visual)</mark> , Flat & Elongated (6)	1 per 200 C.Y. (6)	Number consecutively CA-G-1
Fine Aggregate	_		Gradation, <mark>Deleterious</mark> <mark>(visual)</mark> , Fineness Modulus	1 per 200 C.Y.	Number consecutively FA-G-1
Mix		As required <mark>by test</mark> method	Slump, % Air, Cement factor, Water/Cement Ratio, <mark>Unit Weight/Yield</mark>	1 per ½ days pour (1) or 1 per 200 C.Y.	(2)
		Cylinders or beams	Compressive strength or Flexural strength (3)	1 per ½ days pour (1) or 1 per 200 C.Y.	Mold two (6x12) or three (4x8) cylinders. Test at 28 days. (2) (5)
	Information	Cylinders or beams	Compressive strength or Flexural strength (3)	As required (e.g. for 7 day break)	Mold two (6x12) or three (4x8) cylinders "As Required" for strength data.
Coarse Aggregate	Independent Assurance	(4)	Gradation, Deleterious, Flat & Elongated (6)	1 per 2,000 C.Y. with minimum of 1	Mold two (6x12) or three (4x8) Cylinders if acceptance cylinders
Fine Aggregate	-		Gradation, Deleterious (visual), Fineness Modulus	per project if over 100 C.Y. is placed	<mark>are not tested in Regional Lab.</mark> Numbers correspond to
Mix		As required by test method	Slump, % Air, Cement factor, Water/Cement Ratio, <mark>Unit Weight</mark>	<mark>1 per 2,000 C.Y.</mark>	acceptance samples. Include field test results with sample.
		Cylinders or beams	Compressive strength or Flexural strength (3)	1 per 2,000 C.Y.	
 Half day's pour (2) Commercial sou as determined b as determined b (3) Only required wt (4) See the specifie (5) Non-structural o (6) Refer to project sources, the RQ 	considered to be irces, which are y the Project En hen strength crit hen strength crit hen concrete r minor concrete specifications. F E or RME may v	6 hours or less. periodically inspected, dc gineer. Placement report eria is included for the ite r minimum sample size. construction, 1 set minir construction, 1 set minir lat and Elongated (F&E) waive this requirement.	o not have to be tested if day s summarizing all minor pour m. num per project is recommer tests shall be performed on	's total quantity of conc rs will be completed. nded. the first five samples fr	rete placement is less than 5 C.Y. om any source. For known

Page 6 of 7	Remarks	Approved by designated authority; reference MCL.	Approved by designated authority; reference MCL.	Project Engineer documentation if on QPL. If not on QPL, manufacturer's certification or sample for testing.	Number consecutively PB-G-1	Allow 15 days for testing and transport	Number consecutively TS-G-1	I submit to the Project Engineer for d to be used for this item. The data shall ations, etc. The above data shall be all also be submitted.	
mary Units	Frequency	1 per pay item or assembly, min.	1 for each type, grade and size in a shipment	1 per type	1 per source or as required by change in material	1 per source prior to use	 1 per 15,000 square yards or 1 per 2,500 cubic vards 	ontract, the contractor shall equipment that is propose orts, manufacturers' certific leviation from the plans sha	chemical properties.
or Airports in US Custon	Type of Tests			(1) See remarks	Gradation and <mark>Deleterious (visual)</mark>	Organic content, Gradation, pH	Gradation	 following award of the c nplete list of material and cuts, diagrams, test rep ght sets. Any proposed c 	rP 60 attion date, physical and ale size.
าg Frequency fo	Sample Size	(1)	(2)	1 Quart for each liquid (see remarks)	(3)	15 lbs.	(3)	Within 30 days approval a corr include catalog submitted in ei	specifications GC t numbers, fabric r minimum samp
ımpling & Testir	Type of Sample	Quality	Quality	Quality	Acceptance	Quality	Acceptance	Quality and Acceptance	Compliance per S ts to include hea ed test method fo
Table IX, Materials, Sá	Material	Misc. Hardware	Concrete Reinforcing Steel	Joint Sealer, Joint Filler, and Curing Materials for Concrete	Porous Backfill	Topsoil		Lighting Equipment	 (1) Certificates of ((2) Mill Test Report (3) See the specifi

e IX, Materials, Sampling & Testing Frequency for Airports in US Customary Units Page 7 of 7	r Quantities	A. Portland Cement Concrete. Concrete for the following items may be accepted on the basis of an approved mix design and placement reports documenting batch information and pour location, time, and quantity. Under this system arrangements should be made for the producer to state on the delivery ticket accompanying each load of concrete, the class of concrete being furnished, the weights of cement, aggregates and water used in the batch, and the time of batching. Use only State-tested aggregates and cement, or supplier certified cement, approved by the RQE, RME, or Statewide Materials Engineer (SME). Each pour must be documented on a Concrete Placement Report.	 Sidewalks - not to exceed 150 square yards per day. Curb and gutter, not to exceed approximately 250 lineal feet per day Slope paving and headers. Paved Ditches and flumes. Manhole bases, Catch Basins, Inlets and Inspection Holes. Small culvert headwalls and Miscellaneous Drainage Structures. Fence Post Footings. Sign Post footings. Cable Markers Electrical Duct encasement and markers Electrical vault. light or signal boxes 	B. Small Quantities of Miscellaneous Materials. The primary documentation of delivery and placement may be the Project Materials Report.	 Aggregates—not to exceed 500 Tons per item per project. Asphalt/Aggregate Mixtures—not to exceed 1,500 Tons per approved mix design. Bituminous Material—not to exceed 85 Tons per project. Paint—not to exceed 20 Gallons per project. Acceptance to be based on weights and analysis on the container label. Masonry Items—Subject to checking of nominal size and visual inspection. Not to exceed 100 pieces. Plain concrete or clay pipe— not to exceed 100 lineal feet. Topsoil—not to exceed 800 square yards.
Table IX, N	Minor Qua	۲ ۲		ю́	

Appendix D

Safety Plan

State of Alaska Department of Transportation and Public Facilities

Tununak Airport Improvements

Project Number 51791

Safety Plan

I. Introduction

The following is the safety plan to be used during construction activity at Tununak Airport.

The purpose of the plan is to present information needed for operation of the airport and construction so that the project can be completed safely with a minimum of disruption to air and ground traffic. The existing airport will remain open during the construction of this project. When the operations of the airport move to this project site, the existing site will be closed. This plan is not intended to contradict specifications; if any discrepancies exist, the specifications govern. Work necessary to meet the requirements of the Safety Plan shall be subsidiary to other items of work. No separate payment will be made.

A new runway, taxiway and apron will be constructed approximately one mile from Tununak along with a connecting airport access road. A lighting system will be installed for the new runway and taxiway. New equipment storage buildings will be constructed to house the snow removal equipment now in use at the existing runway. When the airport construction is complete, the new runway will be opened and the old runway will be closed.

II. Contacts and Notification

A. Chain of Notification

The Engineer will be the central point of contact between the Contractor, Airport Maintenance personnel and the FAA.

B. Issuance of Notices to Airmen (NOTAM's)

The Engineer will issue NOTAM's for the airport. The Engineer, or his designated representative, has authority to issue NOTAM's and shall be the point of contact for required issuances, updates, and cancellations.

C. Radio Frequencies

Refer to the current Alaska Flight Information Supplement for communication frequencies.

III. Construction Activities

A. Scheduling of Work

During construction, the existing Tununak Airport is to remain open. Construction will occur in two stages:

Stage 1 All work required on the new airport facility: Construct the new runway, taxiway, apron, access and maintenance roads, pads, and other new airport features. Install airport lighting, navaids, and equipment storage buildings when earthwork is complete. During this time, the existing runway is to remain open.

Stage 2 Open the new runway to air traffic and close existing runway. Remove, demolish and salvage the existing equipment, buildings, and other improvements defined in the plans and specifications.

The Contractor shall begin work in a timely manner and coordinate with the Project Engineer to provide a smooth transition of airport operations between runways.

B. Haul Routes

Access and haul to the site shall be on the designated haul routes shown on the material site plan. Any changes to this routing outside of airport property shall be coordinated with the Tununak Traditional Council and Tununrmiut Rinit Corportation, and approved by the Engineer prior to use.

C. Location of Flaggers

Flaggers' positions along roadway shall be in accordance with approved TCP as specified in Section G-710.

D. Utility Line Coordination

The Contractor shall request locates from all utilities having facilities in the area. Their telephone numbers are as follows:

Tununak Traditional Council (water, sewer)	(907) 652-6312
AVEC (electricity)	
United Utilities (telephone, internet)	

When the Contractor's operations meet any of the following conditions, the Contractor shall advise the owning utility in writing at least 24 hours in advance of the work.

- 1. Operations anticipated within 10 feet of an overhead electric line.
- 2. Operations anticipated within 3 feet of an underground electrical line according to the location provided by the owning utility.
- 3. Operations requiring the use of equipment capable of coming within 10 feet of an overhead electrical line.

Notice to the utility shall indicate the location and duration of the work to be performed.

All existing utilities are to remain in service. The Contractor shall repair any damage to utilities caused by the Contractor's operations at no cost to the Department. 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.

Power and communication will be provided to the new airport by others. The utility contractor(s) may be working from or on the proposed road or bridge. Coordinate work activities to provide safe working conditions for all workers.

E. Marking and Lighting of Excavations, Open trenches, and Other Hazardous Areas

Open excavations, trenches, and hazardous areas shall be marked with barricades visible at night. Barricades shall be in accordance with Specification GCP-70-09.

IV. Aircraft Operations Areas

A. Restriction of Construction Activity on Aircraft Operation Areas (AOA) and Runway and Taxiway Closures

Construction of the project will require closure of the existing runway, taxiway and apron upon completion of the new airport facility. Coordination between opening the new facility and closing the existing facility will be required. The Contractor may only schedule work within Aircraft Operation Areas upon approval by the Engineer.

B. Setback Lines from Active Runways and Taxiways

The setback for work in the vicinity of an open runway is 200 feet from the centerline; from open taxiways, the setback is 60 feet from the centerline. No equipment may operate within these limits without clearance from the Project Engineer. Construction may occur only with permission of the Engineer and after the proper NOTAM's have been issued.

C. Runway and Taxiway Closure Markings

Permanent Markings

Closed areas will be marked with yellow X's placed at the ends of the closed runway. The X's shall be supplied by the Contractor and constructed as specified or as approved by the Engineer. The Contractor shall maintain the markings to the satisfaction of the Engineer.

Temporary Markings

The proposed runway will be marked as closed once the embankment dimensions are 40'x1,000' or greater. The Contractor shall move and maintain the markers as required to support his operations as specified in Section GCP 80-04.

V. Navaids and Visual Aids

A. FAA Navigational Aids and Associated Critical Areas

No FAA navaids exist at Tununak Airport.

B. Visual Aids

The existing lighting systems, wind cones and other airport improvements shall be removed just after closing the existing runway and salvaged per Specification P-165 and the Plan set.

VI. Security Program

A. Vehicle Access on AOA

Contractor vehicles are only authorized in the areas where contract work is being performed and on the access routes to and from that area. All persons operating vehicles in the Air Operations Area (AOA) shall undergo a briefing by the Project Engineer on standard operating procedures for operating vehicles within the AOA before entering an AOA.

Vehicles that operate within the AOA shall display a flag on a staff attached to the vehicle so that the flag is readily visible from all directions. The flags shall be square, 3 feet on each side (9 square feet), with a checkered pattern of international orange and white squares (each square is 1 square foot) printed on each side.

Appendix E

Permits

State of Alaska Department of Transportation and Public Facilities

Permits (to be included in Final PS&E)

- U.S. Army Corps of Engineers Section 404 permit for fill in wetlands
- ADFG Title 16 Fish Habitat Permit for a bridge over the Tununak River
- ADEC 401 Certificate of Reasonable Assurance for fill in wetlands and Letter of Nonobjection for storm water system changes
- U.S. Coast Guard Individual Bridge Permit.

Permit applications were filed on September 20, 2011, and DOT&PF expects the USACE public notice of the permit application to be published soon.

Appendix F

Traffic Plan (Not Used)

State of Alaska Department of Transportation and Public Facilities

Appendix G

Sign Plan (Not Used)

State of Alaska Department of Transportation and Public Facilities

Appendix H

Mining Plan (Not Used)

State of Alaska Department of Transportation and Public Facilities

Appendix I

Aviation Materials Certification List

State of Alaska Department of Transportation and Public Facilities

	AVIATION	MASTER MA	TERIALS	CERTIFI	CATION	I LIST					
Project Name	Tununak Airport Re	slocation									
Project Number	51791										
Project Engineer Signature											
	Unshaded boxes in If two boxes are not * I hoshaded boxes	dicate who approves the t shaded, either approving under the OPI do not ind	material submittals g authority may be	used. rials are on that	· list They indiv	ata matariale	with notantial f	or heiper on the	ileine energi	tion	
		מוומפו גוופ מרוב מס ווסרווומ	Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment Certification	Engineer	Materials or QA	Design Engineer	Design Engineer	Design Engineer	Products List *	Materials or QA	Remarks	Location e.g.
		Program		Engineer	OT KECOLO	OT KECOLD	OT RECORD	(UPL)	Engineer		Billder #
D-701 STORM DRAINS AND C	ULVERTS										
Pipe											
Corrugated Steel Pipe, 36 & 42 Inch Diam.	D-701-2.2										
Rubber Gaskets	D-701-2.4										
Joint fillers	D-701-2.6										
Plastic gaskets	D-701-2.7										
Culvert Marker Posts	D-701-2.8										
End sections	D-701-2.10										
										-	
D-/60 I HAW PIPE AND I HAM	WIKES										
Thaw Wire			_							-	
Conduits and Fittings	D-760-2.2										
Heat Cable	D-760-2.2										
Conductors	D-760-2.2										
Device, Junction, and Pull Boxes	D-760-2.2										
Receptacles, Remote Power	D-760-2.2										
Grounding	D-760-2.2										
Terminal Posts	D-760-2.2										
F-162 CHAIN-LINK FENCE											
Fabric	F-162-2.1										
Barbed Wire	F-162-2.2										

Page 1 of 14

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Program		or un Engineer	of Record	of Record	of Record	(QPL)	Engineer		e-y. Binder #
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										
Concrete Mix Design	F-162-2.7										
Pre-mixed Sacked Concrete (Sac- Crete)	F-162-2.7										
Gate Locks	F-162-2.9										
F-170 STEEL BOLLARD											
Steel Pipe	F-170-2.1a										
Concrete Mix Design	F-170-2.1b										
Pre-mixed Sacked Concrete (Sac- Crete)	F-170-2.1b										
Paint	F-170-2.1c										
Retroreflective Bands	F-170-2.1d										
G-710 TRAFFIC CONTROL FO	R ROADS, STF	REETS AND HIGHW	IAYS								
Traffic Control Devices	G-710-2.1										
Reflective Sheeting	G-710-2.1 a., c., e., f. & h.										
Plastic Safety Fence	G-710-2.1 g.										
ITEM L-100 RUNWAY AND TA	XIWAY LIGHTI	NG									
Constant Current Regulator, L-828	L-100-2.1 a.(1)										
Runway Edge Light, Bi-Directional High Intensity, L-862	L-100-2.1 a.(2)										
Runway Edge Light, Medium Intensity, L-861	L-100-2.1 a.(3)										
Taxiway Edge Light, Medium Intensity, L-861T	L-100-2.1 a.(4)										
Airport Signs, L-858, internally lighted	L-100-2.1 a.(5)										
Airport Signs, L-858, unlighted	L-100-2.1 a.(6)										
Airport Light Base, L-867	L-100-2.1 a.(7)										

Page 2 of 14

6/09 (DOT rev. 6/9/09)

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification		or QA	Engineer	Engineer	Engineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(QPL)	Engineer		Binder #
Airport Light Base, L-867	L-100-2.1 a.(8)										
Airport Light Base, L-868	L-100-2.1 a.(9)										
Isolating Transformer, L-830	L-100-2.1 a.(10)										
Isolating Transformer, L-830	L-100-2.1 a.(11)										
Isolating Transformer, L-830-1	L-100-2.1 a.(12)										
Isolating Transformer, L-830-6	L-100-2.1 a.(13)										
Radio Control Equipment, L-854	L-100-2.1 a.(14)										
Flush Taxiway Centerline Light Fixture	L-100-2.1 a.(15)										
Flush Runway Light Fixture	L-100-2.1 a.(16)										
Primary Hand Hole, L-868	L-100-2.1 a.(17)										
Wind Cone Primary Handhole, L-867	L-100-2.1 a.(18)										
Handhole, L-867, Size B, Watertight	L-100-2.1 a.(19)										
Self-leveling silicone Sealer	L-100-2.1 b.										
Transformer Support Platform	L-100-2.1 c./Plans										
Power Adapter	L-100-2.1 d.										
Regularly Used Commercial Items	L-100-2.1 e.										
Lock Washers	L-100-2.1 f.										
Free Flowing Insulating Material	L-100-2.1 g.										
Lubricant and Sealant	L-100-2.1 h.										
Soft Gasket	L-100-2.1 i.										
Pedestals	L-100-2.1 j.										
Junction Box, Type II	L-100-2.1 k./Plans										
ITEM L-101 ROTATING BEAC	NC										
Beacon, L-801A or L-802A, Class II	L-101-2.2										
Arctic Kit	L-101-2.2 a.										

Page 3 of 14

6/09 (DOT rev. 6/9/09)
			Construction			Design		State	vide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification)	or QA	Engineer	Engineer	Engineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(apl)	Engineer		Binder #
Internal Heater	L-101-2.2 b.										
beacon Contactor	L-101-2.2 C.										
Panel Boards and Breakers	L-101-2.3										
Weatherproof Cabinets	L-101-2.4										
Wire	L-101-2.5										
Conduit	L-101-2.6										
Paint											
Priming for ungalvanized metal	L-101-2.7 a.										
Priming for galvanized metal	L-101-2.7 b.										
Orange											
	L-101-2./ d.										
Priming for wood surfaces	L-101-2.7 e.										
ITEM L-103 BEACON TOWER											
Tower											
Fixed Tubular Steel Tower	L-103-2.2 a.										
Hinged Pole Tower	L-103-2.2 b.										
Lightning Rod	L-103-2.3										
Down Conductor	L-103-2.4										
Ground Rod	L-103-2.5										
Ground Clamp	L-103-2.6										
Paint											
Priming for galvanized steel	L-103-2.7 a.										
Priming for ungalvanized steel	L-103-2.7 b.										
Orange	L-103-2.7 c.										
White	L-103-2.7 d.										

Page 4 of 14

			Construction			Desian		State	vide		Materials
Materials Item or		Airnort I inhting	Drojact	Pedional	Civil	Building	Electrical	Oualified	Ctate State	Manufacturer/	Cartificate
Test Permirement	Cracification	Entipment	Encineer	Materiale	Design	Decian	Decinoar	Broducte	Matoriale	Bemarke	Location
	opecilication	Certification		or QA	Enaineer	Engineer	Enaineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(QPL)	Engineer		Binder #
Foundation	L-103-2.8										
ITEM L-107 WIND CONE											
Wind Cones											
Type L-807, Style I, Size 1	L-107-2.2 a.										
Type L-807, Style I, Size 2	L-107-2.2 b.										
Type L-807, Style II, Size 1	L-107-2.2 c.										
Type L-807, Style II, Size 2	L-107-2.2 d.										
Wire	L-107-2.3										
Conduit	L-107-2.4										
Concrete Mix Design	P-610										
Paint											
Priming for ungalvanized metal	L-107-2.6 a.										
Priming for galvanized metal	L-107-2.6 b.										
Orange	L-107-2.6 c.										
ITEM L-108 UNDERGROUND	CABLE										
L-824 Cable											
5000 V	L-108-2.2/Plans										
600V	L-108-2.2/Plans										
Underground Electrical	L-108-2.2/Plans										
Telephone Control	L-108-2.2/Plans										
Counterpoise Conductors	L-108-2.2/Plans										
Bare Copper Wire	L-108-2.3										
Cable Connections										-	
Cast Splice	L-108-2.4 a.										
Vulcanized Splice	L-108-2.4 b.										

Page 5 of 14

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification Program		or uA Engineer	Engineer of Record	Engineer of Record	Engineer of Record	(QPL)	or uA Engineer		e.g. Binder #
Field-attached Plug-in Splice	L-108-2.4 c.										
Factory-molded Plug-in Splice	L-108-2.4 d.										
Taped Splice	L-108-2.4 e.										
Electrical Insulating Tape	L-108-2.4 e.										
Concrete Mix Design	P-610										
Marker Tape	L-108-2.6										
Interstice Filler	L-108-2.7/Plans										
ITEM L-109 TRANSFORMER	'AULT AND VA	ULT EQUIPMENT									
Concrete Mix Design	L-109-2.2/P-610										
Reinforcing Steel	L-109-2.3										
Brick	L-109-2.4										
Asbestos Cement Duct	L-109-2.5										
Rigid Steel and Intermediate Conduit	L-109-2.6										
Lighting (Inside Vault)	L-109-2.7										
Outlets	L-109-2.8										
Switches	L-109-2.9										
Paint											
Priming for ungalvanized metal	L-109-2.10 a.										
White	L-109-2.10 b.										
Priming for wood surfaces	L-109-2.10 c.										
Inside Vault Paint	L-109-2.10 d.										
Roof Coating	L-109-2.10 e.										
High Voltage Bus	L-109-2.11										
Bus Connectors	L-109-2.12										
Bus Supports	L-109-2.13										

Page 6 of 14

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification	1	or QA	Engineer	Engineer	Engineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(apl)	Engineer		Binder #
Ground Bus	L-109-2.14										
Square Duct	L-109-2.15									Sauare D Company	
Ground Rods	1-109-2.16									-	
	11 0 007										
Professional Motel Housing	L-103-2.17										
	1										
L-821 Panels for Remote Control of Airport Lighting	L-109-2.19										
Circuit Selector Switch	L-109-2.19										
L-824 Underground Electrical Cable for Lighting Circuits	L-109-2.19										
Constant Current Regulators and Regulator Motors	L-109-2.19										
Assembly for Pilot Control of Airport Lighting Circuits	L-109-2.19										
Other Electrical Equipment										-	
Constant-current regulators	L-109-2.20										
Distribution Transformers	L-109-2.20										
Oil Switches	L-109-2.20										
Cutouts	L-109-2.20										
Relays	L-109-2.20										
Terminal Blocks	L-109-2.20										
Transfer Relays	L-109-2.20										
Circuit Breakers	L-109-2.20										
All other items	L-109-2.20										
Wire											
Control Circuits										-	
Wire	L-109-2.21 a./Plans										
Telephone control cable	L-109-2.21 a./Plans										

Page 7 of 14

			Construction			Design		State	vide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
lest Requirement	Specification	Equipment Certification	Engineer	Materials or QA	Design Engineer	Design Engineer	Design Engineer	Products List *	Materials or QA	Remarks	Location e.g.
		Program		Engineer	of Record	of Record	of Record	(QPL)	Engineer		Binder #
Power Circuits											
600 volts maximum	L-109-2.21 b.(1)										
3,000 volts maximum	L-109-2.21 b.(2)										
Over 3,000 volts	L-109-2.21 b.(3)										
Wood Platform Foundation	L-109-2.22/P-650										
Electrical Enclosure	L-109-2.23/Plans										
Foundation	L-109-2.23/Plans										
Panels and Facings	L-109-2.23 a.										
Insulation Core	L-109-2.23 b.										
Panel Joints	L-109-2.23 c.										
State Fire Marshall Approval (if over 300 sq. ft.)	L-109-2.23 e.										
Metal Flashing	L-109-2.23 f.										
Louvered Vent	L-109-2.23 g.										
Refrigerator-style doors	L-109-2.23 h.										
Metal Storage Cabinet	L-109-2.23 j.										
Wall Mounted Shop Desk	L-109-2.23 j.										
Flexible Metal Conduit	L-109-2.24										
Tapes											
Pipe Sealing Tape	L-109-2.25 a.										
Corrosion Preventive Tape	L-109-2.25 b.										
Electrical Insulating Tape	L-109-2.25 c.										
Doors	L-109-2.26										
Radio Control Equipment, L-854	L-109-2.27										
Antenna for Receiver-Controller	L-109-2.28										
Apron Floodlight	L-109-2.29										

Page 8 of 14

6/09 (DOT rev. 6/9/09)

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification Program		or QA Engineer	Engineer of Record	Engineer of Record	Engineer of Record	List * (QPL)	or QA Enaineer		e.g. Binder #
Photo Electrical Control	L-109-2.30			2					2		
Panel Boards	L-109-2.31										
Branch Breakers	L-109-2.31										
Enclosure	L-109-2.31										
Panel Board Circuit Breakers	L-109-2.31										
Transfer Switch	L-109-2.32										
Identification Ties	L-109-2.33										
Service Entrance Equipment	L-109-2.34/Plans										
Plug Cutout	L-109-2.35										
Supports for Wall-Mounted Panels, Panel Boards, and Fixtures	L-109-2.36										
Push-Button Stations	L-109-2.37										
Electric Heater	L-109-2.38										
Indoor Lighting Fixtures	L-109-2.39										
Hardware	L-109-2.40										
ITEM L-110 UNDERGROUND	ELECTRICAL [DUCT									
Bituminous Fiber Duct											
Type I, for concrete encasement	L-110-2.2 a.										
Type II, for direct burial	L-110-2.2 b.										
Asbestos Cement Duct											
Type I, for concrete encasement	L-110-2.3 a.										
Type II, for direct burial	L-110-2.3 b.										
Steel Conduit	L-110-2.4										
Concrete Mix Design	L-110-2.5/P-610										
Underground Plastic Conduit											
Rigid, non-metallic conduit Schedule 40 PVC	L-110-2.6 a.										

Page 9 of 14

6/09 (DOT rev. 6/9/09)

	_	-	Construction			Design		Statev	vide		Materials
Materials Item or	_	Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
	_	Certification Program		or QA Engineer	Engineer of Record	Engineer of Record	Engineer of Record	List * (QPL)	or QA Engineer		e.g. Binder #
Type II, rigid, HDPE pipe	L-110-2.6 b.										
Flexible Metal Conduit	L-110-2.7										
Tapes											
Pipe Sealing tape	L-110-2.8 a.										
Corrosion preventive tape	L-110-2.8 b.										
ITEM P-171 TEMPORARY CON		SOIL STOCKPILE									
Liner	P-171-2.3										
Cover	P-171-2.4										
P-610 STRUCTURAL PORTLA	ND CEMENT C	CONCRETE									
Concrete Mix Design	P-610-3.2										
Cover Materials for Curing											
Sheet Materials for Curing Concrete	P-610-2.10										
Liquid Membrane-Forming	P-610-2.10										
P-640 SEGMENTED CIRCLE											
Panel-Type										-	
Panels	P-640-2.2 a.(1), (2) & (3)										
Reflective Sheeting	P-640-2.2a.(4)										
Stanchions	P-640-2.2 b./Plans										
Hardware and Fasteners											
Gusset and splice plates	P-640-2.2 c.(1)										
Fasteners	P-640-2.2 c.(2)										
P-650 AIRCRAFT TIE-DOWN											
Soil Anchor Tie-Downs	P-650-2.1 & 2.2										
P-660 RETROREFLECTIVE M [≠]	ARKERS AND	CONES								-	
Type II Marker	P-660-2.1 b.										

Page 10 of 14

			Construction			Design		State	vide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification		or QA	Engineer	Engineer	Engineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(QPL)	Engineer		Binder #
Cone. 18 Inch	P-660-2.1 c.										
P-661 STANDARD SIGNS											
Sheet Aluminum	P-661-2.1 a./ Plans										
P-681 GEOTEXTILE FOR SEP	ARATION AND) STABILIZATION									
Separation	P-681-2.1 a.										
Stabilization	P-681-2.1 b.										
P-684 FLOATING SILT CURTA	NIN										
Curtain Fabric	P-684-2.3										
S-142 EQUIPMENT STORAGE	BUILDING [NG	O EDITS MADE TO T	HIS ITEM - TO	O BE COMP	LETED BY	EQUIPME		IG DESIGNI	ER]		
Steel Reinforcing Bars - test reports & shop drawings	03300.2.2.A.										
Concrete Aggregates	03300.2.3.D-H										
Cementitious Material	03300.2.3.C.										
Chemical Admixtures	03300.2.3.J-L.										
Curing Materials	03300.2.4.										
Expansion Joint Filler	03300.2.5.A										
Concrete Design Mixtures - for each application	03300.2.6.										
Proportioning & Measuring	03300.3.1.A										
Sprayed Insulation	7201										
Wall & Roof Panels	7414										
Joint Sealants	7920										
Steel Doors & Frames	8110										
Folding Exterior Doors	8355										
Shop Drawings	13121.1.6.B										
Structural Calculations	13121.1.6.C										
Warranty	13121.1.12										

Page 11 of 14

6/09 (DOT rev. 6/9/09)

			Construction			Design		State	vide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
l est kequirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Kemarks	Location
		Program		or ea Engineer	of Record	of Record	of Record	(QPL)	UI WA Engineer		e-y. Binder #
Product Data	14551.1.3.B										
Installation Drawings	14551.1.3.C										
Supplier Certification	14551.1.3.D										
System Warranty	14551.1.4.A.										
Pipe Hangers & Supports	15140, 1.4.A										
Hanger & Support Shop Drawings	15140, 1.4.B										
Mechanical Identification Product Data	15190, 1.3.A										
Valve Schedule	15190, 1.4.A										
Vibration Isolators	15245, 2.2										
Flex Connectors	15245, 2.3										
Compressed Air System	15481, 1.4										
Day Tank	15484, 2.4										
Piping	15484, 2.1										
Flanges, Unions Couplings	15484, 2.2										
Valves, Strainers	15484, 2.3										
Testing	15484, 3.3.C										
Connectors, Filters	15540, 2.1										
Unit Heater	15540, 2.2										
Thermometers	15575, 2.4										
Double Wall Stacks	15575, 2.4										
Raceways	16000, PAR. 2.1										
Wire and Cable	16000, PAR. 2.2										
Boxes	16000, PAR. 2.3										
Cabinets	16000, PAR. 2.4										
Panelboards and Overcurrent Protection	16000, PAR. 2.5										

Page 12 of 14

6/09 (DOT rev. 6/9/09)

			Construction			Design		State	wide		Materials
Materials Item or		Airport Lighting	Project	Regional	Civil	Building	Electrical	Qualified	State	Manufacturer/	Certificate
Test Requirement	Specification	Equipment	Engineer	Materials	Design	Design	Design	Products	Materials	Remarks	Location
		Certification		or QA	Engineer	Engineer	Engineer	List *	or QA		e.g.
		Program		Engineer	of Record	of Record	of Record	(apl)	Engineer		Binder #
Wiring Devices	16000, PAR. 2.6										
Motor Starters and Disconnects	10000, PAK. 2.8										
Grounding	16000, PAR. 2.9										
Lighting Fixtures	16000, PAR. 2.10										
S-143 FUEL TANK											
Tank	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/Special Provisions										
Fertilizer	Т-901-2.2										
T-908 SOIL STABILIZATION											
HECP	Т-908-2.4										
U-500 ELECTRICAL SYSTEM											
Electrical Line Extension Submittals	U-500-2.1										
ADDITIONAL MATERIALS							-				

Page 13 of 14

Materials	Certificate	Location	e.g.	Binder #			
	Manufacturer/	Remarks					
wide	State	Materials	or QA	Engineer			
State	Qualified	Products	List *	(apl)			
	Electrical	Design	Engineer	of Record			
Design	Building	Design	Engineer	of Record			
	Civil	Design	Engineer	of Record			
Construction	Regional	Materials	or QA	Engineer			
Construction	Project	Engineer					
	Airport Lighting	Equipment	Certification	Program			
		Specification					
	Materials Item or	Test Requirement					

Appendix J

FAA Technical Specifications for Approach Lighting Aids (Not Used)

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

Appendix K

Mandatory Post-Award Conference Notice and Agenda

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

State of Alaska

Departments of Labor, Transportation, Community and Economic Development,

together with the

Denali Training Fund, Regional Agencies, and Contractor:

will be hosting a

Post-Award Conference

to discuss local hire opportunities and local resources re: [project name and number] to be held on [date & time] in the [building location and community], Alaska

Purpose: DCED, DOT/PF, DOL/WD, in conjunction with regional employment & training departments, and the Contractor, will hold informational meeting with local community to promote cooperation between the parties regarding local resources available for the upcoming construction project.

Agenda:

DCED

Introduction of participants

Purpose

- 1. Provide information to the residents about possible jobs that the contractor will have during the course of the project.
- 2. Provide information to residents about training that is available to prepare them for these jobs, if they do not already have the skills.
- 3. Provide information to the contractors about the skills and other resources that are available in the community.

DOT/PF

Brief project description

DOT/PF inspection opportunity - *Local 71 Chapter, Labor Trades & Crafts Union.* Introduction to Contractor

Contractor

Overview of project, bid description, and other project related matters Project timeline Impacts on community

Jobs (Project job numbers and types of employees)

Housing

Food Services

Hiring process

Q&A

DCED/ Local Community Officials

Community Profile – overview of equipment, land, apartments, and facilities for rent or lease Department of Labor and Workforce Development

Training Programs available to community residents

Process to Apply for Training

Assistance in applying for project positions

Denali Training Fund

Training Programs available to community residents

Process to Apply for Training

Regional/ Community and Union Opportunities

Local Tribal Officials

Operating Engineers, the Laborers' Union and the Union apprenticeship recruitment.

Alaska Works Partnership

ANCET /CTER/TERO

DOL/ Community Leader/ Contractor

Contacts for follow-up

Suggestions on scheduling employment interviews

Appendix L

Snow Removal Equipment Building Technical Specifications

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

SECTION 01000 GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED SECTIONS

- A. Section 05121 Structural Steel: Steel Skid Foundation
- B. Section 07201 Sprayed Insulation
- C. Section 07414 Insulated Metal Wall & Roof Panels
- D. Section 07920 Joint Sealants
- E. Section 08110 Steel Doors and Frames
- F. Section 08355 Folding Exterior Doors
- G. Section 13121 Pre-Engineered Buildings
- H. Section 14551 Trolley and Hoist
- I. Section 15010 Basic Mechanical Requirements
- J. Section 15140 Supports and Anchors
- K. Section 15190 Mechanical Identification
- L. Section 15245 Vibration Isolation
- M. Section 15250 Earthquake Restraint
- N. Section 15481 Compressed Air System
- O. Section 15484 Fuel Oil Piping system
- P. Section 15540 Fuel-Fired Heaters
- Q. Section 15575 Breechings, Chimneys and Stacks
- R. Section 16000 Electrical

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Appendix comprises general construction including architectural, structural, mechanical, and electrical for two single-bay snow removal equipment buildings (one heated, one unheated) on skid foundations at the Tununak Airport, as indicated on the Snow Removal Equipment Building (SREB) documents.

NOTE: All administrative requirements set forth in this section are intended to compliment all other portions of these specifications and shall not be construed as a waiver of any conditions set forth in the GCP portions of these Specifications.

1.03 REFERENCE STANDARDS

- A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. The date of the standard is that in effect as of the Project Advertisement date, or Effective Date of the Contract when there was no Advertisement, except when a specific date is specified.
- C. Obtain copies of standards when required by Contract Documents. Maintain copy at jobsite during progress of the specific Work.

1.04 SUBMITTALS

- A. Deliver submittals to DEPARTMENT as directed.
- B. Transmit each item under DEPARTMENT accepted form.
- C. After DEPARTMENT review of submittal, revise and resubmit as required.

1.05 SHOP DRAWINGS

A. Submit the number of opaque reproductions which CONTRACTOR requires, plus four copies which will be retained by DEPARTMENT.

1.06 PRODUCT DATA

- A. Mark each copy to identify applicable products, models, options, and other data; supplement manufacturers' standard data to provide information unique to the Work.
- B. Submit the number of copies which CONTRACTOR requires, plus four copies which will be retained by DEPARTMENT.

1.07 ELECTRICITY, LIGHTING

- A. Provide lighting for construction operations.
- B Existing and permanent lighting may be used during construction. Maintain lighting and make routine repairs.

1.08 HEAT, VENTILATION

- A. Prior to operation of permanent facilities for temporary purposes, verify that installation is approved for operation, and that filters are in place. Provide and pay for operation and maintenance.
- B. Provide ventilation of enclosed areas to cure materials, to disperse humidity, and to prevent accumulations of dust, fumes, vapors, or gases.

1.09 SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures.

1.10 BARRIERS

A. Provide as required to prevent public entry to construction areas to provide for DEPARTMENT and Using Agency's use of site, and to protect existing facilities and adjacent properties from damage from construction operations.

1.11 PROTECTION OF INSTALLED WORK

A. Provide temporary protection for installed products. Control traffic in immediate area to minimize damage.

1.12 SECURITY

A. Provide security as necessary at installed work to protect work from unauthorized entry, vandalism, and theft.

1.13 CLEANING DURING CONSTRUCTION

- A. Control accumulation of waste materials and rubbish; periodically dispose of off-site.
- B. Clean interior areas prior to start of finish Work, maintain areas free of dust and other contaminants during finishing operations.

1.14 REMOVAL

- A. Remove temporary materials, equipment, services, and construction prior to Substantial Completion inspection.
- B. Clean and repair damage caused by installation or use of temporary facilities.

1.15 CLOSEOUT PROCEDURES

- A. Using Agency will occupy Project for the purpose of conduct of business under provision stated in certificate of Substantial Completion.
- B. When CONTRACTOR considers Work has reached Final Completion, submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and requesting DEPARTMENT inspection.
- C. In addition to submittals required by the conditions of the Contract, provide submittals required by governing authorities.

1.16 PROJECT RECORD DOCUMENTS

- A. Store documents separate from those used for construction.
- B. Keep documents current; do not permanently conceal any Work until required information has been recorded.
- C. Upon request by the DEPARTMENT submit complete collection of record

documents to the DEPARTMENT for review and duplication as desired.

D. At Contract closeout, submit documents with transmittal letter containing date, Project title, DEPARTMENT's Project number, CONTRACTOR's name and address, list of documents, and signature of CONTRACTOR.

1.17 OPERATION AND MAINTENANCE DATA

- A. Provide data for:
 - 1. Mechanical equipment and controls Division 15.
 - 2. Electrical equipment and controls Division 16.
- B. Submit two sets prior to final inspection, bound in 8-1/2 x 11 inch three-ring side binders with durable plastic covers.
- C. Provide a separate volume for each system, with a table of contents and index tabs for each volume.
- D. Part 1: Directory, listing names, addresses, and telephone numbers of: DEPARTMENT, Consultants, and CONTRACTOR.
- E. Part 2: Operation and maintenance instructions, arranged by Specification Division. For each system, give names, addresses, and telephone numbers of Subcontractors and Suppliers. List:
 - 1. Appropriate design criteria.
 - 2. List of equipment.
 - 3. Parts list.
 - 4. Operating instructions.
 - 5. Maintenance instructions, equipment.
 - 6. Maintenance instructions, finishes.
 - 7. Shop drawings and product data.
 - 8. Warranties.

1.30 WARRANTIES AND BONDS

- A. Provide duplicate, notarized copies. Execute CONTRACTOR's submittals and assemble documents executed by Subcontractors and Suppliers.
- B. Submit material prior to substantial completion. For equipment put into use with DEPARTMENT permission during construction, submit within 10 days after first operation. For items of Work delayed materially beyond date of Substantial Completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.31 SPARE PARTS AND MAINTENANCE MATERIALS

Provide products, spare parts, and maintenance materials in quantities A. specified in each Section, in addition to that used for construction of Work. Coordinate with DEPARTMENT, deliver to Project site and obtain receipt prior to final payment.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 05121 STRUCTURAL STEEL: STEEL 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 500 Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 15. ASTM A 563 Carbon and Alloy Steel Nuts.

- 16. ASTM A 572 High-Strength Low-Alloy Columbium-Vanadium of Structural Steel.
- 17. ASTM F 436 - Hardened Steel Washers.
- 18. ASTM F 959 Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
- 19. AWS D1.1 Structural Welding Code Steel.
- 20. SSPC SP 1 - Solvent Cleaning
- 21. SSPC SP 10 Near-White Blast Cleaning
- 22. SSPC PA 1 Shop, Field, and Maintenance Painting.

1.2 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.

1.3 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:
 - All materials for field and shop connection of steel including anchor 1. bolts.
- B. All other items called out in this Section and miscellaneous steel detailed on the Drawings.

1.4 **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.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01000 General Requirements.
- B. 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.
- C. 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.
- D. Certificates
 - 1. Steel
 - 2. Bolts, Nuts, and Washers
- E. Coatings
 - 1. Submit manufacturer's technical data sheets for specified coatings.

1.6 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 Division 01 General Requirements.
- 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.

1.7 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 24 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 vield.
- 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.

STRUCTURAL STEEL ACCESSORIES 2.3

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.

CONNECTIONS 3.2

- A. Except as modified in this section, connections not detailed shall be designed in accordance with AISC S335. Build connections into existing work. Punch, subpunch 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;
 - 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.
- D. Mixing
 - 1. 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.
- E. 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.
 - 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 07201 SPRAYED INSULATION

PART 1 - GENERAL

APPLICABLE PUBLICATIONS 1.1

- The publications listed below form a part of this Specification. Α. The publications are referred to in the text by basic designation only. In case of conflict the most stringent shall apply.
 - American Society of Testing and Materials (ASTM) C177 Test 1. Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot-Plate Apparatus.
 - ASTM C1029 Specification for Spray-Applied Rigid Cellular 2. Polyurethane Thermal Insulation.
 - ASTM D1621 Test Method for Compressive Properties of Rigid 3. Cellular Plastics.
 - 4. ASTM D1623 - Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
 - ASTM D2126 Test Method for Response of Rigid Cellular Plastics to 5. Thermal and Humid Aging.
 - 6. ASTM D2842 - Test Method for Water Absorption of Rigid Cellular Plastics.
 - ASTM D2856 Test Method for Open Cell Content of Rigid Cellular 7. Plastics by the Air Pyenometer
 - ASTM E84 Test Method for Surface Burning Characteristics of 8. Building Materials.
 - 9. ASTM E96 - Tests Method for Water Vapor Transmission of Materials.
 - 10. International Building Code (IBC), 2006 Edition Section 2603.
 - 11. Underwriters Laboratories Inc (UL) Fire Resistance Directory

SYSTEM DESCRIPTION 1.2

Spray applied (foamed in place) urethane-isocyanurate rigid foam plastic Α. insulation. IBC approved thermal (fire) barrier where exposed.

1.3 SUBMITTALS

- Product Data: Indicate product descriptions, performance data, materials, Α. recommended use, application instructions, substrate surface preparation, and special curing temperature requirements.
- B. Manufacturer and Installer qualifications.

2/25/11

1.4 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.
 - 1. Same installer shall apply insulation and barrier systems.
- C. Provide project names, location, date, product used and owner telephone number.

1.5 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.

1.6 **PRE-INSTALLATION MEETING:**

A. Applicator, CONTRACTOR, and CONTRACTING OFFICER shall hold a pre-construction meeting at least 1 week prior to commencing insulation installation.

1.7 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.

1.8 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 60 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.
- 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.
- 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.
 - 2. Compressive Strength: 15-psi minimum at yield 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 per ASTM D2856.
 - 6. Meet specified "Regulatory Requirements" for flame, fuel, and smoke.
- C. Provide primer for substrate in accord with insulation manufacturer instructions.

2.2 THERMAL BARRIER

- A. Under Building Between Skids: Cementitious or intumescent singlecomponent coating requiring only addition of water at work site. Manufacturer recommended for single pass spray application over sprayapplied urethane-isocyanurate rigid foam plastic insulation: Grace Z3306 "Monokote", <u>http://www.grace.com</u>, Bayseal "Flame Seal" <u>http://www.specialty-products.com</u> subject to specified criteria, or equal.
 - 1. Minimum thickness or as required to comply with IBC 2603.
 - 2. Manufacturer recommended for high humidity and low temperature use.
 - 3. Primer-bonding agent as recommended by barrier manufacturer.
 - 4. Minimum in place bond strength: 500 psf.
 - 5. Hard durable surface with minimum dry density of 20 pounds.
- B. Exterior Edge of Building: 24 gage galvanized sheet steel securely screwed in place per IBC 2603.4.1.4. Install under spray foam and under bottom of wall panel.

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. 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 to achieve a thermal resistance 'R' value of 14.
- 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 THERMAL BARRIER APPLICATION

- A. Apply thermal barrier to spray insulation exposed at sides of building: at floor to wall panel joint.
 - 1. Thermal Banner not required under steel floor.

3.5 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 07414 INSULATED METAL WALL & ROOF PANELS

PART 1 - GENERAL

1.1 **RELATED SECTIONS**

- Α. Section 07920 - Joint Sealants
- B. Section 13121 - Pre-Engineered Building

1.2 **APPLICABLE PUBLICATIONS**

- The publications listed below form a part of this Specification. The Α. publications are referred to in the text by basic designation only. In case of conflict the most stringent shall apply.
 - ASTM A36 Specification for Carbon Structural Steel. 1.
 - ASTM A653 Specification for Steel Sheet, Zinc-Coated 2. (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.
 - ASTM A792 Specifications for Sheet Steel, 55 Aluminum Zinc 3. Alloy – Coated by the Hot – Dip Process.
 - 4. ASTM B117 – Practice for Operating Salt Spray (Fog) Apparatus.
 - ASTM C518 Test Method for Steady-State Heat Flux 5. Measurements and Thermal Transmission Properties by Means of Heat Flow Meter Apparatus.
 - ASTM D522 Test Method for Mandrel Bend Test of Attached 6. Organic Coatings.
 - 7. ASTM D523 – Test Method for Specular Gloss.
 - ASTM D822 Practice for Conducting Tests on Paint and Related 8. 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.
- ASTM E331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- 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 Nonmetallic Materials.
- 21. International Building Code (IBC) 2006.

1.3 **PERFORMANCE REQUIREMENTS**

- A. Fire Characteristics: IBC 2603 foam plastic compliant.
 - 1. Flamespread 75 and smoke developed without sprinklers: 450 maximum per ASTM E 84.
 - 2. Large scale tests per FM 4880 or UL 1040.
- 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.

1.4 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.

1.5 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

1.6 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.

1.7 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).

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to meeting specified criteria:
 - 1. Kingspan: <u>http://www.kingspanpanels.us</u>
 - 2. Centria: http://www.centria.com
 - 3. Metlspan: http://www.metlspan.com
 - 4. IPS Insulated Panel Systems: <u>http://www.insulated-panels.com</u>
 - 5. All Weather: <u>http://www.awipanels.com</u>
 - 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 and exterior facings of 26 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 shall be 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 3/16 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 ¼ 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.

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 ¼ 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.

SECTION 07920 JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Section 07414 Insulated Metal Wall and Roof Panels
- B. Section 08110 Steel Doors Hardware and Frames
- C. Section 08355 Folding Exterior Doors

1.2 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.
 - 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

1.3 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.

1.4 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.

1.5 DELIVERY AND STORAGE

- A. Deliver in manufacturer's original unopened container, clearly indentifying each product.
- B. Store in accord with manufacturer's recommendations.

1.6 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 <u>http://www.gesealants.com</u>
 - 3. Tremco <u>http://www.tremco.com</u>
 - 4. Sika Corporation <u>http://www.sikaindustry.com</u>
 - 5. Or approved equal.

2.2 TYPICAL JOINT SEALANTS

- A. Typical use unless otherwise noted: Single component non-sag, nonstaining 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.<u>http://www.chemrex.com</u>
 - 2. Gaska-Tape Inc. http://www.gaska-tape.com
 - 3. Norton Performance Plastics <u>http://www.nortonadhesives.com.</u>
 - 4. Or approved equal.

2.4 FLOOR SEALANT

- A. Self-leveling, 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 1/4 -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.
- C. Size sealant materials to achieve sealant manufacturer's recommended width to depth ratio: typical depth in joint shall be ½ width of joint. Sealant depth shall be ¼ 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 ¼ 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**

Remove surplus materials and excess sealant from surrounding surfaces at A. completion of each day's work.

SECTION 08110 STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Section 07414 Insulated Metal Wall & Roof Panels
- B. Section 07920 Joint Sealants
- C. Section 13121 Pre-Engineered Building

1.2 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.
 - 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.

1.3 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.

1.4 QUALITY ASSURANCE

A. Conform to requirements of HMMA and these SPECIFICATIONS.

1.5 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. Polyurethane foam insulation filled cavity.

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 mortise type per ANSI A156.13 grade 1: Schlage L series with interchangeable key core 6 pin E Keyway or equivalent Corbin Russwin or Best Co..
 - 1. Coordinaate Key Code from OWNER prior to procurement.
 - 2. F-13 "corridor" function: latchbolt operated by lever either side except the outside lever made inoperative by key outside or inside turn piece.
 - 3. Provide four keys.
- D. Closers: Cast iron shell with steel rack and pinion piston surface mount: LCN 4000 Series or equivalent Norton or Corbin Russwin.
 - 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 arm.
 - 6. Mount on inside of building.
 - 7. Full metal cover.
- 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. Mount on inside warm face. 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. Factory prime painting, and factory finish painting.
- B. 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 enamel paint, selected from one of manufacturer's standard colors.

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 frames with foamed in-place urethane insulation.
- B. Seal both sides of frame to adjoining wall surfaces with a continuous bead of 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.

SECTION 08355 FOLDING EXTERIOR DOORS

PART 1 - GENERAL

1.1 RELATED SECTIONS

- A. Section 07414 -Insulated Metal Wall and Roof Panels
- B. Section 07920 Joint Sealants
- C. Section 13121 Pre-Engineered Building

1.2 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
 - 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.

1.3 PERFORMANCE REQUIREMENTS

- A. Vertical Bi-fold opening insulated door assembly.
 - 1. Manual operation.
 - 2. Uniform wind force of 35 pound per square foot 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.

1.4 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, hardware, anchorage, weatherstripping required opening clearances, and installation instructions.

- D. Engineer Calculations or test results demonstrating compliance with Performance Requirements.
- E. Manufacturer's certification that doors proposed meet these SPECIFICATIONS.
- F. Operation and maintenance instructions.

1.5 QUALIFICATIONS

- A. Manufacturer: Constructor of door assemblies similar to those specified in this Section with a minimum 25 successful installations.
- B. Installer: approved by door manufacturer with a minimum of 5 successful 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. <u>www.doorengineering.com</u>,
 - 2. Electric Power Door Co. <u>www.electricpowerdoor.com</u>
 - 3. Door-Man Manufacturing <u>www.door-man.com</u>
 - 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 meeting Performance Requirements.

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. Interior Framing: 1/8-inch minimum sheet or steel tube.
- 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 powder coat or epoxy enamel paint system in manufacturers standard white color.

1. 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 face strap hinges with through door attach bolts for each door panel: ³/₄-inch minimum diameter hinge pins and grease zerk fittings.
 - 2. Tracks, guides, trolleys, and brackets. Trolleys with bronze oil impregnated bearings.
 - 3. Door bottom into floor manually operated cane bolts with cane bolt floor receivers: ½ inch minimum diameter.
 - 4. Heavy duty steel hasps with holes to receive padlock.a. Padlock provided by OWNER.
 - 5. Bolt and screw attachments and anchors as necessary.

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 Requiremtents.

2.6 WEATHERSTRIPPING

- A. Nylon brush type, 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 seals on edges of each hinged door panel.
- E. Door Bottom: two layers 1/8 inch minimum thick reinforced EPDM or Nylon with field replaceable adjustable screw attachment: 3 inch minimum high.
- 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

3.3 TOLERANCES

A. No warp out of horizontal or vertical plane of door opening more than 1/4 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.

SECTION 13121 PRE-ENGINEERED BUILDINGS

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

Provide anchor bolts to be installed into steel skid foundation. Α.

1.2 **RELATED SECTIONS**

- Α. Section 07414 – Insulated Metal Wall and Roof Panels
- B. Section 07600 - Metal Flashing and Trim
- C. Section 07920 - Joint Sealants
- D. Section 08110 - Steel Doors, Frames, and Hardware
- E. Section 14551 – Trolley and Hoist
- F. Section 08355 – Folding Exterior Doors
- G. Division 15 - Mechanical
- H. Division 16 - Electrical

1.3 **APPLICABLE PUBLICATIONS**

- Α. 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
 - American Institute of Steel Construction (AISC) Specification for 2. the Design, Fabrication, and Erection of Structural Steel for Buildings.
 - AISC Manual of Steel Construction. 3.
 - 4. American Iron and Steel Institute (AISI) - Specification for the Design of Cold-formed Steel Structural Members.

- American Society of Civil Engineers (ASCE) ASCE 7: Minimum 5. Design Loads for Buildings and Other Structures (latest edition)
- ASTM A36 Specification for Carbon Structural Steel. 6.
- ASTM A123 Specification for Zinc (Hot-Dip Galvanized) Coatings 7. on Iron and Steel Products.
- ASTM A153 Specification for Zinc Coating (Hot Dip) on Iron and 8. Steel Hardware.
- ASTM A307 Specification for Carbon Steel Bolts and Studs, 60 9. 000 psi Tensile Strength.
- 10. ASTM A325 Specification for High Strength Bolts for Structural Steel Joints.
- 11. ASTM A500, Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 12. ASTM A501 Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- 13. ASTM A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvanealed) by the Hot-Dip Process.
- 14. ASTM A792 Specification for Steel Sheet, 55 Aluminum-Zinc Alloy-Coated by the Hot Dip Process.
- 15. ASTM B117 Practice for Operating Salt Spray (Fog) Apparatus.
- 16. American Welding Society (AWS) A2.0 Standard Welding Symbols.
- 17. AWS D1.1 Structural Welding Code-Steel.
- 18. International Building Code (IBC) latest edition adopted by the State of Alaska including any amendments
- 19. Metal Building Manufacturers Association (MBMA) 2006 Metal Building Systems Manual including 2010 Supplement
- 20. Steel Structures Painting Council (SSPC) Systems and Specifications.
- 21. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) - Architectural Sheet Metal.

1.4 SYSTEM DESCRIPTION

- Α. The pre-engineered building shall include the following minimum requirements for purposes of this Specification and Submittals:
 - Primary Framing: Clear span rigid frame of roof beams and 1. 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 07414.
 - 4. Roof System: Provided under Section 07414.

1.5 PERFORMANCE REQUIREMENTS

- Α. 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.
- Β. Design Ground Snow Load: As applicable for regional requirements per IBC or other locally recognized source. In no case less than 50 pounds per square foot ground snow load and roof design snow load shall not be less than 35 pounds per square foot. 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 = 130 mph, importance factor 1.0, and Exposure "D".

- 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.
- Ι. 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.
- Field connections shall be bolted, unless otherwise approved in writing L. by the Engineer.

1.6 SUBMITTALS

- Submit under provisions of Section 01000 General Requirements. If Α. manufacturers standard product data is submitted mark out nonapplicable items.
- B. 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, scaledrawing 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.
- C. 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.

1.7 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC -Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

1.8 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.

1.9 **REGULATORY REQUIREMENTS**

- A. Conform to International Building Code (IBC).
- B. Cooperate with regulatory agency or authority and provide verifying data as requested.

1.10 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this Section.

1.11 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.12 WARRANTY

Α. Provide written 3-year warranty.

PART 2 - PRODUCTS

2.1 **GENERAL**

Conform to Performance Requirements listed in Part 1. Α.

2.2 **MATERIALS - FRAMING**

- Α. Hot Rolled Structural Steel: ASTM A36, Grade 50.
- Β. Cold Rolled Structural Steel: ASTM A653, Galvanized G90 coating.
- C. Structural Tubing: ASTM A500, or A501, Grade B.
- D. Anchor Bolts: ASTM A307 or as otherwise specified by building manufacturer, galvanized per ASTM A153.
- Ε. 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**

Wall panels are specified in Section 07414 – Insulated Metal Wall and Α. Roof Panels.

2.4 **ROOFING SYSTEM**

Α. Roofing is specified in Section 07414 - Insulated Metal Wall and Roof Panels.

2.5 SHOP FINISH FOR STRUCTURAL STEEL

- Primary building framing and bracing shall be hot-dip galvanized per Α. ASTM A123 after fabrication.
- Β. Cold rolled steel girts and purlins: Galvanized G90 coating.

2.6 WELDING PROCEDURES

- Shop and field welds shall be in accordance with the AISC and AWS Α. 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**

- Specified in Section 08110 Steel Doors and Frames. Α.
- Β. Provide structural rough-in frame surround as part of pre-engineered building.

2.8 FOLDING EXTERIOR DOORS

- Specified in Section 08355 Folding Exterior Doors. Α.
- B. Provide structural attachment frame surround as part of pre-engineered building.

2.9 **FABRICATION - FRAMING**

- Fabricate members in accordance with AISC Specifications for plate, Α. 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.
- Shop Fabrication and Assembly: Fabricate and assemble structural C. 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

A. Furnish and install a 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**

- Leave pre-engineered building surfaces clean and free from damage. Α.
- Factory Painted Panel Surfaces: Β.
 - Paint field cut edges, minor scratches with panel manufacturer 1. 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.

SECTION 14551

TROLLEY AND HOIST

PART 1 - GENERAL

1.1 PRODUCTS FURNISHED BUT NOT INSTALLED UNDER THIS SECTION

Α. Monorail – refer to Section 13121

1.2 **RELATED SECTIONS**

- Α. Section 13121 – Pre-Engineered Buildings
- **Division 16 Electrical** B.

1.3 SUBMITTALS

- Submit under provisions of Section 01000 General Requirements. Α.
- B. Manufacturer's standard product data: mark out non-applicable items.
- C. Manufacturer's Installation Drawings and Instructions: Indicate preparation requirements and assembly sequence.
- Supplier's Certification that product meets the requirements of this D. specification.

1.4 WARRANTY

Provide 1-year warranty. Α.

PART 2 – PRODUCTS

2.1 TROLLEY AND HOIST

Α. 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 10' minimum. Trolley wheels shall have anti-friction ball bearings. Paint with manufacturer's standard primer and finish coat.

PART 3 – EXECUTION

3.1 INSTALLATION

Erect and install system as per manufacturer's recommendations and Α. approved submittals.

SECTION 15010

BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 SECTION INCLUDES

Basic Mechanical Requirements specifically applicable to Division 15 Α. Sections.

1.2 WORK INCLUDED

Α. The work of Division 15 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 15 is part of all other sections of Division 15.

1.3 SPECIFICATION TERMINOLOGY

- Streamlining: In many instances, the products, reference standards, and Α. 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.

1.4 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. Provide all work shown on the contract drawings and called for in these contract specifications, unless otherwise stated or directed.

1.5 **PROJECT/SITE CONDITIONS**

- A. Generally, install Work in locations indicated on the contract drawings, unless prevented by Project conditions.
- B. Verify field measurements prior to fabrication of products and installation of equipment and systems.

1.6 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, International Fuel Gas Code, Uniform Plumbing Code, National Electrical Code, AGA and OSHA, as they apply to this project, except in cases where statutes govern.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable electrical code.
- B. 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.

1.8 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.

1.9 ELECTRICAL WORK

- A. Related Work Specified Elsewhere.
 - 1. Electrical Specifications: Section 16000.
- B. Unless otherwise indicated on the electrical drawings, provide all mechanical equipment motors, thermostats, motor valves, damper motors, electrical control components, control wiring, and any other miscellaneous Division 15 controls.
- C. Carefully coordinate all work with the electrical work shown and specified elsewhere in the contract documents.
- D. When motor starters are furnished under Division 15, they must meet the requirements of Division 16.

1.10 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. 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.

- C. Operating Tests: Upon request from the Department, place the entire mechanical installation, and/or any portion thereof, in operation to demonstrate satisfactory operation.
- D. Completion: Upon completion of the mechanical installation, demonstrate to the Department'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

SECTION 15140

SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

- Pipe hangers and supports. Α.
- B. Hanger rods.

1.2 **RELATED SECTIONS**

- Section 15010 Basic Mechanical Requirements. Α.
- B. Section 15245 - Vibration Isolation.
- C. Section 15481 - Compressed Air System.
- D. Section 15484 - Fuel Oil Piping System.
- E. Other sections referring to or affecting work of this section.

1.3 REFERENCES

- Α. Uniform Plumbing Code - Latest Locally Adopted Edition: Hangers and Supports.
- B. International Building Code - Latest Locally Adopted Edition.
- C. ASME B31.9 - Building Services Piping.
- D. ASTM F708 - Design and Installation of Rigid Pipe Hangers.
- E. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- F. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- G. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
1.4 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's catalog data including load capacity.
- B. Shop Drawings: Indicate hanger and support framing and attachment methods.

1.5 QUALITY ASSURANCE

- A. Support piping to prevent sag, undue play and swing.
- B. Hangers to be removable without requiring removal of supported pipe.
- C. Provide earthquake restraints per Section 15250.
- D. Prime coat exposed steel hangers and supports.

PART 2 - PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 2-1/2 Inch: Carbon steel, adjustable swivel ring.
- B. Wall Support: Cast iron hook for pipe not requiring restraint.
- C. Multiple or Trapeze Hangers: Steel channels with welded spaces and hanger rods.
- D. For piping seismic restraint, refer to Section 15245.

2.2 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, threaded one end, or continuous threaded.

PART 3 - EXECUTION

3.1 PIPE HANGERS AND SUPPORTS

A. Support horizontal piping as follows:

PIPE SIZE MAX. HANGER SPACING HANGER DIAMETER

1/2 to 1-1/4 inch 6' 3/8"

- B. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- C. Place a hanger within 12 inches of each horizontal elbow.
- D. Use hangers with 1-1/2 inch minimum vertical adjustment.
- E. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- F. Support riser piping independently of connected horizontal piping.

SECTION 15190

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

- Α. Nameplates.
- B. Tags.
- C. Pipe Markers.

1.2 REFERENCES

Α. ASME A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS FOR REVIEW

Product Data: Submit list of wording, symbols, letter size, and color Α. coding for mechanical identification.

1.4 SUBMITTALS AT PROJECT CLOSEOUT

Α. Provide valve schedule in Operation and Maintenance Manual indicating valve tag number, location, and function.

PART 2 - PRODUCTS

EQUIPMENT 2.1

- Α. Plastic Nameplates: Laminated three-layer plastic with engraved black letters on light contrasting background color.
- Β. Examples: "Water Heater No. 1," "Exhaust Fan F-2," "Air Handling Unit AHU-1," etc.

2.2 VALVES

Α. Plastic Tags: Laminated three-layer plastic with engraved white letters on dark contrasting background color. Tag size minimum 1-1/2 inch diameter.

- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter.
- C. Examples: Plumbing valves: "P-1", "P-2", "P-3", etc.

PIPING 2.3

- Α. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic preformed to fit around pipe or pipe covering, and indicating flow direction arrow and fluid being conveyed. Brandysnap-on, Seton or approved equal.
- B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings. Brandysnap-on, Craftmark, Seton or approved equal.

PART 3 - EXECUTION

3.1 PREPARATION

Α. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

- Α. Install identifying devices after completion of coverings and painting.
- B. Plastic Nameplates: Install with corrosive-resistant mechanical fasteners, or adhesive.
- C. Tags: Install using corrosive-resistant chain. Number tags consecutively by location.
- D. Identify equipment with plastic nameplates. Small devices may be identified with tags.
- E. Valves: Identify valves in main and branch piping with tags.
- F. Piping: Identify piping, concealed or exposed. Tags may be used on small diameter piping. 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 "T", at each side of penetration of structure or enclosure, and at each obstruction.

3.3 VALVE CHART AND SCHEDULE

Provide valve chart and schedule for inclusion in operation and Α. maintenance manual.

SECTION 15245

VIBRATION ISOLATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- Α. Vibration isolators
- B. Flexible connections.

1.2 **RELATED WORK**

- Section 15010 Basic Mechanical Requirements. Α.
- B. Section 15481 - Compressed Air Systems.
- C. Section 15835 - Terminal Heat Transfer Units.
- D. Section 16000 - Motors and Connections.
- E. Other sections referring to or affecting Work of this Section.

1.3 REFERENCES

- Α. ASHRAE - Guide to Average Noise Criteria Curves.
- Β. SMACNA HVAC Duct Construction Standards - Metal and Flexible.

1.4 **DELIVERY, STORAGE, AND PROTECTION**

- Accept material on site in factory containers and packing. Inspect for Α. damage.
- B. Protect from damage and contamination by maintaining factory packaging and caps in place until installation.

1.5 SUBMITTALS FOR REVIEW

Α. Provide manufacturer's catalog data for vibration isolators and flexible connections.

B. Indicate vibration isolator locations with static and dynamic load on each and described on product data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS, VIBRATION ISOLATION

Amber/Booth Co., Mason Industries Inc., Peabody Noise Control, Inc. N.W. Α. Sausse and Co., or approved equal.

2.2 **VIBRATION ISOLATORS**

- Type 1: Closed spring hanger with one inch thick acoustic isolator. Α.
- Β. Type 3: Rubber waffle pads, 30 durometer, minimum ¹/₂ inch thick, maximum loading 40 psi. Use neoprene in oily or exterior locations.

2.3 FLEXIBLE PIPE CONNECTIONS, METALLIC HOSE

- Α. Use hose suitable for minimum 125 psi WSP and 450 degrees F and 200 psi WPG and 250degrees F. Threaded ends for pipes sizes under 3 inches, flanged ends for pipe sizes 3 inches and larger.
- Β. 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.
- Maximum Offset: 1/2 inch on each side of installed centerline. D

PART 3 - EXECUTION

3.1 INSTALLATION

- Α. Install vibration isolators for motor driven equipment.
- Β. Suspended Motor Driven Equipment, Not Internally Isolated:
 - 1 Includes unit heaters.
 - 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. Air Compressors:
 - 1. Install with Type 3 vibration isolators between unit and floor.
 - 2. 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.

SECTION 15250

EARTHQUAKE RESTRAINT

PART 1 - GENERAL

1.1 SECTION INCLUDES

Restraints for seismic loads on mechanical equipment, piping, and ductwork. Α.

1.2 **RELATED WORK**

- Α. Section 15010 - Basic Mechanical Requirements.
- B. Section 15140 - Supports and Anchors.
- C. Section 15481 - Compressed Air Systems.
- D. Section 15835 - Terminal Heat Transfer Units.
- E. Section 16000 - Motors and Connections.
- F. Other sections referring to or affecting Work of this Section.

1.3 REFERENCES

Α. International Building Code, Latest Locally Adopted Edition.

1.4 QUALITY ASSURANCE

Maintain International Building Code criteria for seismic restraints for Α. mechanical systems and equipment.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.1 FABRICATION

Α. 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 EQUIPMENT REQUIREMENTS

- A. Adequately anchor equipment weighing more than 100 pounds to resist lateral earthquake forces. Tank weights shall include contents.
- B. Use procedure specified in 2003 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 circulating of isolators.

3.3 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. 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.

SECTION 15481

COMPRESSED AIR SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- Α. Pipe and pipe fittings.
- B. Reciprocating air compressor.
- C. Air receiver and accessories.

1.2 **RELATED SECTIONS:**

- Α. Section 15010 - Basic Mechanical Requirements.
- B. Section 15140 - Supports and Anchors
- C. Section 15245 - Vibration Isolation
- D. Section 15250 - Earthquake Restraint
- E. Section 16000 - Electrical
- F. Other sections referring to or affecting work of this section.

1.3 REFERENCES

- Α. Uniform Plumbing Code - Latest Locally Adopted Edition.
- B. ASME B16.3 - Malleable Iron Threaded Fittings.
- C. ASME B31.9 - Building Services Piping.
- D. ASME B40.1 - Gauges - Pressure Indicating Dial Type - Elastic Element.
- E. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless,
- F. ASME IX - Boiler and Pressure Vessel Code - Welding and Brazing qualifications.
- G. MSS SP 58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.

- H. MSS SP 69 - Pipe Hangers and Supports - Selection and Application.
- Ι. MSS SP 89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- MSS SP 110 Ball Valves Threaded, Socket-Welding, Solder Joint, J. Grooved and Flared Ends.

1.4 SUBMITTALS FOR REVIEW

- Α. Product Data:
 - Piping: Submit data on pipe materials, fittings, and accessories. 1.
 - 2. Valves: Submit manufacturer's catalog information with valve data and ratings for each service.
 - 3. Hangers and Supports: Submit manufacturer's catalog information including load capacity.
 - 4. System components: Submit manufacturer's catalog information including capacity, component sizes, rough-in requirements, and service sizes. When applicable, include electrical characteristics and connection requirements.
 - 5. Compressors: Submit type, capacity, and performance characteristics. Include electrical characteristics and connection requirements.
- Β. Product Data: Submit manufacturer's catalog literature with capacity, weight, and electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Submit hoisting and setting requirements, starting procedures.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

Α. Operation and Maintenance Data: Submit assembly views, lubrication instructions, replacement part numbers and availability.

1.6 QUALITY ASSURANCE

Α. Perform Work in accordance with ASME B31.9 code for installation of piping systems and ASME Section IX for welding materials and procedures.

- B. Perform Work in accordance with applicable authority for welding hanger and support attachments to building structure.
- C. Maintain one copy of each document on site.

1.7 QUALIFICATIONS

- Manufacturer: Company specializing in manufacturing products specified Α. 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

- Α. Accept equipment on site in factory fabricated containers with shipping skids and plastic pipe end protectors in place. Inspect for damage.
- B. Protect piping and equipment from weather and construction traffic. Maintain factory packaging and caps in place until installation.

1.9 WARRANTY

Α. Furnish five year manufacturer warranty for pumps, compressors, refrigerated dryers and valves excluding packing.

PART 2 - PRODUCTS

2.1 **COMPRESSED AIR PIPE AND PIPE FITTINGS**

- Α. Steel Pipe: ASTM A53, Schedule 40 black.
 - Fittings: ASME B16.3, malleable iron, forged steel welding type. 1.
 - Joints: Threaded or welded to ASME B31.9. 2.

2.2 COMPRESSED AIR VALVES

- Α. Minimum working pressure 175 psig W.O.G.
- B. Type: Ball with reinforced Teflon seat.

2.3 AIR OUTLET QUICK DISCONNECT COUPLINGS

- Α. Standardize all outlets throughout the project.
- Β. Type: Ring and ball lock type.

2.4 AIR COMPRESSOR

- Type: 60 Gallon, floor mounted, two stage, air cooled, cast iron, V-belt Α. driven compressor.
- B. Provide the following features:
 - 1. Starter switch mounted and wired.
 - 2. Crank case heater.
 - 3. ASME rated and stamped receiver.
 - 4. ASME rated relief valve.
 - 5. Low lube oil shutdown.
 - 6. Pressure gauge.
 - 7. Pressure regulator (initial setting 90 psi).
 - 8. Automatic condensate drain.
 - 9. Load-free starting.
 - 10. Controls start-stop.
 - 11. Furnish 50 feet of 3/8-inch high pressure hose with quick connect couplers with outlet pressure regulator, pneumatic tire filler with 0 -160 psi pressure gauge, safety type air-blow gun with a 12-inch extension.
- Provide all miscellaneous controls and wiring for complete and proper C. Arrange wiring for single point 230 volt single phase operation. connections by Electrical Contractor.

2.5 REGULATORS

Α. 9.0 acfm, 175 maximum psi regulated, 250 psi maximum inlet pressure.

2.6 FILTERS

Disposable felt type. Α.

2.7 TRAPS

A. Drainable dirt and moisture leg full size of branch line.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install drip connections with valves at low points of piping system.
- B. Provide freeze protection for compressor drain and relief valves.
- C. Install take-off to outlets from top of main, with shut off valve after take off. Slope take-off piping to outlets.
- D. Install compressed air couplings, female quick connectors, and pressure gages as indicated on Drawings.
- E. Install tees instead of elbows at changes in direction of piping. Fit open end of each tee with plug.
- F. Cut pipe and tubing accurately and install without springing or forcing.
- G. Slope piping in direction of flow.
- H. Install pipe identification in accordance with Section 15190.
- I. Except where indicated or in flush wall mounted cabinets, install manual shut off valves with stem vertical and accessible for operation and maintenance.
- J. Install strainers on inlet side of pressure reducing valves. Install pressure reducing valves with bypasses and isolation valves to allow maintenance without interruption of service.
- K. Install air compressor unit on vibration isolators. Level and bolt in place.
- L. Install air valve and drain connection on horizontal casing.
- M. Install line size shut-off valve and check valve on compressor discharge.
- N. Install replaceable cartridge type filter silencer for each compressor.
- O. Install bypass with valves around air dryer. Use factory insulated inlet and outlet connections.

3.2 TESTING

Test for Compressed Air Piping Leak Test: Prior to initial operation, clean Α. and test compressed air piping in accordance with ASME B31.9.

SECTION 15484

FUEL OIL PIPING SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- Α. Pipe and pipe fittings.
- Β. Flanges, unions, and couplings.
- C. Valves, strainers, connectors, and filters.
- D. Day tank.

1.2 **RELATED SECTIONS**

- Α. Section 15010 - Basic Mechanical Requirements.
- B. Section 15140 - Supports and Anchors.
- C. Section 15190 - Mechanical Identification.
- D. Section 16000 - Motors and Connections.
- E. Other sections referring to or affecting Work of this Section.

REFERENCES 1.3

- Α. ANSI B31.1 - Power Piping.
- Β. ANSI B31.9 - Building Service Piping.
- C. ASME Sec. IX - Welding and Brazing Qualifications.
- D. ASME B36.10 - Welded and Seamless Wrought Steel Pipe.
- E. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- F. NFPA 31 - Installation of Oil Burning Equipment.

1.4 SUBMITTALS FOR REVIEW

A. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories. Provide manufacturer's catalog information. Indicate valve data and ratings.

1.5 SUBMITTALS AT PROJECT CLOSEOUT

- A. Maintenance Data: Include installation instructions, spare parts lists.
- B. Warranty: Submit Manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

- A. Welding Materials and Procedures: Conform to ASME Code.
- B. Welders Certification: In accordance with ASME SEC IX
- C. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years experience.
- D. Installer Qualifications: Company specializing in performing the Work of this section with minimum three years experience.
- E. Valves: Manufacturer's name and pressure rating marked on valve body.

1.7 REGULATORY REQUIREMENTS

- A. Conform to applicable EPA Regulations for installation of fuel oil system.
- B. Conform to ANSI B31.1 for installation of fuel oil piping.
- C. Provide certification of compliance from authority having jurisdiction indicating approval of installation of fuel oil system.
- D. Product Requiring Electrical Connection: Listed and classified under testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.8 DELIVERY, STORAGE, AND PROTECTION

A. Protect piping and fittings from soil and debris with temporary end caps and closures. Maintain in place until installation.

PART 2 - PRODUCTS

2.1 ABOVE GROUND PIPING

- A. Steel Pipe: ASTM A53 or ASME B36.10, Schedule 40 black.
 - 1. Fittings: ASTM B16.3, malleable iron, or ASTM A234, wrought carbon steel and alloy steel welding type.
 - 2. Joints: NFPA 30, threaded or welded to ANSI B31.9.

2.2 FLANGES, UNIONS, AND COUPLINGS

- A. Pipe Size 2 Inches and Under:
 - 1. Ferrous pipe: 150 psig malleable iron threaded unions.

2.3 VALVES, STRAINERS, CONNECTORS, AND FILTERS

- A. Fusible Valves.
 - 1. Use only valves designed to automatically close when acted upon by heat of 190 degrees F. Provide valves with self-adjusting stuffing box, back seat feature. Install on supply to each burner.
- B. Ball Valves.
 - 1. Two piece bronze body with brass internals, reinforced Teflon seats and seals, non-blowout stems, full size parts thru three inch 150 psi WOG rated.
- C. Check Valves.
 - 1. Spring loaded ball check, bronze body, Teflon seat.
- D. Flexible Connectors.
 - 1. Bronze inner hose and braided exterior sleeve, suitable for minimum 200 psi CWP and 250 degrees F.
- E. Filters.
 - 1. Manufacturer: Tigerloop Combi, combination oil de-aerator and filter, Model 5011ST, or approved equal.

2. Provide a filter at each fuel burning apparatus.

2.4 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 **PREPARATION**

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside of pipe, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation and access to valves and fittings.
- F. Provide access where valves and fittings are not exposed.
- G. Where pipe support members are welded to structural building framing, scrape, brush clean, weld, and apply one coat of zinc rich primer.
- H. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.
- I. Identify piping systems. Refer to Section 15190.
- J. Install valves with stems upright or horizontal, not inverted.

K. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

3.3 **CONNECTION TO EQUIPMENT**

- Provide the final operating connection to fuel oil burning equipment on the Α. 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, filter assemblies, and all fuel oil products subject to leakage.
- C. Test fuel oil piping from tank connections to equipment connections with 100 psi air pressure for a period of one hour. Soap all joints during test period and check for leaks. Certify test results and include such in the O&M Manual

SECTION 15540

FUEL-FIRED HEATERS

PART 1 - GENERAL

1.1 SUMMARY

- Section Includes: Α.
 - Oil fired unit heaters. 1.
- B. Related Sections:
 - 1. Section 15140 - Supports and Anchors.
 - 2. Section 15245 - Vibration Isolation.
 - Section 15250 Earthquake Restraint. 3.
 - Section 15484 Fuel Oil Piping System. 4.
 - Section 15525 Breechings, Chimneys, and Stacks. 5.
 - Section 16000 Motors and Connections: Electrical Supply to 6. Units.
 - 7. Other sections referring to or affecting work of this section.

1.2 REFERENCES

- Α. National Fire Protection Association:
 - NFPA 31 Standard for the Installation of Oil-Burning Equipment. 1.
 - 2. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances.

SUBMITTALS FOR REVIEW 1.3

Α. Product Data: Provide manufacturer's literature and data indicating rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.

1.4 SUBMITTALS AT PROJECT CLOSEOUT

Α. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listing.

B. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

Α. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years experience.

1.6 QUALIFICATIONS

- Manufacturer: Company specializing in manufacturing products specified Α. 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

Α. Accept heaters and controls on site in factory packaging. Inspect for damage.

1.8 WARRANTY

Α. Furnish ten year manufacturer warranty for heat exchanger.

PART 2 - PRODUCTS

2.1 **OIL-FIRED UNIT HEATERS**

- Α. 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.
 - Location: Suspended overhead. 3.
- Β. Casing: Provide unit heater casing made of steel with baked on polyester paint or powder coating, with adjustable horizontal discharge louvers.
- C. Fan and Motor Unit: Propeller type fan resilient mounted to unit. Motor: 1/4 HP, 1100 RPM, 115-volt totally enclosed PSC type with integral overload protection. Finger-proof fan guard. Throw: 51 feet with unit heater mounted at 12 feet above floor. Mount unit heater at height specified on the Plans.

- D. Combustion Chamber: UL ceramic fiber fire pot.
- E. Oil Burner: Flame Retention type, with cadmium sulfide flame detector, two stage fuel pump rated 10 feet single-pipe fuel supply system and 20 feet two-pipe supply/return fuel system. Continuous-duty ignition transformer, nozzle line heater, switch controlled to operate as needed to maintain the nozzle and combustion head temperature between 140 and 150 degrees F. to facilitate proper operation when the unit is started after a long exposure to cold temperatures.
 - 1. Barometric draft regulator in flue.
 - 2. Oil deaerator Oventrop Tiger Loop or approved equal.
- F. 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, deenergizes burner on excessive bonnet temperature, automatic reset.
- G. Heat Exchanger: Provide heat exchanger made of roll-formed aluminized steel. Furnish combustion chamber equipped with inspection port, service door, and two (2) cleanout ports. Design to operate with a minimum stack draft of minus 0.02 inches W.C.
- H. Burner Operation Controls:
 - 1. Room Thermostat: Cycles burner to maintain room temperature setting.
 - 2. Supply Fan Control: Energize from bonnet temperature independent of burner controls, with fixed time on delay, with manual switch for continuous fan operation.
- I. Modine POR 185, Reznor OH 190 or approved equal.

2.2 ROOM THERMOSTATS

A. Provide a complete set of controls to operate the heating system via timer which controls temperature level in the building by selecting the thermostat operating the heating system. When the timer times out (off position), unit heater(s) operate via integral controls in response to the low temperature thermostat. When the timer is timing, (on position) the unit

heater(s) operate in response to the high temperature thermostat. Control items include but are not limited to an interval timer with zero to four (4) hour setting capability, without hold, and with a double-pole double-throw contact rated 10-amps @ 240-volt, in a NEMA-1 enclosure. Provide Class 2 120-volt primary, 24 -volt secondary transformer. Mount in box with time switch. Suitable for operation at minus 38 degrees F. Intermatic FF34H or approved equal. Thermostats: Wall mount line voltage types 8 pin plug in relay with SPDT contact (open on temperature rise) rated 10-amps at 120volts, 60-Hz. Adjustable temperature range minus 30 to plus100 degrees F, Honeywell T631C1103 or approved equal.

PART 3 - EXECUTION

3.1 **EXAMINATION**

Verify space is ready for installation of units and openings are as indicated Α. on shop drawings.

3.2 INSTALLATION

- Install units in accordance with NFPA 31. Α.
- B. Install vent connections in accordance with NFPA 211. Install vents and stacks. Refer to Section 15575.
- C. Install unit heaters with vibration isolation. Refer to Section 15245.
- D. Provide hangers and supports for suspended units. Refer to Section 15140.
- E. Provide operating controls.
- F. Provide connection to electrical power systems. Refer to Section 16000.

3.3 **TESTING AND WARRANTY**

Perform flue gas analysis of each fully operational heater. Tests to include Α. smoke, draft, CO2, stack temperature and unit steady operation efficiency. Final test results to meet or exceed manufacturer's specifications. Provide a copy of the test results to the engineer prior to final acceptance of the installation. Provide manufacturer's warranty for all heating system components for a period of one year from the date of final acceptance of the project.

SECTION 15575

BREECHINGS, CHIMNEYS AND STACKS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Manufactured double wall chimneys for fuel fired equipment.

1.2 RELATED SECTIONS

- A. Section 15540 Oil Fired Unit Heaters.
- B. Other sections referring to or affecting Work of this Section.

1.3 REFERENCES

- A. ANSI/ASTM A167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- B. ANSI Z223.1 (NFPA 54) The National Fuel Gas Code.
- C. NFPA 211 Standards for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances.
- D. SMACNA HVAC Duct Construction Standards Metal and Flexible.
- E. International Mechanical Code Latest Locally Adopted Edition.
- F. UL 103 Standard for Factory Built Low Heat Chimneys.
- G. ASHRAE Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems."

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: That 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.
- Ε. Vent Connector: That 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**

- Α. Factory built vents and chimneys used for venting natural draft appliances shall comply with NFPA 211 and be UL listed and labeled.
- Β. Make provisions for barometric dampers as recommended by the appliance (unit heater) manufacturers.

1.6 SUBMITTALS

- Α. Submit shop drawings indicating general construction, dimensions, weights, support and layout of venting system(s). Submit layout drawings indicating plan view and elevations and a custom detail of the roof penetration installation.
- Β. Submit product data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights.
- C. Submit manufacturer's installation instructions.

1.7 QUALIFICATIONS

Manufacturer: Company specializing in the manufacture of products Α. specified in this Section with minimum three years experience.

1.8 **REGULATORY REQUIREMENTS**

Α. Conform to applicable code for installation of oil burning appliances and equipment.

PART 2 - PRODUCTS

DOUBLE WALL METAL STACKS 2.1

Α. Indoor: Provide double wall stainless steel assembly with 1-inch insulation, tested to UL 103 and UL listed, for use with building heating

equipment, in compliance with NFPA 211. Provide transition to 2-inch Metalbestos IPS or approved equal prior to exiting building.

- В. Outdoor: Fabricate with 2-inch fiber insulated minimum space between walls. Construct inner jacket of 20 gauge ANSI/ASTM A167 Type 304 stainless steel. Construct outer jacket of Type 304 stainless steel 24 gauge. Metalbestos Model No IPS, 2-inch, or approved equal.
- C. Provide accessories each bearing factory applied UL label.
 - 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

- Install in accordance with manufacturer's instructions. Α.
- B. Install in accordance with recommendations of ASHRAE-Handbook, Equipment Volume, Chapter "Chimney, Gas, Vent, and Fireplace Systems", and ANSI Z223.1 (NFPA 54).
- C. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing.
- D. Level and plumb chimney and stacks.
- E. Clean breechings, chimneys, and stacks during installation, removing dust and debris.
- F. At appliances, provide slip joints permitting removal of appliances without removal or dismantling of breechings, chimneys, or stacks.
- G. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold shape and prevent buckling. Support vertical breechings, chimneys and stacks at 12-foot spacing to adjacent roof structure. Refer to manufacturer recommendations for additional support requirements.

3.2 SCHEDULE

EQUIPMENT	BREECHING	CHIMNEY/STACK

Unit Heater

Galvanized

Double Wall

SECTION 16000 ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

A. Provide complete electrical systems as shown on drawings and specified. Furnish all labor, equipment, appliances, materials, and perform operations required for complete installation in accordance with all sections of specifications, drawings, codes, and conditions of contract.

1.2 CODES, STANDARDS, FEES, PERMITS

- A. Comply with latest edition of the National Electrical Code, National Electrical Safety Code, local codes, amendments, ordinances and requirements of utility companies' furnishing services to installation. Comply with NEMA, UL, ANSI, ICEA and other industry standards. Comply with requirements of IBC, IMC, UPC, and other applicable codes.
- B. Secure and pay for all inspections, fees, permits, etc., required by local and state agencies.

1.3 DRAWINGS

A. Electrical drawings are diagrammatic and do not show all features of work. Install electrical items to provide symmetrical appearance. Do not scale drawings. Review other drawings and adjust work to conform to conditions shown. Verify field conditions. Immediately contact the Owner's Representative for clarification of questionable, obscure items, or apparent conflicts. The Owner's Representative's decision is final for all clarifications requested. Extra cost resulting from a condition where clarification was not requested: Made at no increase in contract amount unless extra cost is approved in writing.

1.4 WORKMANSHIP

A. Considered as important as electrical and mechanical efficiency and subject to approval. Employ workmen skilled in trade and familiar with particular techniques applicable to various sections of work. Install in accordance with NECA "Standard Practices for Good Workmanship in Electrical Contracting."

1.5 COORDINATION

- A. Coordinate with other trades for proper installation and timely execution. Any changes necessitated by failure to properly coordinate work: Made at no increase in contract amount.
- B. Verify information shown on plans with equipment items actually furnished where equipment is furnished or installed by others. Notify Owner's Representative of any conflicts.
- C. Coordinate with serving utilities. Provide all equipment and labor required, include all costs necessary for complete electrical services.

1.6 SUBMITTALS

- A. Submit complete data on all material and equipment to be incorporated into the project. Material submittals shall include conduit, wire and cable, wiring devices, cabinets and enclosures, service equipment, panelboards, motor controls, lighting fixtures, grounding procedures, etc. Include catalog numbers, wiring diagrams, dimensions and performance data.
- B. Submit in neatly bound, hard cover loose-leaf three ring binders. Include project name, Contractor's name, and Division 16 subcontractor's name, address and telephone number on each cover. Index 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.

1.7 OPERATION AND MAINTENANCE MANUALS

- A. Include all electrical items identified in "Submittal" paragraph above.
- B. Submit in neatly bound hard cover loose-leaf three ring binders. Include project name, Contractor's name, address and telephone number, Division 16 subcontractor's name, address and telephone number on each cover.
- C. 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.
- D. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

1.8 SUBSTITUTIONS

A. Make no substitutions or revisions without written approval. For equipment scheduled by manufacturer's name and catalog designations: Manufacturer's published data and/or specification for that item are considered part of specification. All similar equipment same manufacturer throughout.

1.9 **PROJECT COMPLETION**

- A. Thoroughly clean inside and out all fixtures and equipment. Clean premises of construction debris. Call for final construction observation. Conduct operating test for approval. Demonstrate installation to operate satisfactorily in accordance with requirements of contract documents. Provide personnel to assist Engineer in removal and replacement of equipment for observation purposes.
- B. Should any portion of installation fail, repair or replace items until items can be demonstrated to comply.
- C. Emergency systems must be operational prior to occupancy.

PART 2 - PRODUCTS

2.1 RACEWAYS

- A. Galvanized Rigid Steel Conduit or Intermediate Metal Conduit: Use in damp or wet locations, underground, in concrete, where subject to physical damage, for service conductors, and branch circuits up to 10 feet above finished grade.
- B. Electrical Metallic Tubing or Intermediate Metal Conduit: Use in all other areas unless otherwise indicated. Provide raintight/concrete-tight compression fittings for EMT tubing.
- C. Flexible Metallic Conduit: Use for final connections to fixtures and equipment to isolate vibration or allow relocation. Provide flexible watertight conduit in damp or wet locations. Where used outdoors, use liquidtight flexible conduit rated for –60 degrees F and listed for direct bury.
- D. Where noted on drawings use HDPE conduit.
- E. No conduit allowed embedded in spray-applied fireproofing or between structural steel members and gypsum wall board.

- F. Locate raceways to not endanger strength of structural members, and six inches minimum from parallel runs of heat piping. Do not install raceways in or through structural members unless specifically approved. Cross expansion joints with expansion fittings and bonding conductor.
- G. Provide pull wire in raceways installed but left empty.
- H. Waterproof all roof and exterior wall penetrations as approved.

2.2 WIRE AND CABLE

- A. Install all conductors in approved raceway systems. All conductors are to be copper with XHHW-2 insulation, minimum wire size #12 AWG except control wiring can be #14 AWG.
- B. Minimum insulation rating: 90 degrees C, 600 volt.
- C. 120 volt branch circuit lengths from panel to first outlet exceeding 75': No. 10 AWG minimum.
- D. Increase conductor sizes to #10 AWG to offset derating factor when more than three 20 amp conductors are installed in single raceway.
- E. Color code 120/240 volt single phase systems: Black, red and white.
- F. Connections:
 - 1. #6 and larger: Solderless lugs.
 - 2. #8 and smaller: Insulated wire nut connector, ideal "Wingnut" hard shell.

2.3 BOXES

- A. Provide galvanized or cadmium plated, one piece pressed or welded steel with device finish ring and gang cover. Four inch square or octagonal, 1-1/2" deep minimum size.
- B. Provide additional pull boxes as required to avoid excess pulling tensions and to facilitate work.

2.4 CABINETS

A. Provide cabinets of code gauge, zinc-coated sheet steel, interior dimensions as indicated, with hinged door and flush catch. Key to match panelboards.

2.5 PANELBOARDS AND OVERCURRENT PROTECTION

- A. Square D Type NQOD, NF, or HC Series, GE, Cutler Hammer or approved equal. Same manufacturer and keyed alike throughout project. Factory assembled panels with thermal magnetic branch breakers, main lugs or circuit breaker, etc., as shown. Provide dead front construction, flush or surface mounted as shown, 20" wide, 5-3/4" deep unless otherwise indicated. Provide doors with concealed hinges, flush keyed handles. Provide typed circuit directories on door in frame with protective plastic covering. Directory to include circuit number, circuit use, etc. See drawings for additional requirements. Mount top of cabinet at 6'-6" unless noted.
- B. Provide circuit breakers of thermal magnetic type, quick-make, quickbreak with a minimum of 10,000 AIC rating at 120, 240 volt. Meet NEMA standard AB1. Provide high interrupting capacity and non-fuse type current limiting circuit breakers where shown. Provide multi-pole breakers with internal common trip.
- C. Provide "switching rated" circuit breakers for all lighting circuits controlled at the panelboard. Provide circuit breakers designated "GFI" equipped with integral Class A ground fault circuit interrupter set to trip on ground fault of six milliamps or greater.

2.6 WIRING DEVICES

- A. Duplex receptacles: 20 amp, 125 volt, NEMA Type 5-20R, hospital grade that meets Federal Specification W-C-596G tests. Provide outlets designated GFI with integral Class A ground fault circuit interrupter UL 943-listed. Color shall be ivory.
- B. Special Outlets: Capacity, voltage and NEMA configuration noted, same quality as duplex receptacles.
- C. Switches: 20 amp, 120/277 volt, meet federal specification W-S-896F, UL #20, self-grounding. Color shall be ivory.
- D. Device Plates: Use galvanized plates for exposed wiring, gasketed polycarbonate self-closing weatherproof plates outdoors, U.L. Listed for wet locations while in use.

2.7 MOTORS AND CONNECTIONS

A. 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 Division 15.)

(MC = Mechanical Contractor Division 15) (EC = Electrical Contractor Division 16)

ITEM	FURNISHED BY	SET IN PLACE BY	WIRED POWER	WIRED CONTROL
Equipment Motors	MC	MC	EC	MC
a) In packaged equipment	MC	MC	EC	MC
Disconnect Switches, Manual Motor Starters Thermal Overload Switches	s, EC	EC	EC	
Control Relays, Trans formers, Time Clocks, Thermostats, Other Miscellaneous Division 15 Controls	- MC	МС	MC	МС

B. 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 SO or ST 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.

2.8 MOTOR STARTER AND DISCONNECTS

- A. Provide each motor with disconnecting means and with suitable controller or other device as required, complete with manual or automatic control of standard NEMA sizes.
- B. Arrange control circuits for manual, auto and other signal inputs from mechanical control panels, and arrange control power to de-energize control circuits whenever operating power supply to particular equipment is disconnected.
- C. Provide horsepower rated manual motor starting switch with thermal overload protection for each single phase motor. Size heaters for 115% measured full load current.
- D. Disconnects: Heavy duty safety switches, circuit breakers or manual motor starting switches.

2.9 GROUNDING

- A. Ground all electrical devices, motors, metallic piping, ductwork, metal framing and flooring, etc., in accordance with N.E.C. Article 250.
- B. In addition to NEC Article 250 requirements, provide a supplementary system ground around each SRE building and in footing where available and bond together as shown on the drawings. Bond to service equipment. Where grounding system is buried or concealed, use Thermold, Cadweld or Burndy Hyground connection systems.
- C. Ground all main disconnect switches and distribution panels with minimum #2 AWG bare copper ground wire unless otherwise noted.
- D. Provide separate green grounding conductor in all raceways and for all connections.

2.10 LIGHTING FIXTURES

- A. Provide all new fixtures, UL listed and equipped with necessary frames and modifications required for complete installation. Uniformly space and coordinate installation with ceiling or wall patterns, as approved. Coordinate to avoid conflicts.
- B. Provide all fixtures complete with lamps, ballasts, lenses and mounting devices as required.
- C. Coordinate all lighting fixtures with ceiling types prior to ordering. Provide required mounting devices, frames, etc., at no additional cost.
- D. Provide all exterior lighting fixtures U.L. listed for damp location where beneath soffits and for wet location where directly exposed to rain.
- E. Equip exterior ballasted fixtures with -40 degrees F. ballasts.
- F. Set fixtures true and plumb, free of light leaks, warps, dents, irregularities.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install all material and equipment in accordance with manufacturer's recommendations, instructions and installation drawings, unless otherwise indicated and in accordance with NECA's "Standard Practices for Good Workmanship in Electrical Contracting".
- B. Seal penetrations with UL-listed fireproofing materials to maintain fireproofing integrity and watertightness.
- C. Seal airtight all penetrations through vapor barriers.
- D. Replace or repair any fireproofing or insulation damaged by installation of electrical equipment.
- E. Repair all damage to finished surfaces where caused by installation of electrical equipment.
- F. Provide proper identification for panels, switches, or any item of electrical equipment used as a control device or disconnecting means for any equipment. Identify boxes containing emergency circuits per N.E.C. Article 700-9.

3.2 SUPPORTS

- A. Support raceways on approved types of wall brackets, ceiling trapeze hangers or malleable iron straps. Plumbers perforated strap not permitted as means of support.
- B. Do not suspend raceways or equipment from water or other piping, but support independently.

- C. Anchor equipment to the building structure to resist Seismic Design Category D earthquake forces. Provide adequate backing at structural attachment points to accept the forces involved.
- D. Provide equipment supported by flexible isolation mounts with earthquake restraining supports.
- E. Secure boxes, wall brackets, cabinets and hangers by means of machine screws, bolts or welding on metal surfaces; and wood screws in wood construction.
- F. For fixtures weighing 56 pounds or more, support luminaires from structural members capable of supporting total weight and independently from wiring system.

END OF SECTION

Appendix M

Bridge Technical Specifications

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

SECTION 205

EXCAVATION AND FILL FOR MAJOR STRUCTURES

205-1.01 DESCRIPTION. Excavate and backfill for bridges, retaining walls, concrete box culverts, and other major structures.

Furnish all resources to place and remove cribbing or cofferdams. Perform all required sheeting, bracing, bailing, pumping, draining, and grouting.

Replace unsuitable material encountered below the elevation of the bottom of footings.

205-2.01 MATERIALS. Use materials that conform to the following:

Portland Cement	Section 701
Blended Hydraulic Cement	Section 701
	Section 701
	Section 701
Fine Aggregate	Subsection 703-2.01
Porous Backfill Material	Subsection 703-2.10
Structural Fill	Subsection 703-2.13
Chemical Admixtures	Subsection 711-2.02
Water	Subsection 712-2.01

CONSTRUCTION REQUIREMENTS

205-3.01 EXCAVATION.

1. <u>General</u>. Clear and grub prior to starting excavation according to the requirements of Section 201.

Cut all rock or other hard foundation material to a firm surface, either level, stepped, or serrated, as directed, and remove all loose material.

Do not disturb material below the bottom of spread footings, unless otherwise noted in the Contract.

Excavate to the bottom of footing prior to driving piles. Do not excavate below the footing elevation unless otherwise noted in the Contract. When swell results from driving piles, excavate the footing area, to the elevation of the bottom of the footing, as shown on the Plans. When subsidence results from driving piles, backfill with

structural fill material, to the elevation of the bottom of the footing, as shown on the Plans.

Dispose of all necessary excavated material as provided in Subsection 203-3.01.

Do not alter streambed channel and do not place excavated materials in natural stream channels, unless shown on the Plans or approved in writing.

Give the Engineer in writing no less than 15 days advance notice prior to beginning excavation for spread footings to allow for inspection of the excavated surface. With this notification, identify the location and specify a time period of no less than two days for the Department to inspect the excavated surface. Dewater and remove all debris from the surface prior to the Department's inspection. Obtain the Engineer's approval of the excavated surface prior to the placement of any formwork or foundation materials. Account for the time required by the Department to perform the inspection in the progress schedule submitted under Subsection 108-1.03. Suspension of work to allow for inspection is not a suspension of work per Subsection 108-1.06 and additional contract time will not be allowed.

- 2. <u>Foundations on Bedrock</u>. Excavate for footings founded on bedrock, to the neat lines of the footings. Fill overbreak areas outside the neat lines of footings, with Class A concrete, at no additional cost to the Department.
- 3. <u>Cofferdams</u>. Use suitable cofferdams as necessary wherever water-bearing strata are encountered above the elevation of the excavation. Construct foundation seals according to the requirements of Section 501.

Submit detailed drawings, designed and sealed by a professional engineer proficient in structural design and registered in the State of Alaska, showing proposed method of cofferdam construction. The details and clearance of cofferdams, which affect the character of the finished work, is subject to approval but other details of the design are your responsibility. Submit drawings at least 3 weeks in advance of cofferdam construction.

Extend cofferdams to the required depth or to bedrock. Adequately brace cofferdams and make them as watertight as practical. Provide sufficient clearance inside cofferdams to permit construction of forms and permit pumping outside of the forms.

Right or enlarge cofferdams which are tilted or moved out of position by any cause during the sinking process, to provide the necessary clearance and proper pier location.

When no foundation seal is shown on the Plans and the cofferdam cannot be dewatered, place a seal if the Engineer approves seal placement in writing.

Foundation seals, when shown on the Plans, may be eliminated as directed if the cofferdams can be dewatered without the seals when the excavation has been carried to the elevation of the bottom of the footing.

Construct cofferdams to protect concrete against damage from a sudden rising of the water and to prevent damage by erosion by venting cofferdams at low water or by other means that limit differential hydrostatic head.

No timber may extend into the completed substructure.

After substructure completion, remove sheet piling and other temporary structural materials in such a manner as to avoid disturbing the finished structure. Steel or concrete sheeting or bracing may be permitted to remain in the completed structure, subject to approval.

205-3.02 STRUCTURAL FILL. Remove material that is unsuitable for supporting foundations, from the bottom of the footing to the depth as shown on the Plans. Remove material that is unsuitable for approach slabs shown on the Plans. Place Structural Fill in 6-inch layers, compacted to meet Subsection 205-3.05. Place Structural Fill as uniformly as possible on all sides of structural units as shown on the Plans. Avoid unbalanced loading of Structural Fill material which could damage the structure. When placed against concrete, place Structural Fill in accordance with Section 501.

Controlled Low-Strength Material may be used as an alternative source for Structural Fill if approved by the Engineer.

205-3.03 BACKFILL. Unless otherwise noted, reuse excavated material for backfill where shown on the Plans. If additional backfill is required, use material meeting Selected Material, Type C (Subsection 703-2.07), or as approved by the Engineer. Place backfill material in layers, and compact to the satisfaction of the Engineer. Bench slopes within the area to be filled.

Place underwater backfill in natural stream channels without compaction or layer requirements.

Place backfill as uniformly as possible on all sides of structural units. Avoid unbalanced loading of backfill which could damage the structure. When placed against concrete, place backfill according to the requirements of Section 501.

No ponding or jetting of backfill is allowed.

205-3.04 POROUS BACKFILL. Place porous backfill material continuously within a vertical plane 1 foot behind retaining walls and abutments, unless otherwise shown on the Plans.

Where weep holes are shown on the Plans or required by the Specifications, place not less than 1 cubic foot of Porous Backfill material in the fill at each hole, securely tied in a burlap bag, or wrapped with an acceptable geotextile fabric. Extend the wrapped Porous Backfill material at least 6 inches above the hole.

205-3.05 COMPACTION. Compact material in conformance with the following, using moisture and density control unless the Engineer determines that such controls are not feasible.

1. <u>Compaction With Moisture and Density Control</u>. The maximum density will be determined by WAQTC FOP for AASHTO T 180 or ATM 212.

Water or aerate as necessary to provide the approximate optimum moisture content for compaction. Compact each layer to not less than 98% of the maximum density. Acceptance densities will be determined by WAQTC FOPs for AASHTO T 310 and T 224.

2. <u>Compaction Without Moisture and Density Control</u>. Compact by routing construction equipment and/or rollers uniformly over the entire surface of each layer before the next layer-is placed. Compact until the material does not rut under the loaded hauling equipment.

Keep dumping and rolling areas separate. Do not cover any lift by another until the Engineer-has determined the required compaction is obtained.

205-3.06 CONTROLLED LOW-STRENGTH MATERIAL. Provide Controlled Low-Strength Material (CLSM) that is self compacting, cementitious, flowable material requiring no subsequent vibration or tamping to achieve consolidation. Provide a job mix design in writing to the Engineer on Form 25D-203. Do not place CLSM until the Engineer approves the mix design.

Design CLSM to have 28-day compressive strength between 100 psi minimum to 300 psi maximum as determined by ASTM D 4832 and a flowable consistency within a slump range of 3 to 10 inches as determined by WAQTC FOP for AASHTO T 119.

Calculate the water-cement ratio on the total weight of cementitious material. The following are considered cementitious materials: Portland cement, blended hydraulic cement, fly ash, and silica fume. Use admixtures in accordance with the manufacturer's recommendations. Do not use admixtures containing calcium chloride.

Mix and batch CLSM in accordance with Subsection 501-3.01 to Subsection 501-3.03.

Do not place CLSM on frozen ground, in standing water, or during wet weather conditions. Place CLSM only if the air temperature is 40 °F minimum and rising. Ensure the material temperature is at least 50 °F while being placed.

Do not apply loads to the CLSM until the compressive strength reaches 50 psi.

Meet the proportion requirement of Subsection 501-3.05.5.a. Acceptance will be based on a Certificate of Compliance. Provide a Certificate of Compliance for each batch of CLSM in accordance with Subsection 501-3.05.2.

DIVISION 500 -- STRUCTURES

SECTION 501

CONCRETE FOR STRUCTURES

501-1.01 DESCRIPTION. Furnish, place, finish, and cure Portland cement concrete for structure construction. Use the class of concrete noted on the Plans unless otherwise specified.

CLASSES OF CONCRETE

<u>Class A</u> :	General use concrete
<u>Class A-A</u> :	Concrete where improved strength and durability is required
<u>Class P</u> :	Concrete where strength in excess of 5000 psi is required
Class DS:	Concrete for drilled shaft foundations

501-1.02 DEFINITIONS.

ADMIXTURE. A material other than water, aggregate, hydraulic cement, pozzolan, and fiber reinforcement, added to the batch before or during mixing, used as an ingredient of a cementitious mixture to modify its freshly mixed, setting, or hardened properties..

AIR-ENTRAINING ADMIXTURE. An admixture causing the development of a system of microscopic air bubbles in concrete, mortar, or cementitious material paste during mixing, usually to improve its workability and resistance to damage by freezing and thawing.

SET-ACCELERATING ADMIXTURE. An admixture causing an increase in the rate of hydration of the hydraulic cement and shortens the time of setting, increases the rate of strength development, or both.

SET-RETARDING ADMIXTURE. An admixture causing a decrease in the rate of hydration of the hydraulic cement and lengthens the time of setting, decreases the rate of strength development, or both.

WATER-REDUCING ADMIXTURE. An admixture either increasing slump of freshly mixed mortar or concrete without increasing water content or maintaining slump with a reduced amount of water, due to factors other than air entrainment.

AGITATION. The process of providing motion in mixed concrete just sufficient to prevent segregation or loss of plasticity.

BLEED WATER. The autogenous flow of water emerging from newly placed concrete, and caused by the settlement of the solid materials within the mass. The relative quantity of mix water that will bleed can be estimated by AASHTO T 158.

CAMBER. For prestressed concrete members, camber is the net upward deflection of an eccentrically prestressed concrete member due to the combined loads, shrinkage, creep, and eccentricity of the prestress force. For non-prestressed members, camber is a deflection intentionally built into a structural element or form to improve appearance or to nullify the deflection of the element under the effects of loads, shrinkage, and creep.

CEMENT. A binding material that sets and hardens by hydration and is capable of doing so underwater, sometimes called hydraulic cements

CEMENTITIOUS MATERIAL. Hydraulic cements and pozzolans with cementing properties.

CHAMFER. A beveled edge or corner formed into finished concrete.

COMPRESSIVE STRENGTH, (f_c). The measured maximum resistance of a concrete or mortar specimen to axial compressive loading; expressed as force per unit cross-sectional area; or the specified resistance used in design calculations.

SPECIFIED COMPRESSIVE STRENGTH, (f'c). The 28-day compressive strength used in structural design and specified in the Contract documents.

REQUIRED AVERAGE COMPRESSIVE STRENGTH, (f'_{cr}**).** The 28-day compressive strength, used as the basis for selection of concrete proportions in the mix design process, sufficiently greater than the Specified Compressive Strength to ensure the acceptance criteria are met.

COMPRESSIVE STRENGTH TEST. The average strength test of concrete, from at least two 6.0 x 12.0 inch or at least three 4.0 x 8.0 inch compressive strength test cylinders sampled according to AASHTO T 141, cured according to AASHTO R 39 or WAQTC FOP for AASHTO T 23, and tested according to AASHTO T 22 or sampled, cured, and tested to equivalent ASTM test methods. Unless otherwise noted, tested at an age of 28 days.

The average strength test of grout, from at least three specimens from a batch and tested according to WAQTC TM 12, AASHTO T 106, or ASTM C 109.

CONCRETE ANCHOR. Cast-in-place or post-installed fastening device installed in the concrete for the purpose of transferring loads to the concrete. See ASTM E 2265 for standard terminology.

CONSOLIDATION. The process of inducing a closer arrangement of the solid particles in freshly mixed concrete during placement by the reduction of voids, usually by vibration, rodding, tamping, or some combination of these actions.

CONSTRUCTION JOINT. The surface where two successive placements of concrete meet.

CURING. Action taken to maintain moisture and temperature conditions in a freshly placed cementitious mixture to allow hydraulic cement hydration and (if applicable) pozzolanic reactions to occur so the desired properties of the mixture develop.

CURING PERIOD. The length of time in which continuous curing operations are maintained thereby allowing the concrete to properly hydrate and develop its required strength and durability.

INITIAL CURING PERIOD. The time period between placement and implementation of final curing methods in which deliberate action is taken to reduce the loss of moisture from the surface of the concrete.

FINAL CURING PERIOD. The time period after the concrete achieves final set in which deliberate action is taken, without damaging or marring the concrete surface, to maintain satisfactory moisture content and temperature in concrete.

CURING COMPOUND. A liquid applied as a coating to the surface of newly placed concrete to retard the loss of water and, in the case of pigmented compounds, reflects heat to provide an opportunity for the concrete to develop its properties in a favorable temperature and moisture environment.

DURABILITY. The ability of concrete to resist weathering action, chemical attack, abrasion, and other conditions of service.

EVAPORATION RATE REDUCER. A material generating a continuous thin film when spread over water on the surface of fresh concrete to retard the evaporation of bleed water.

FIELD TEST RECORD. A record of compressive strength test results from concrete used on prior projects and produced by the concrete production facility.

INFORMATIONAL FIELD TEST. A compressive strength test, determined by the Engineer, from field test cylinders cured on the site under temperature and moisture conditions similar to the concrete in the structure; except, the compressive strength test

may consist of one 6.0 x 12.0 inch or one 4.0 x 8.0 inch compressive strength test cylinder.

KEYWAY. A recess or groove in one lift or placement of concrete and filled with concrete of the next lift or grout, giving shear strength to the joint.

LAITANCE. A layer of weak material derived from cementitious material and aggregate fines either: 1) carried by bleeding to the surface or to internal cavities of freshly placed concrete; or 2) separated from the concrete and deposited on the concrete surface or internal cavities during placement of concrete underwater.

MORTAR. A mixture of cementitious material paste and fine aggregate occupying the space between particles of coarse aggregate.

RETEMPER. To add water and remix concrete or mortar to restore workability to a condition in which the mixture is placeable or usable.

ROCK POCKET. A porous, mortar-deficient portion of hardened concrete consisting primarily of coarse aggregate and open voids.

SCREED. To strike off concrete lying beyond the desired plane or shape. A tool for striking off the concrete surface, sometimes referred to as a strikeoff.

SET. The condition reached by a cementitious material paste, mortar, or concrete that has lost plasticity to a degree of stiffening generally stated as the time in hours and minutes required for cementitious material paste to stiffen sufficiently to resist the penetration of a weighted test needle as prescribed by AASHTO T 197,

INITIAL SET. The first stiffening of concrete.

FINAL SET. Attainment of significant rigidity in which rainfall, foot traffic, and curing materials contacting the concrete surface do not damage or mare the concrete surface and do not alter the properties of the finished surface.

TREMIE. A pipe or tube with a hopper for filling at its upper end through which concrete is deposited.

501-2.01 MATERIALS. Use materials conforming to the following:

1. <u>Cementitious Materials</u>

Portland Cement	Section 701
Blended Hydraulic Cement	Section 701
Fly Ash	Section 701
Ground Granulated Blast-Furnace Slag	Section 701
Silica Fume	Section 701

2. Aggregate Materials

Fine Aggregate	Subsection 703-2.01
Coarse Aggregate	Subsection 703-2.02
Aggregate for Abrasive Finish	Subsection 703-2.14

3. Water, Admixtures and Curing Materials

Curing Materials	Subsection 711-2.01
Chemical Admixtures	Subsection 711-2.02
Water and Ice	Subsection 712-2.01

4. Anchors and Inserts

Concrete Anchor Inserts and Bolts	Subsection 712-2.20
Utiliduct, HDPE	Subsection 706-2.08
Utiliduct, Steel	Section 716
Structural Steel	Section 716
Asphalt Felt	ASTM D 226, Type I (No. 15 Asphalt Felt)

5. Grout and Epoxy

Grout	Subsection 701-2.03
Epoxy Adhesive for Crack Sealing	AASHTO M 235, Type IV, Grade 3
Epoxy Adhesive for Crack Injection	AASHTO M 235, Type IV, Grade 1
Low-Viscosity Resin	Subsection 712-2.19
Epoxy Bonding Agents	AASHTO M 235, Type V

501-2.02 COMPOSITION OF MIXTURE - JOB MIX DESIGN. Provide a Job Mix Design, for each required class of concrete and Specified Compressive Strength (f'_c), which meets the requirements of this Subsection and provides workability and consistency so the concrete can be worked readily into the forms and around reinforcement without segregation or bleeding. Determine proportions using the absolute volume method according to ACI 211.1.

1. <u>Water-Cement Ratio and Cementitious Materials</u>. Provide a Job Mix Design meeting the water-cement ratio requirements in Table 501-1.

Calculate the water-cement ratio based on the total weight of cementitious material. The following are considered cementitious materials: Portland cement, blended hydraulic cement, fly ash, ground granulated blast-furnace slag, and silica fume.

Fly ash, ground granulated blast-furnace slag, silica fume, and combinations of these materials may be used as a substitute for Type I and II Portland cement provided the quantity meets the limits of Table 501-2 and the total quantity of combined fly ash, ground granulated blast-furnace slag, and silica fume does not exceed 40 percent of the total cementitious material by weight. Do not use fly ash with Type III Portland cement.

Class of Concrete	Water-Cement Ratio, maximum
	lbs/lbs
Α	0.45
A-A	0.40
Р	0.35
DS	0.45

TABLE 501-1WATER-CEMENT RATIO REQUIREMENTS

TABLE 501-2SUPPLEMENTARY CEMENTITIOUS MATERIAL LIMITS

Cementitious Material	Percent of Total Cementitious Material by Weight ¹	
	Maximum	
Fly Ash	35%	
Ground Granulated Blast-Furnace Slag	40%	
Silica Fume	10%	

¹ The maximum percent includes initial quantities in blended hydraulic cement plus additional supplementary cementations materials.

2. <u>Aggregate Gradations</u>. Provide a Job Mix Design meeting the fine aggregate gradation requirements in Subsection 703-2.01 and the coarse aggregate gradation requirements in Table 501-3

Class of	Coarse Aggregate Size Number
Concrete	AASHTO M 43
Α	No. 57 or 67
A-A	No. 57 or 67
Р	No. 67
DS	No. 7 or 8

TABLE 501-3COARSE AGGREGATE GRADATION REQUIREMENTS

- 3. <u>Air Content</u>. Provide a Job Mix Design with a total air content of 6.0 percent. The total air content for Class P concrete having a water/cement ratio less than 0.33 may be reduced 3.0 percent. Air-entrained concrete is required only for the deck portion of prestressed precast concrete members. Air-entrained concrete is not required for Class DS concrete.
- 4. <u>Slump</u>. Provide a Job Mix Design meeting the slump requirements in Table 501-4.

TABLE 501-4SLUMP REQUIREMENTS

Condition	Slump
Concrete without a water-reducing admixture	4" max.
Concrete with a Type A, D, or E water- reducing admixture	6" max.
Concrete with a Type F or G high-range water-reducing admixture	9" max.
Class DS concrete, wet-shaft process	7" min. 9" max.
Class DS concrete, dry-shaft process	6" min. 9" max.

5. <u>Chloride Ion Content</u>. For Class A-A and P Concrete, provide a Job Mix Design with a total water soluble chloride ion content of the concrete that does not exceed 0.06

percent by weight of cementitious material for precast concrete members or 0.08 percent by weight of cementitious material for other concrete, tested according to ASTM C 1218.

6. <u>Required Averaged Compressive Strength</u>. Provide a Job Mix Design meeting a Required Average Compressive Strength (f'_{cr}) established from either the Empirical Method or the Statistical Method.

If the Specified Compressive Strength (f_c) is not designated on the Plans, use a Specified Compressive Strength listed in Table 501-5.

Class of	Specified Compressive Strength (f'c)
Concret e	(psi)
Α	4000
A-A	5000
Р	8000
DS	4000

TABLE 501-5COMPRESSIVE STRENGTH REQUIREMENTS

a. <u>Empirical Method</u>. Establish the Required Average Compressive Strength from the following equations:

$f'_{cr} = f'_{c} + 1200$	for $f'_c \le 5000 \text{ psi}$
f' _{cr} = 1.1f'c + 700	for f' _c > 5000 psi

- Where: f'_{cr} = Required Average Compressive Strength, psi f'_{c} = Specified Compressive Strength, psi
- b. <u>Statistical Method</u>. If the production facility has field test records of compressive strength tests, establish the Required Average Compressive Strength based on the calculated standard deviation of the field test records and using the largest result of the following the equations:

 $f'_{cr} = f'_{c} + 1.34 \text{ks}$ for all f'_{c} or, $f'_{cr} = f'_{c} + 2.33 \text{ks} - 500$ for $f'_{c} \le 5000 \text{ psi}$,

Linear interpolation to determine *k* for intermediate number of tests is acceptable.

Use field test records performed within the past 12 months and spanning a period of more than 60 days for a class of concrete within 1000 psi of the Specified Compressive Strength. Use field test records from concrete produced at the production facility, which represent materials, quality-control procedures, and climatic conditions similar to those expected in the work. Do not use field test records from concrete in which acceptance requirements for materials or concrete proportions were more closely restricted than those in the proposed work. Use field test records meeting one of the following:

(1) <u>One Group of Field Test Records</u>. Use field test records representing a group of at least 15 consecutive compressive strength tests in which all concrete was produced using the same mixture proportions. Calculate the standard deviation using the following equation:

$$s = \sqrt{\frac{\sum_{i=1}^{n} (X_i - \bar{X})^2}{(n-1)}}$$

Where: s = standard deviation, psi

- n = number of compressive strength test results considered
- X_i = individual compressive strength test result, psi
- $\overline{\mathbf{x}}$ = average of *n* compressive strength test results, psi
- (2) <u>Two Groups of Field Test Records</u>. Use field test records representing two groups of consecutive compressive strength tests totaling at least 30 tests. Ensure each group is comprised of at least 10 consecutive compressive strength tests, and all concrete in each group was produced using the same mixture proportions. Calculate the standard deviation using the following equation:

$$s = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{(n_1+n_2-2)}}$$

- Where: s = standard deviation for the two groups combined, psi
 - s_1 , s_2 = standard deviation for groups 1 and 2, respectively, calculated according to Subsection 501-2.02.6.b.(1), psi
 - n_1 , n_2 = number of test results in groups 1 and 2, respectively

7. Job Mix Design Verification.

- a. <u>Required Average Compressive Strength</u>. Verify the Job Mix Design satisfies the Required Average Compressive Strength by meeting at least one of the following requirements:
 - (1) Field Test Records. Use field test records that:
 - (a) use materials of the same brand and type and from the same manufacturer as the materials used in the work;
 - (b) were from concrete produced at the production facility;
 - (c) use quality-control procedures, and had climatic conditions similar to those expected in the work; and
 - (d) encompass a period of not less than 60 days.

Do not use field test records from concrete in which acceptance requirements for materials or concrete proportions were more closely restricted than those in the proposed work.

For a single group of at least 10 consecutive compressive strength tests for one mixture, verify the average of the compressive strength tests equals or exceeds the Required Average Compressive Strength.

For two groups, each having at least 10 consecutive compressive strength tests, for two mixtures representing classes of concrete within 1000 psi of the Specified Compressive Strength, plot the average strength of each group versus the water-cementitious material ratio of the corresponding mixture proportions and interpolate between them to determine the compressive strength corresponding to the water-cementitious material ratio of the Job Mix Design. Verify the interpolated compressive strength equals or exceeds the Required Average Compressive Strength.

(2) <u>Laboratory Trial Mixtures</u>. Use materials and material combinations for trial mixtures of the same brand and type and from the same manufacturer as the materials used in the work.

Record the temperature of the freshly mixed concrete according to AASHTO T 309 and ensure the temperature is within 10°F of the intended maximum temperature of the concrete as mixed and delivered.

For each trial mixture, make and cure at least two 6.0×12.0 inch or at least three 4.0×8.0 inch compressive strength test cylinders for each test age according to AASHTO R 39. Test for compressive strength according to AASHTO T 22 at test ages of 7, 14 and 28 days.

For a single trial mixture, verify the compressive strength test equals or exceeds the Required Average Compressive Strength.

For a group of trial mixtures, make at least three trial mixtures with each mixture having a different cementitious material content. Select water-cement ratios producing a range of compressive strengths encompassing the Required Average Compressive Strength. From the results of the 28-day compressive strength tests, plot a curve showing the relationship between water-cement ratio and compressive strength. From the curve of water-cement ratio versus compressive strength, determine the compressive strength corresponding to the water-cementitious material ratio of the Job Mix Design. Verify the compressive strength.

- b. <u>Flowability Requirements for Class DS Concrete (Wet-Shaft Process)</u>. Verify the Job Mix Design satisfies the concrete flowability requirements of Subsection 501-3.05.6.a.1. Develop a slump loss table showing the slump at 1 hour intervals since batching until the concrete takes initial set.
- c. <u>Plasticity Requirements for Class DS Concrete (Dry-Shaft Process)</u>. Verify the Job Mix Design satisfies the concrete plasticity requirements of Subsection 501-3.05.6.b.1. Ensure initial set occurs after placement operations are complete.
- 8. <u>Job Mix Design Submittal</u>. Submit a written mix design, signed and sealed by a Professional Engineer registered in the State of Alaska, for each specified class of concrete and for each Specified Compressive Strength, to the Engineer at least 45 days prior to scheduled production. Submit the mix design on Form 25D-203. Include the following:
 - a. <u>Job Mix Design Proportions and Test Results</u>. Submit concrete mixture proportions per cubic yard and test results for the proposed Job Mix Design. Include the following information:
 - (1) Weights of cementitious materials
 - (2) Weights of aggregates in saturated surface dry condition
 - (3) Volume or weight of each admixture.
 - (4) Weight of water
 - (5) Water-cement ratio
 - (6) Percentage of air by volume

- (7) Total water soluble chloride ion content
- (8) Wet unit weight
- (9) Expected slump
- (10) Expected 7, 14, and 28 day compressive strength
- (11) Slump loss table for flowability requirements of Class DS concrete (if applicable)
- (12) Time of initial set for plasticity requirements of Class DS concrete (if applicable)
- b. Materials Documentation. Submit the following:
 - (1) For each cementitious material, include:
 - (a) Type/Class
 - (b) Brand
 - (c) Producer
 - (d) Plant location
 - (e) Certified test reports confirming the cementitious material meets these Specifications.
 - (2) For aggregates, include:
 - (a) Pit or quarry location(s)
 - (b) Bulk dry specific gravity, bulk saturated surface dry specific gravity, and apparent specific gravity
 - (c) Absorption values
 - (d) AASHTO size number for coarse aggregates
 - (e) Gradations for aggregates
 - (3) For each admixture, include:
 - (a) Type
 - (b) Manufacturer
 - (c) Manufacturer's product data sheet giving the procedure for admixture use and confirming the admixture meets these Specifications.
 - (d) The batching process step and mixing instructions when each admixture is added.
 - (e) When using two or more admixtures in the same Job Mix Design, provide manufacturer's certifications showing the admixtures are compatible and if they can be added simultaneously.
 - (4) Include the source of supply for water and ice.
- c. <u>Materials Samples</u>. The Engineer may require samples of aggregate, cementitious materials, and admixtures to verify the mix design. If requested,

furnish representative samples (330 pounds each) of both coarse and fine aggregates, 94 pounds of each cementitious material, and enough admixture to allow for Job Mix Design verification testing. Ensure the Department receives these samples at least 45 days before the mixture's scheduled production for the project.

- d. <u>Basis of Required Average Compressive Strength</u>. If the Statistical Method is used, submit the following for each field test record:
 - (1) Compressive strength test results of the tested concrete.
 - (2) Standard test method used for determining compressive strength.
 - (3) Date the compressive strength tests were performed
 - (4) Aggregate source used for the tested concrete.
 - (5) Specified strength of the tested concrete.
 - (6) Batched weights of constituent materials for the concrete used for each compressive strength test.
- e. <u>Documentation of Required Average Compressive Strength</u>. Submit documentation indicating the proposed concrete proportions will produce an average compressive strength equal to or greater than the Required Average Compressive Strength meeting one of the following requirements:
 - (1) <u>Field Test Records</u>. If field test records were used to verify the Required Average Compressive Strength, submit the following for each field test record:
 - (a) Compressive strength test results of the tested concrete.
 - (b) Standard test method used for determining compressive strength.
 - (c) Date the compressive strength tests were performed
 - (d) Aggregate source used for the tested concrete.
 - (e) Specified strength of the tested concrete.
 - (f) Batched weights of constituent materials for the concrete used for each compressive strength test.
 - (2) <u>Trial Mixtures</u>. If a single or group of trial mixtures were used to verify the Required Average Compressive Strength, submit concrete mixture proportions per cubic yard and test results for each trial mixture. Include the following information:
 - (a) Weights of cementitious materials
 - (b) Weight of aggregates in saturated surface dry condition
 - (c) Volume or weight of each admixture
 - (d) Weight of water
 - (e) Water-cement ratio
 - (f) 7-day, 14-day, and 28-day compressive strength test results

- (g) Percentage of air by volume
- (h) Wet unit weight
- 9. <u>Changes</u>. A change in the approved Job Mix Design proportions, materials, aggregate gradation, or aggregate quality requires a new Job Mix Design; except, a change in Type A, D, E, F, and G admixture proportions, or the addition of a Type A, D, E, F, and G admixture, does not require a new Job Mix Design.
- 10. <u>Approval</u>. Obtain the Engineer's approval of each mix design prior to use. Approval of the Job Mix Design does not constitute acceptance of produced concrete and will not obligate the Department to accept or pay for concrete that does not meet the mix acceptance requirements of Subsection 501-3.03.

CONSTRUCTION REQUIREMENTS

501-3.01 BATCHING. Batch concrete, in proportioned amounts, according to the approved Job Mix Design.

- <u>Certification and Calibration</u>. Batch concrete using a certified batch plant. Obtain plant certification meeting the requirements in this Subsection. Use and maintain calibrated weighing and measuring devices for concrete batching equipment, including measuring devices for adding material on-site, meeting the requirements of this Subsection. Submit documentation required for plant certification and weighing and measuring device calibration meeting the requirements of this Subsection before commencing concrete work.
 - a. <u>Plant Certification by the National Ready Mix Concrete Association</u>. Certification may be obtained from the National Ready Mix Concrete Association (NRMCA). Information concerning NRMCA certification may be obtained from the NRMCA at 900 Spring Street, Silver Springs, MD 20910 or online at www.nrmca.org. The NRMCA certification is valid for 2 years from the date of inspection.
 - b. <u>Plant Certification by a Professional Engineer</u>. Certification may be obtained by an independent inspection and evaluation by a Professional Engineer registered in the State of Alaska using and completing the NRMCA Plant Certification Check List. Correct deficiencies to the satisfaction of the Professional Engineer. The Professional Engineer must sign and seal the completed NRMCA Plant Certification Check List certifying all applicable items have been met. The certification by a Professional Engineer is valid for 2 years from the date of inspection.
 - c. <u>Calibration of Weighing and Measuring Devices</u>. Use weighing and measuring devices meeting the requirements of the National Institute of Standards and Technology Handbook 44: Specifications, Tolerances, and other Technical

Requirements for Weighing and Measuring Devices, and are calibrated by a commercial scale service or certified by the DOT&PF Division of Measurement Standards & Commercial Vehicle Enforcement. Calibrate weighing and measuring devices using equipment traceable to the Alaska State Standards of Weight and Measure as adopted by AS 45.75.020.

Calibrate weighing and measuring devices:

- (1) no more than 12 months before commencing concrete work,
- (2) after each relocation,
- (3) at least once every 12 months until the work is completed, and
- (4) when, in the opinion of the Engineer, there is a question as to the accuracy or adequacy of the device.
- d. <u>Certification and Calibration Submittals</u>. If the Plant Certification is by the NRMCA, submit a copy of the NRMCA Certificate of Conformance. If the Plant Certification is by a Professional Engineer, submit a copy of the completed NRMCA Plant Certification Check List and associated Fleet Inspection Reporting Spreadsheet.

Submit copies of the calibration worksheets for weighing and measuring devices including the most recent date of inspection and the calibrated accuracy for each weighing and measuring device. Submit copies of updated calibration worksheets for each additional calibration required according to 501-3.01.1.c.

2. Measuring Materials.

a. <u>Cementitious Materials</u>. Use cementitious materials of the same brand, type, and from the same plant of manufacture as the cementitious materials used to verify the approved Job Mix Design according to Subsection 501-2.02.7. Ensure the quantity of the Portland cement and the cumulative quantity of Portland cement plus other cementitious materials is proportioned in amounts required by the Job Mix Design and meets the mix acceptance requirements.

Measure cementitious materials by weight. When other cementitious materials, including fly ash, ground granulated blast-furnace slag, or silica fume, are specified in the concrete proportions, the material may be cumulatively weighed with the Portland cement. Weigh cementitious materials on a weighing device that is separate and distinct from those used for other materials. Weigh the Portland cement before other cementitious materials.

Portland cement is permitted to be measured in bags of standard weight (94 pounds). Do not use a fraction of a bag of cementitious materials unless its weight has been determined by calibrated weighting devices.

b. <u>Aggregates</u>. Use aggregates from the same sources and having the same size ranges as the aggregates used in the trial mixtures or field test records used to verify the required average compressive strength. Ensure the quantity of the aggregates is proportioned in amounts required by the Job Mix Design.

Measure aggregates by weight. Establish batch weight measurements on dry materials and adjust the actual scaled weight for the required dry materials weight plus the total weight of moisture, both absorbed and surface, contained in the aggregate.

- c. <u>Water</u>. The total quantity of mixing water includes water added to the batch, ice added to the batch, and water occurring as surface moisture on the aggregates. Measure the added water by weight or volume. Measure added ice by weight. Discharge the flush water (wash water) prior to loading the next batch of concrete. Do not use flush water (wash water) as a portion of the mixing water.
- d. <u>Admixtures</u>. Use concrete admixtures according to the manufacturer's instructions and the approved Job Mix Design. Type A, D, E, F, and G admixtures not included in the approved Job Mix Design may be added according to Subsection 501-2.02.9.

Measure powdered admixtures by weight. Measure paste or liquid admixtures by weight or volume.

- 3. Materials Storage and Handling.
 - a. <u>Cementitious Materials</u>. Keep cementitious materials dry and free from contaminants. Do not use cementitious materials which have become partially hydrated or which contain lumps of caked cementitious material.
 - b. <u>Aggregates</u>. Do not allow segregation of the aggregates or contamination with foreign materials. Separate aggregate to prevent intermixing of specified gradations.

Drain aggregate so the moisture content is uniform and is accounted for during the batching process.

Do not use aggregates that contain ice, are frozen, or have been heated directly by combustible materials. Use direct steam, steam-coil, or water-coil heating when heating aggregates. When direct steam is used to thaw aggregate piles, drain aggregates to uniform moisture content before batching.

c. <u>Admixtures</u>. Protect admixtures from contamination, evaporation, or damage. Store admixtures according to the manufacturer's instructions. Protect liquid admixtures from freezing and from temperature changes affecting the admixture's performance.

501-3.02 MIXING AND DELIVERY. Mix concrete, in proportioned amounts, according to the approved Job Mix Design. Mix ingredients into a thoroughly intermingled uniform mixture. Do not retemper concrete mixtures. Do not use concrete that has developed initial set prior to placement.

- 1. <u>Addition of Water</u>. Additional water may be added on-site provided the following are met:
 - a. The volume of concrete in the mixer after the additional water is added does not exceed the maximum mixing capacity.
 - b. The water measuring device is calibrated according to Subsection 501-3.01.1.c.
 - c. The Water-cement ratio for the batch as established by the approved Job Mix Design is not exceeded. Account for the actual volume of concrete remaining in the mixer.
 - d. Water additions are completed within 30 minutes after the introduction of the mixing water to the cementitious materials.

The addition of water is not prohibited from being several distinct additions of water. Inject additional water into the mixer under pressure and direction of flow to allow for proper distribution within the mixer. Provide additional mixing to ensure a thoroughly intermingled uniform mixture is attained.

- 2. <u>Time for Placement</u>. Discharge the concrete within 1.5 hours of the following:
 - a. after adding the mixing water to the cementitious materials, and
 - b. after adding the cementitious materials to the aggregates.

The time to complete discharging the concrete may be extended 2 minutes for every degree of temperature at which the concrete is discharged below 70°F, to a maximum total time of 2 hours. The Engineer may increase the time to discharge requirement provided the concrete can be placed before initial set occurs and without the addition of water.

501-3.03 EVALUATION OF MATERIAL FOR ACCEPTANCE. All concrete in the work will be evaluated for acceptance.

The Engineer may reject a batch or load of concrete failing to meet the requirements for proportions, slump, total air content, or temperature. Prior to sampling, the Engineer may reject a batch or load of concrete that appears defective in composition.

1. <u>Sampling</u>. The Department will take samples at the discharge point of the placement system, except Class DS concrete will be sampled at the truck discharge.

Provide adequate and representative fresh concrete for sampling and testing as directed by the Engineer. The Engineer will sample the concrete after a minimum of 1/2 cubic yard of concrete has discharged from the placement system. Do not add water or admixtures to the mix after the concrete has been sampled for acceptance testing.

The Engineer will determine aggregate gradation for acceptance based on random samples taken at the plant.

2. <u>Sampling and Test Methods</u>. The Department will sample and test according to the following:

WAQTC TM 2	Sampling Freshly Mixed Concrete	
WAQTC FOP for AASHTO T 309	Temperature of Freshly Mixed Portland Cement Concrete	
AASHTO T 22	Compressive Strength of Cylindrical Concrete Specimens	
WAQTC FOP for AASHTO T 27/T 11Sieve Analysis of Fine and Coarse Aggregates, and Materials Finer Than No. 200 Sieve in Mineral Aggregate by Washing		
WAQTC FOP for AASHTO T 23	Method of Making and Curing Concrete Test Specimens in the Field	
WAQTC FOP for AASHTO T 119	Slump of Hydraulic Cement Concrete	
WAQTC FOP for AASHTO T 121	Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete	
WAQTC FOP for AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method	
AASHTO T 231	Capping Cylindrical Concrete Specimens	
WAQTC FOP for AASHTO TP 83	Field Sampling and Fabrication of 50-mm (2-in) Cube Specimens using Grout (Non-Shrink) and or Mortar	

3. <u>Batch Tickets</u>. Provide a ticket with each batch of concrete delivered to the project. Include the following information:

- a. Manufacturer plant (batching facility)
- b. Department contract number
- c. Date
- d. Time cementitious material added to batch
- e. Truck number
- f. Quantity (quantity batched this load)
- g. Batch facility mix identification number
- h. Weights of every type of cementitious material
- i. Weights of each aggregate
- j. Weight or volume of each admixture
- k. Weight or volume of water added at the plant
- I. Total moisture and absorption percentage for each aggregate
- m. Maximum weight or volume of water that may be added in the field
- n. Weight or volume of water added in the field
- o. Time discharge completed
- p. Signature of Contractor's representative, affirming the accuracy of the information provided
- 4. <u>Proportion Requirements</u>. Meet the proportion requirements of the approved Job Mix Design within the following proportion tolerances:

a.	Total Cementitious Material, weight	±1%
b.	Aggregates, weight	±2%
c.	Total Water, weight or volume	+3%
d.	Air-Entraining Admixtures, weight or volume	manufacturer's limits
e.	Type S Admixture, weight or volume	±3%

f. Type A, B, C, D, E, F, G Admixtures, weight or volume manufacturer's limits

If the total cementitious material weight is made up of different components, keep the component weights within the following tolerances:

(1) Portland Cement	±1%
(2) Fly Ash	±5%
(3) Ground Granulated Blast-Furnace Slag	±5%
(3) Silica Fume	±10%

Proportion tolerance will be calculated using consistent units for M_{JMD} and M_{A} as follows:

$$P = \frac{(M_A - M_{JMD})}{M_{JMD}} \cdot 100$$

Where: P= Proportion tolerance, percentage

 M_{JMD} = Weight or Volume of component according the approved Job Mix Design

M_A = Weight or Volume of actual batched component

- 5. <u>Slump Requirements</u>. Do not exceed 9" slump for Class A, A-A, P, and DS concrete. For Class DS concrete, meet the following slump tolerances:
 - a. Using the wet-shaft process: 7 inches minimum, 9 inches maximum
 - b. Using the dry-shaft process: 6 inches minimum, 9 inches maximum
- 6. <u>Total Air Content Requirements</u>. Meet the total air content percentage within a tolerance of ±1.5 of the approved Job Mix Design percentage.
- 7. <u>Temperature Requirements</u>. Unless otherwise noted, ensure the concrete temperature is between 50°F and 90°F when placed in the forms.
- 8. <u>Compressive Strength Requirements</u>. Meet the strength requirements for the Specified Compressive Strength. Concrete of the approved Job Mix Design will be considered to meet the Specified Compressive Strength requirements when both of the following conditions are met:
 - a. The lowest individual compressive strength test result is not less than the Specified Compressive Strength minus 500 psi, or 90.0 percent of the Specified Compressive Strength, whichever is lower.
 - b. The lowest averaged result of three consecutive individual compressive strength tests meets or exceeds the Specified Compressive Strength.

501-3.04 PREPARATION FOR CONCRETE PLACEMENT. Allow time for inspection prior to concrete placement.

Remove debris, concrete splatter, oil, paint, and other foreign substances from the surfaces of forms and reinforcing steel, against which the concrete is to be placed.

Remove soil and other debris from pipe piles to the bottom of concrete elevation shown on the Plan.

Prepare foundations according to Section 205.

Moisten foundations and forms with water before the concrete is placed. Remove standing water on the foundation, in the pile, and in the forms before placing concrete.

501-3.05 PLACING CONCRETE. Do not begin concrete placement without the Engineer's authorization. Place concrete conforming to the approved Job Mix Design.

Place and consolidate each layer within 30 minutes and before the preceding layer takes initial set.

If concrete placement operations are delayed so initial set occurs before placement of the succeeding section or layer, place a joint according to Subsection 501-3.11. The resulting joint will be considered a construction joint. If, in the opinion of the Engineer, the location of the construction joint will affect the strength or durability of the concrete, the Engineer may reject the concrete, the structure, or a portion of the structure.

Place concrete in a sequence to obtain a well-consolidated concrete and to prevent cracks. Place concrete as near as possible to final position. Prevent segregation of the mix, displacement of reinforcing steel, and spattering of mortar on the reinforcing steel and forms above the elevation of the layer being placed. Do not deposit a large quantity of concrete at any point and run or work the concrete along the forms. Do not allow concrete to slide down the sides of the forms.

Regulate concrete placement so the pressures do not exceed the load capacity of the forms. Limit layer thickness to no more than 2.5 feet, or the capacity of the vibrators to consolidate and merge the concrete with the previous layer, whichever is less.

Unless otherwise specified, use a tremie, tube, or other such device to limit the free-fall height to less than 5.0 feet when placing operations would otherwise allow concrete to drop more than 5.0 feet. When using a tremie to place concrete, use a watertight tremie with an inside diameter of at least 10 inches. When using a concrete pump to place concrete, use concrete pump lines that are watertight with an inside diameter of at least 5 inches.

Concrete placed in piles or in dry-shaft process may free-fall more than 5.0 without use of tremie, tube or other such device, provided the falling concrete does not contact rebar or other objects before reaching the top surface of the placed concrete. When free-falling concrete more than 5.0 feet, use a drop chute at least 3.0 feet long.

After initial set, prevent movement of forms, projecting ends of reinforcing steel, and other embedded items.

Do not use aluminum components in contact with fresh concrete.

Place concrete in the superstructure only after substructure forms are removed and the substructure has been inspected.

1. <u>Concrete Placement Plan</u>. Submit a concrete placement plan to the Engineer, for concrete decks and drilled shafts. Submit each concrete placement plan to the Engineer, at least 30 days before placing concrete. Do not place concrete until after the Engineer has approved the plan. Include the following in each concrete placement plan:

- (1) concrete placement sequence,
- (2) schedule of concrete placement and curing,
- (3) estimated concrete volume of each section,
- (4) placement rate and duration,
- (5) description of finishing equipment,
- (6) placement procedure,
- (7) name of the concrete foreman,
- (8) curing materials, equipment, and procedure.
- 2. <u>Pre-concreting Conference</u>. Hold a pre-concreting conference for concrete decks and Drilled Shafts, at least 5 working days before placing concrete. Include the Engineer, the Superintendent and foremen in charge of placing reinforcing steel, placing concrete, finishing concrete, and curing operations. Discuss construction procedures, personnel, and equipment to be used.

If the project includes more than one concrete placement operation, and if key personnel change between concreting operations, hold additional conferences to include replacement personnel before placing successive concrete sections.

- 3. <u>Pumping Concrete</u>. Use a pump producing a continuous stream of concrete without air pockets. When pumping is completed, the concrete remaining in the pipeline, if used, must eject without contaminating the concrete or separating the ingredients. Discard concrete contaminated by priming or cleaning the pump.
- 4. <u>Conveying Concrete</u>. Concrete may be conveyed if the equipment will handle the class of concrete, with the slump and air content specified and without segregation of the aggregate, and no equipment vibrations will damage freshly placed concrete or reinforcing steel. Limit the length of conveyor belts to prevent aggregate segregation or 300 feet, whichever is less. Cover the belt to protect the concrete from heat, evaporation, precipitation, or when the Engineer determines precipitation is likely.
- 5. <u>Piles</u>. Do not place concrete underwater in piles.
- 6. <u>Drilled Shaft Foundations</u>. Place concrete following either the wet-shaft process or dry-shaft process, as applicable.

The dry-shaft process may be used where the ground water level and soil and rock conditions are suitable to permit construction of the shaft in a relatively dry excavation, and where the sides and bottom of the shaft can be visually inspected by the Engineer prior to placing the concrete. Relatively dry excavation conditions exist when excavation fluids have been removed from the shaft and the rate of water intrusion is less than 6 inches of water accumulating above the base in a 1-hour period without pumping or other methods to drain or remove water. Suitable soil and

rock conditions exist when the sides and bottom of the hole remain stable without caving, sloughing, or swelling between completion of excavation and concrete placement; and loose material and water can be satisfactorily removed prior to inspection and concrete placement. Do not begin concrete placement if there is more than 1 inch of water in the bottom of the shaft excavation. Use wet-shaft process if the requirements for dry-shaft process cannot be satisfied.

Provide process control testing during concrete placement. Test total air content and slump before placing each batch of concrete in the drilled shaft. Perform sampling and testing according to Subsection 501-3.03.2 using a WAQTC qualified concrete testing technician or ACI certified concrete field testing technician. Test every batch of concrete before placement. Record the time when each sample is collected. Submit test results to the Engineer within 72 hours of completing each test.

a. <u>Wet-Shaft Process</u>. Place concrete using a tremie or concrete pump. Place concrete continuously until good quality concrete, as determined by the Engineer, is evident at top of the shaft or nearest construction joint. Good quality concrete is considered concrete of the same consistency, appearance, and quality as the concrete being delivered and meeting the applicable mix acceptance requirements. Remove a sufficient volume of concrete to ensure elimination of contaminated concrete at the top of shaft before continuing with subsequent construction operations.

Remove concrete laitance during or immediately after concrete placement operations have ended.

Do not allow water, fluids, drilling aids, or concrete from the top of the shaft to enter streams or other waterways.

Construct the discharge end of the tremie or pump line to prevent water intrusion and permit the free flow of concrete during concrete placement. Use caps, bottom plates, pigs, or other such devices inserted into or attached to discharge pipe to separate the concrete from the excavation fluid during initial charging of the discharge pipe. Ensure the discharge pipe has sufficient length and weight to rest on the shaft base before starting concrete placement.

When using a tremie, provide adequate support so the tremie can be raised to increase the discharge of concrete and lowered to reduce the discharge of concrete. Do not shake, vibrate, or rapidly raise or lower the tremie to increase the discharge of the concrete.

Maintain a positive head of concrete inside the tremie or pump line relative to the excavation fluid level. Position the discharge orifice within one pipe diameter of the shaft base. Do not re-position the discharge pipe until the orifice is at least 8 feet below the concrete surface. Maintain at least 8 feet of concrete above the

discharge orifice during concrete placement. Monitor the concrete level during placement to ensure the tremie or pump line discharge orifice remains at least 8 feet below the concrete surface throughout placement.

If the discharge orifice rises above the concrete surface before concrete placement is complete, the shaft will be considered defective. Immediately terminate concrete placement operations and notify the Engineer.

- (1) <u>Concrete Flowability Requirements</u>. Ensure concrete placed in the shaft remains flowable throughout placement operations by maintaining a slump of at least 6 inches until placement is completed. Collect samples from the first batch of concrete. Test slump from the first batch of concrete at the beginning of the concrete placement operations and immediately after concrete placement operations are complete. Record the time when samples are collected and when tests are performed. Submit test results to the Engineer within 72 hours of completing each test.
- b. <u>Dry-Shaft Process.</u> Place concrete continuously until concrete is evident at top of the shaft or nearest construction joint. Concrete may be permitted to free-fall into place if the concrete does not contact the sides of the shaft, reinforcing steel, or other objects while free falling.

Remove concrete laitance during or immediately after concrete placement operations have ended.

- (1) <u>Concrete Plasticity Requirements</u>. Ensure concrete placed in the shaft remains plastic throughout placement operations by completing placement operations before initial set occurs.
- 7. <u>Concrete Decks and Approach Slabs</u>. Before placing concrete, operate the finishing machine over the entire length of the deck to check screed deflection, reinforcing steel clearance, and concrete thickness.

Limit the rate of placing concrete to what can be finished before initial set.

- a. <u>Placement Sequence</u>. Place the concrete deck in the sequence shown on the Plans. The Engineer may approve a revised placement sequence for casting the concrete deck continuously from one end to the other provided the following:
 - (1) Do not use Type III Portland cement.
 - (2) Stockpile the materials necessary to complete the placement and have the equipment, incidentals, and workers on the site before beginning concrete placement operations.

- (3) Ensure the continuous concrete placement and finishing operation proceeds at a minimum rate of 30 feet per hour, measured longitudinally along the axis of the span.
- (4) The Engineer determines the revised placement sequence will not reduce the stability during construction and will not reduce the quality, capacity, or durability of the completed structure.

If the Engineer approves the proposal for a continuous concrete placement operation, the Department will observe and evaluate performance to the first planned construction joint in the sequence. At this point, the Engineer may authorize you to proceed with the continuous concrete placement operation or suspend the placement and install a construction joint. The Engineer's decision will be based on whether the concrete can be produced, delivered, and finished at a continuous rate permitting the structure to accommodate final dead load deflections while the concrete is plastic.

If the Engineer suspends the continuous concrete placement operations after the first sequential placement, submit modifications for improving the continuous concrete placement operations, beginning at the other end of the deck. If a second attempt at continuous concrete placement is authorized, the placement will be evaluated and allowed or terminated based on the same criteria as the first sequential placement.

If the Engineer suspends the continuous concrete placement operation after the second attempt, additional attempts will not be permitted. Follow the deck placing sequence shown on the Plans.

501-3.06 CONSOLIDATION OF CONCRETE. Consolidate concrete to make a dense homogeneous mass free of voids and rock pockets. Consolidate each layer to leave a compact, dense, and impervious concrete with smooth faces on exposed surfaces with no visible line of separation between adjoining layers.

Consolidate concrete, except underwater or other exempted placements, by mechanical vibration at the point of deposit. Use vibrators capable of visibly affecting concrete with a 1-inch slump for a distance of at least 18 inches from the vibrator.

Use vibrators and regulate placement in order to consolidate the fresh concrete within 15 minutes of placement and before initial set. Effectively vibrate the full depth of each layer.

For immersion-type vibrators, insert vibrators vertically to a depth penetrating into the previous layer. Withdraw vibrators slowly to avoid segregation or grout pockets. Vibrate in a uniform pattern spaced less than 1.5 times the radius of visible effectiveness.

Avoid vibration of initially set layers and reinforcing steel below the succeeding placement. Do not hold vibrators against reinforcing steel or use them to flow or spread the concrete into place. Manipulate vibrators to produce concrete free of voids, with proper texture on exposed faces, and maximum consolidation. Do not allow the concrete to segregate, form pools of mortar, or form laitance on the surface.

When immersion-type vibrators are used to consolidate concrete around epoxy-coated reinforcing steel, use rubber or nonmetallic vibrator heads that will not damage epoxy coatings.

Concrete may be placed directly into drilled shaft foundations and piles without mechanical vibration; except, vibrate the top 5 feet of concrete. For drilled shaft foundations, consolidate the top 5 feet of concrete after good quality concrete is evident at the top of the shaft and after water, slurry, drilling aids, and other materials other than concrete have been removed.

501-3.07 FINISHING CONCRETE SURFACES. After the concrete is consolidated and prior to the application of curing materials, strike-off unformed concrete surfaces to the required elevation and slope. Finish the surface by floating the surface to remove local irregularities and leave sufficient mortar to seal the concrete surface. Do not use mortar topping for concrete surfaces. Do not use aluminum finishing equipment.

Complete initial floating operations before bleed water or excess moisture is present on the surface and before the concrete takes initial set. Complete final finishing before final set occurs. Do not use finishing aids or additional water to assist in finishing concrete surfaces. Do not finish concrete surfaces if bleed water, excess moisture, or curing materials are present.

Provide formed concrete surfaces with an ordinary finish unless otherwise noted.

1. <u>Ordinary Finish</u>. An ordinary finish is the finish left on a surface after removing the forms, filling the holes left by the form ties, and repairing defects. Ensure the surface is true and even and free from rock pockets and depressions or projections.

Immediately after removing the forms, remove the metal devices holding the forms in place and passing through the body of the concrete, or cut them back at least 1 inch beneath the surface of the concrete. Remove fins of mortar and irregularities caused by form joints.

Patch cavities produced by form ties, depressions, holes, and voids greater than 1/4 inch. Fill the cavity with stiff mortar composed of one part of Portland cement to two parts of fine aggregate. Proportion the mortar by loose volume with only enough water to form a small ball when squeezed gently by hand. Clean the cavity and saturate the concrete with water before filling the cavity. Thoroughly tamp the

mixture into place. Float the surface of the mortar before initial set to make the surface neat in appearance. Cure the patch according to Subsection 501-3.08.

Do not repair concrete with rock pockets, cracks, or other defects until the concrete is inspected by the Engineer. Concrete repaired prior to inspection by the Engineer may be rejected. If, in the opinion of the Engineer, the defect will affect the strength or durability of the concrete, the Engineer may reject the concrete, the structure, or portion of the structure. If the defect is greater than 3/4 inch in depth, submit a repair plan including complete details of the method, materials, and equipment proposed for use in repairing the concrete. Obtain the Engineer's approval of the repair plan before repairing the defect. A repair plan is not required if the defect is less than 3/4 inch in depth.

Repair broken corners and edges, rock pockets, and other defects. If the defect is greater than 3/4 inch in depth, repair the defect according to the approved repair plan. If the defect is less than 3/4 inch in depth, chip away coarse or broken material according to Subsection 501-3.16 to obtain a dense, uniform surface of concrete exposing solid coarse aggregate. Cut feathered edges to form faces perpendicular to the surface. Apply an epoxy bonding agent to the concrete mating surfaces according the manufacturer's instructions. Patch the repaired area with stiff mortar composed of one part of Portland cement to two parts of fine aggregate. Proportion the mortar by loose volume with only enough water to form a small ball when squeezed gently by hand.

Perform repairs prior to releasing falsework, prestressing, or applying additional loads to the concrete.

2. <u>Rubbed Finish</u>. Provide a rubbed finish at locations shown on the Plans. When forms can be removed, wet the surface and then rub with a wooden float until irregularities and form marks are removed and the surface is covered with a lather composed of cement and water. A thin grout composed of one part Portland cement and one part fine aggregate may be used. Allow this lather to set for at least 5 days. Then, smooth the surface by lightly rubbing with a fine carborundum stone.

If the concrete has hardened before being rubbed, use a medium coarse carborundum stone to finish the surface at least 4 days after placing the concrete. Spread a thin grout composed of one part Portland cement and one part fine aggregate over a small area of the surface. Immediately rub the surface with the stone until form marks and irregularities are removed and the surface is covered with a lather. Allow this lather to set for at least 5 days. Then, smooth the surface by rubbing lightly with a fine carborundum stone.

Complete ordinary finish work before applying the rubbed finish.

3. <u>Concrete Decks and Approach Slabs</u>. Obtain a smooth riding surface of uniform texture, true to the required grade and cross section.

Use a self-propelled mechanical finishing machine:

- a. capable of forward and reverse movement,
- b. with a rotating cylindrical single or double drum screed,
- c. with necessary adjustments to produce the required cross-section, line, and grade,
- d. allowing screeds to be raised and lowered, and
- e. with an upper vertical limit of screed travel permitting the screed to clear the finished concrete surface.

When placing concrete abutting previously placed concrete, equip the finishing machine to travel on the existing concrete.

The Engineer may approve hand-operated motorized roller screeds (friction screeds) where jobsite conditions prohibit the use of conventional configuration finishing machines described above, for small areas less than 12 feet wide, and on approach slabs in which conventional configuration finishing machines are not used to finish the concrete deck. Do not use vibratory screeds.

Use equipment capable of striking off the full placement width without intermediate supports or rails. Use rails resting on adjustable supports that can be removed with the least disturbance to the concrete. Place the supports on structural members or on forms rigid enough to resist deflection. Use supports that are removable to at least 2 inches below the finished surface. If possible, place rails outside the finishing area. If not possible, place them above the finished surface.

Use rails (with their supports) that are strong and stiff enough for operation of the equipment without excessive deflection. Place and secure rails for the full length of the deck before placing concrete. Set the rails to the proper grade and elevations to ensure the required profile is provided.

After placing and consolidating the concrete, carefully strike off the concrete surface. Correct imperfections left on the deck. Provide a float finish to surfaces receiving a waterproof membrane. Texture other surfaces with a heavy-broom finish perpendicular to the direction of traffic.

Do not place finishing machines or other loads on the screed rail supports or on features supporting fresh concrete after the concrete has initially set and before the concrete attains at least 80 percent of the Specified Compressive Strength.

Do not release falsework or wedges supporting concrete on either side of a joint until each side has cured as specified.
- 4. <u>Curb, Sidewalk, and Concrete Barrier Surfaces</u>. Finish exposed faces of curbs, sidewalks, and concrete barriers to true surfaces and provide a broom finish. Broom finish sidewalks perpendicular to the direction of traffic.
- 5. <u>Sandblasted Finish</u>. Sandblast the cured concrete surface with hard, sharp abrasive media to produce an even fine-grained surface in which the mortar has been cut away, leaving the aggregate exposed.
- 6. <u>Trowel Finish</u>. Trowel the surface smooth and free of trowel marks.

501-3.08 CURING CONCRETE. Maintain a satisfactory moisture content and temperature in the concrete immediately after finishing operations are completed.

- Initial Curing Period. Before final curing, ensure the surface of the concrete is kept moist. Concrete surface is beginning to dry when no bleed water is present and the surface color changes. If the concrete surface begins to dry before the final curing method can be applied, prevent further loss of moisture by one or more of the following methods:
 - a. <u>Fog Spray</u>. Use equipment producing a fog spray from an atomizing nozzle with sufficient velocity to cover the entire concrete surface. Direct the atomized water spray above the concrete surface to allow the fog to drift down to the concrete surface. Do not apply the discharge of the atomized water spray directly at the concrete surface. Continue fogging to maintain the reflective appearance of the damp concrete. Do not allow the surface to dry, or to undergo cycles of drying and wetting. Keep the concrete surface damp, but do not accumulate water until after final set has occurred. Use water meeting the requirements of Subsection 712-2.01.
 - b. <u>Evaporation Rate Reducer</u>. Apply a monomolecular film intended specifically as an evaporation rate reducer to entrap bleed water or excess moisture on the concrete surface. Apply the evaporation rate reducer according to the manufacturer's written instructions. Do not use the evaporation rate reducer during finishing operations or as a finishing aid. Do not use evaporation rate reducers on concrete surfaces receiving a waterproofing membrane such as concrete decks, approach slabs, end diaphragms and decked precast concrete members.
- 2. <u>Final Curing Period</u>. Unless otherwise noted, employ the final curing method immediately following finishing operations.

Use wet curing on construction joints, concrete with a mix design water-cement ratio less than 0.40, and concrete decks, approach slabs, and other concrete surfaces subject to tire contact in the completed structure. For other concrete, use wet curing,

liquid membrane-forming curing, forms-in-place curing, or a combination of these curing methods.

Do not use liquid membrane-forming curing compounds on concrete surfaces to which other materials will be cast against or bonded such as concrete and waterproofing membranes.

In addition to the requirements in this section, precast concrete members may use accelerated curing.

- a. <u>Wet Curing</u>. Until the end of the curing period, provide continuous moisture by:
 - (1) watering a covering of heavy burlap blankets or quilted cotton mats,
 - (2) keeping concrete surfaces wet with water continuously,
 - (3) wetting the outside surfaces of wood forms.

Wait to install curing materials until the concrete has sufficiently hardened to permit such operations without damaging the concrete or marring the finish. While waiting to employ curing materials, maintain the concrete surface moisture as specified for the initial curing period.

Uniformly distribute absorbent materials across the entire concrete surface. Apply water in a manner that will not displace the curing materials or erode the concrete surface. Keep the concrete surfaces continuously wet. Do not allow concrete surfaces to dry or alternate with wetting and drying cycles. Cover the concrete, wooden forms and absorbent material with impermeable sheeting. Use white reflective impermeable sheeting if direct sunlight is present, or if the Engineer determines direct sunlight may be present during the curing period.

Do not use absorbent materials containing harmful substances such as sugar or fertilizer, or materials that may discolor the concrete.

b. <u>Liquid Membrane-Forming Curing Compounds</u>. Apply liquid membrane-forming compounds immediately after final finishing and as soon as the free water has disappeared, no water sheen is visible, and bleeding has essentially ceased. Apply two coats of liquid membrane-forming compound with the second coat at right angles to the first. Apply both coats of liquid membrane-forming compounds uniformly until the original color of the concrete is obscured. Apply liquid membrane-forming compound according to the manufacturer's instructions.

Do not apply the liquid membrane-forming compound to dry concrete surfaces. Moisten the concrete surface, without standing water, before applying the liquid membrane-forming compound. Protect the membrane from damage for the duration of the curing period. Re-apply the liquid membrane-forming compound if the membrane is cracked or damaged during the curing period.

- c. <u>Forms-In-Place Curing</u>. Formed concrete surfaces may be cured by retaining the forms in place for the entire curing period. Keep the forms moisture tight. Do not loosen forms. For wooden forms, keep the forms wet as required for wet curing. If gaps develop between the forms or between the forms and concrete:
 - (1) remove the forms and implement another curing method
 - (2) keep the gaps continuously filled with water for the remainder of the curing period.
- d. <u>Accelerated Curing.</u> Accelerated curing may be used only on Class P Concrete with a water-cement ratio of less than 0.35.

During the curing period, keep the concrete in a saturated curing atmosphere until the concrete achieves the required release strength.

The curing period may be accelerated by using saturated low-pressure steam, convection-heat, or radiant-heat in a suitable curing chamber to contain the live steam or heat. Provide at least 3 inches of clearance between the enclosure and forms to allow adequate circulation.

If accelerated curing methods are used, embed at least one temperaturerecording device in the concrete to verify concrete temperatures are within the specified limits. Install one temperature-recording device, accurate to $\pm 5^{\circ}$ F, near the member's midpoint, 6 to 8 inches from the top or bottom, and along the member's centerline. Monitor the concrete temperature with the temperaturerecording device sensor arranged and calibrated to continuously record, date, and identify the concrete temperature throughout the heating cycle. Begin recording temperatures once concrete is placed in the forms. Stop recording temperatures after the heating cycle is complete and when the concrete temperature is within 20°F of the air temperature to which the concrete will be exposed. Upon request, submit the temperature record to the Engineer for each precast concrete member.

While waiting to begin the heating cycle, maintain the concrete temperature between 50°F and 90°F and maintain concrete surface moisture as specified for the initial curing period. Do not apply steam, convection-heat or radiant-heat prior to initial set except to maintain the concrete temperature. Determine the time of initial set according to AASHTO T 197.

Begin the heating cycle immediately after the initial set. Prevent hot air and steam from blowing directly onto the concrete or forms. Increase the concrete temperature at an average rate not exceeding 40°F per hour until the curing temperature is reached. Limit curing temperature within the concrete to 175°F maximum. Decrease the concrete temperature not more than 40°F per hour until

reaching a temperature 20°F above the temperature of the air to which the concrete will be exposed.

Apply radiant heat by pipes circulating steam, hot oil, or hot water, or by electric heating elements.

- 3. <u>Curing Temperature</u>. To achieve adequate curing, maintain the concrete temperature at or above 50°F during the curing period. Add one addition day of curing for each day or portion of a day the concrete temperature falls below 50°F during the curing period.
- 4. <u>Ending Curing Operations</u>. Continue curing operations uninterrupted until the required concrete properties, strength, and durability have developed or until there is reasonable assurance these properties will be achieved after the curing operations have been terminated.

Curing operations may be terminated after following are satisfied:

- a. The concrete has cured for:
 - (1) at least 7 days.
 - (2) at least 10 days when fly ash or ground granulated blast furnace slag in excess of 10 percent by weight of the Portland cement are used in the mix.
- b. The compressive strength from informational field tests reaches the following:
 - (1) 70 percent of the Specified Compressive Strength if post curing concrete temperature is expected to remain at or above 50°F until 100 percent of the Specified Compressive Strength is attained.
 - (2) 100 percent of the Specified Compressive Strength, if post curing conditions are expected to allow the concrete temperature to fall below 50°F before 100 percent of the Specified Compressive Strength is attained.

501-3.09 PROTECTION OF CONCRETE. Protect concrete from damage. Do not apply loads to the concrete until curing operations are completed and until the Engineer determines the concrete has attained sufficient strength to safely carry the applied loads without damage. Unless otherwise noted, sufficient strength is attained when the concrete has a compressive strength, determined from informational field tests, of at least 80 percent of the Specified Compressive Strength.

Release forms and falsework according to Section 512.

During the curing period, protect concrete from damaging mechanical disturbances. Protect concrete surfaces from damage by construction traffic, equipment, materials, rain or running water, and other adverse weather conditions. Meet the vibration limits during pile driving of Section 505.

Do not backfill against concrete structures until the end of the curing period and until the concrete has attained a compressive strength, determined from informational field tests, of at least 80 percent of the Specified Compressive Strength.

Obtain authorization from the Engineer before driving vehicles or equipment, or storing materials on the structure. Keep the structure closed to traffic until the concrete has been accepted. Obtain authorization from the Engineer before opening the structure to traffic.

- 1. <u>Rain Protection</u>. Provide materials and equipment on site to protect concrete until final set. During precipitation, or when the Engineer determines precipitation is likely before final set, employ materials and equipment to protect the concrete until final set occurs. Do not expose the concrete to rain or flowing water before final set occurs.
- 2. <u>Cold Temperature Protection</u>. When air temperatures are expected to be below 35°F during concrete placement or the curing period, have materials and equipment in place to prevent the concrete temperature from falling below 35°F. Implement the cold temperature concreting plan when the air temperature in the shade, away from artificial heat, is less than 35°F or, in the opinion of the Engineer, is likely within 24 hours.
 - a. <u>Submittals</u>. Submit a cold temperature concreting plan at least 5 days before placing concrete when the air temperature is expected to be below 35°F during the concrete placement or during the curing period. Submit detailed procedures for the production, transport, placement, protection, curing, and temperature monitoring of concrete during cold weather for each concrete placement. Include procedures for abrupt changes in weather conditions and equipment failures.
 - b. <u>Preparation</u>. Remove snow, ice, and frost from surfaces that will touch the concrete. Before beginning concrete placement, thaw the subgrade to at least 2 feet below the concrete to be placed. Do not place concrete around or adjacent to forms, embedded items, concrete, steel, or other materials unless such items are preheated and maintained at a temperature above 35°F.
 - c. <u>Temperature of Concrete Before Placement</u>. Ensure concrete is between 50°F and 70°F during placement. Obtain these temperatures by heating the mixing water and/or aggregate. Heat mixing water to no more than 150°F.

When the temperature of the water or aggregate exceeds 100°F, mix them together so temperature of the combined ingredients does not exceed 80°F when the cementitious materials are added.

d. <u>Temperature of In-place Concrete</u>. Protect the concrete from damage due to cold weather immediately after concrete placement and ensure adequate curing conditions are maintained as required in Subsection 501-3.08.

If the minimum curing temperature cannot be maintained, do not allow the concrete temperature to drop below 35°F. Provide extra protection in areas especially vulnerable to temperatures below 35°F such as exposed top surfaces, corners and edges, thin sections, and concrete placed against steel.

Maintain the concrete temperature using methods such as insulated forms, enclosures, and indirect heat. When using combustion heaters, vent flue gases to the outside of the enclosure. Prevent overheating areas of concrete or drying during the curing period by directing heaters and ducts away from the concrete surface. Do not expose the concrete surface to air with a temperature more than 90°F, unless higher values are allowed according to the curing method.

Protection may be terminated when the air temperature in the shade, away from artificial heat is rising, above 35°F, and is expected to remain above 35°F until the end of the curing period. At the end of the protection period, remove the protection so the concrete surface drops in temperature gradually at a rate not more than 1.25°F per hour until the concrete temperature is within 20°F of the air temperature in the shade, away from artificial heat. If water curing is used, terminate the addition of water to the surface and allow the concrete surface to dry prior to exposure of the concrete to freezing temperatures.

- 3. <u>Hot Temperature Protection</u>. When air temperatures are expected to exceed 90°F during concrete placement, have materials and equipment in place to prevent the concrete temperature from exceeding 90°F before final set and exceeding 150°F during the final curing period. Implement the hot temperature concreting plan when the air temperature in direct sunlight is greater than 90°F.
 - a. <u>Submittals</u>. Submit a hot temperature concreting plan at least 5 days before placing concrete when the air temperature is expected to exceed 90°F during the concrete placement. Submit detailed procedures for the production, transport, placement, protection, curing, and temperature monitoring of concrete during hot temperature for each concrete placement. Include procedures for abrupt changes in temperature conditions or equipment failures.
 - b. <u>Preparation</u>. Prior to placing concrete, plan to minimize the exposure of the concrete to hot temperatures and direct sunlight. Cool surfaces that will touch the concrete to less than 90°F.

Do not sprinkle fine aggregate piles with water. If sprinkling coarse aggregates, monitor the moisture content and adjust the mixing water for the free water in the aggregate.

If replacing all or part of the mixing water with crushed ice, then ensure the ice is completely melted and thoroughly mixed with the other concrete materials before concrete placement commences.

- c. <u>Temperature of Concrete Before Placement</u>. Ensure concrete being placed in forms is between 50°F and 90°F. Obtain these temperatures by cooling the mixing water and/or aggregate.
- d. <u>Temperature of In-place Concrete</u>. Protect the concrete from damage due to hot weather immediately after concrete placement and ensure adequate curing conditions are maintained as required in Subsection 501-3.08.

Provide extra protection in areas especially vulnerable to temperatures above 90°F such as exposed top surfaces, corners and edges, thin sections, and concrete placed against steel.

Protection may be terminated when the air temperature in direct sunlight drops below 90°F and is expected to remain below 90°F for at least 24 hours.

501-3.10 TOLERANCES. Produce concrete elements conforming to the following tolerances:

- 1. <u>Length</u>: $\pm 3/4$ inch for members 100' and shorter. ± 1 inch for members longer than 100'
- 2. <u>Cross-sectional Dimensions</u>:
 - a. For dimensions 6 inches or less: -1/8 inch to +1/4 inch.
 - b. For dimensions over 6 inches but not over 18 inches: -1/8 inch to +3/8 inch.
 - c. For dimensions over 18 inches: -1/4 inch to +3/8 inch.
- 3. <u>Distortion of Cross-section</u>: Limit the slope with respect to the specified surface, plane, or line to less than $\pm 1/16$ inch per foot, but not to exceed $\pm 1/4$ inch measured perpendicular to the long axis of member.
- 4. <u>Surface Irregularities</u> (deviation from a 10-foot straight edge):
 - a. For surfaces receiving a topping or are buried: $\pm 1/4$ inch.

- b. For surfaces not receiving a topping or are visible in the completed work: ±1/8 inch.
- 5. <u>Camber</u>: Do not vary from the approved camber more than ±1/8 inch per 10 feet of length, but not to exceed 1 inch. In addition, the camber of each girder may not differ from the camber or the other girders by more than 1 inch.
- 6. <u>Lateral Sweep</u> (deviation from a straight line parallel to centerline of member):
 - a. For member length 40 feet or less: ±1/4 inch.
 - b. For member length over 40 feet but not over 60 feet: $\pm 3/8$ inch.
 - c. For member length over 60 feet: $\pm 1/2$ inch.
- 7. <u>Deck Width</u> (measured out-to-out): Zero to +2inch, except not more than +1/2 inch where more precision is dictated by the substructure details such as anchor bolts, parallel wing walls, etc
- 8. Position and Alignment:
 - a. Bottom of footing elevation: ± 0.1 feet.
 - b. Profile grade: ±0.05 feet.
 - c. Lateral position: ±0.1 feet.
 - d. Skew: ±0.05 degrees.
- 9. Bearing Seats:
 - a. Elevation: ±0.01 feet
 - b. Variation between bearing seats: Do not vary from a straight line coincident with the centerline of bearings and parallel to the surface of the bottom flanges more than 0.01 feet.
 - c. Grade and cross slope: ±0.005 feet per foot.

10. Openings:

- a. Size of opening: $\pm 1/4$ inch.
- b. Location of centerline of opening: $\pm 1/2$ inch.
- 11. Embedded Items:
 - a. Bolts: ±1/4 inch.
 - b. Utility hangers: $\pm 1/2$ inch.
 - c. Weld Plates: $\pm 1/2$ inch measured along the length of the member, $\pm 1/8$ inch measured perpendicular to the length of the member.
 - d. Inserts: ±1 inch.
 - e. Rail post anchor plates: ±1/4 inch.

Tununak River Bridge #2276

- f. Expansion joints: ±1/8 inch.
- g. Electrical conduits: ±1/2 inch.
- h. Deck drains: ±1/2 inch.
- i. Other embedded items: $\pm 1/2$ inch.

501-3.11 CONSTRUCTION JOINTS. Unless otherwise noted, locate construction joints where specified in the Contract documents. Obtain approval before adding, deleting, or relocating construction joints specified in the Contract documents. Make requests for such changes in writing, accompanied by a drawing depicting the joint. The Engineer will evaluate the proposed construction joint to determine if the joint will affect the strength or durability of the concrete. Joints noted as "permissible" do not need the Engineer's approval before deleting. When permitted, place the joints where they will not be exposed to view in the finished structure.

At horizontal construction joints, place gage strips 1-1/2 inches thick inside the forms along exposed faces to give the joints straight lines.

Do not use wire mesh forming material.

If the Plans require a roughened surface on the joint, create grooves at right angles to the length of the member. Make grooves that are 1/2 to 1 inch wide, 1/4 to 1/2 inch deep, and spaced equally at twice the width of the groove. Terminate the grooves within 1-1/2 to 2 inches from the edges of the joint.

If the Plans require a smooth surface on the joint, provide a trowel finish.

Include shear keys at the joint when the Contract documents do not require a roughened surface or a smooth surface. Make shear keys of formed depressions with slight beveling to ensure ready form removal. Do not use raised shear keys. Make shear keys that meet the following:

- 1. For tops of beams, at the tops and bottoms of boxed girder webs, in diaphragms, and in crossbeams, use shear keys 1-1/2 inches deep, 8 inches long, and spaced at 16 inches.
- 2. In other locations, use shear keys at least 1-1/2 inches deep and 1/3 of the joint width.

Terminate the shear keys within 1-1/2 to 2 inches of the joint edge.

Clean construction joints of surface laitance and other foreign materials before fresh concrete is placed against the surface of the joint. Flush construction joints with water and allow the joint to dry to a surface-dry condition immediately prior to placing concrete.

501-3.12 FORMS AND FALSEWORK. Use forms and falsework designed and constructed according to Section 512.

501-3.13 PRECAST CONCRETE MEMBERS. In addition to the requirements listed in this Section, conform to Section 502 when fabricating prestressed concrete members.

- 1. <u>Shop Drawings</u>. Provide shop drawings for precast concrete members. Include details not provided in the Plans for the construction and erection of the members. Cast members only after shop drawings are approved. Use precast methods for cast-in-place elements when approved. Submit shop drawings, showing construction joint details and other required information.
- 2. <u>Manufacture</u>. Prestress concrete according to Section 502. Fabricate and install reinforcing steel according to Section 503.

Unless otherwise noted, use Class P concrete for precast concrete members meeting the Specified Compressive Strength noted on the Plans.

- 3. <u>Storage and Handling</u>. Handle and move precast concrete members without damage. Store and transport precast concrete members in an upright position with the directions of the support reactions on the member during storage or transport as if in the final position. Locate support points during transport and storage within 30 inches of their final position, or as shown on approved shop drawings. Ship only after the member has cured at least 7 days and has a compressive strength not less than 100 percent of the Specified Compressive Strength.
- 4. <u>Erection</u>. Maintain member stability during transport, lifting, and erection operations. Limit concrete tension stresses due to transport, lifting, and erection operations to less than 500 psi.

Set interchangeable precast concrete members so the initial difference between the top surfaces of the edges of adjacent precast concrete members is no more than 1/2 inch at midspan and no more than 1/4 inch at the bearings.

Set and securely brace precast concrete members within a span before making shear connections. Secure the member to the structure, and provide temporary braces necessary to resist wind or other loads immediately after erecting each precast concrete member.

Provide and use forcing devices as shown in the Plans or as recommended by the precast concrete member manufacturer. Use devices maintaining the top edges of adjacent members at the same elevation while casting or welding diaphragms, welding shear connector plates, and while placing and curing grout in the shear keys.

Make field welds according to Section 503 and Section 504.

Install cast-in-place diaphragms within 2 weeks after setting precast concrete members on their bearings.

If cast-in-place diaphragms cannot be placed within the prescribed time limit, ensure the members are adequately braced to resist movement and rotation. Submit a bracing plan including complete details and substantiating calculations, sealed by a Professional Engineer registered in the State of Alaska.

Erect and place precast deck panels so the mating surfaces do not allow grout leakage. Seal joints where grout leakage may occur.

When the Plans require filling keyways between adjacent concrete members with grout, place grout meeting Subsection 701-2.03 and according to the manufacturer's written instructions. Clean joints of surface laitance and other foreign material before placing grout. Do not place loads on the grouted members until the grout compressive strength has reached 5000 psi.

Tightly pack and rod the grout in the keys and spaces. Keep the grout surface smooth and neat. Ensure the grout surface meets the member edges throughout their lengths and matches the surface elevation of the members with a tolerance of $\pm 1/8$ inch.

501-3.14 PLACING ANCHOR BOLTS. Secure anchor bolt assemblies where shown on the Plans.

When casting anchor bolts in concrete, secure anchor bolts before placing concrete in the forms. Do not disturb anchor bolts after concrete has been placed.

When installing anchor bolts in pipe sleeves, pre-cast holes, cored holes, or drilled holes, completely fill the cavity with grout meeting Subsection 701-2.03. Do not allow water to freeze in the cavity. Do not allow foreign material in the cavity.

501-3.15 UTILIDUCTS, PIPES, CONDUITS, DUCTS, AND UTILITY HOLES. When utiliducts, pipes, conduits, and ducts will be encased in concrete, install them in the forms before placing the concrete. Support the utiliducts, pipes, conduits, and ducts to prevent displacement during concrete placement.

Install utiliducts and utility holes parallel to the roadway centerline unless noted otherwise. Prevent bond between the utiliducts and concrete by tightly wrapping the utiliducts with at least two layers of asphalt felt.

501-3.16 REMOVING CONCRETE. Do not damage other portions of the structure remaining in place when removing concrete.

Tununak River Bridge #2276

Determine and delineate the extent of removal area. Outline the area with a 3/4-inch deep saw cut to form faces perpendicular to the surface prior to the removal of concrete. Do not cut or damage existing reinforcing steel or prestressing steel. During the course of removal, the Engineer may suspend removal or may require additional removal and outline saw cut.

Use any combination of mechanical methods, water-blast cleaning, or abrasive-blast cleaning to remove coarse or broken concrete until a dense, uniform surface of concrete exposing solid coarse aggregate is obtained. When using mechanical methods for removal of concrete, meet the following:

- 1. Use impact tools weighing less than 15 lbs.
- 2. Operate impact tools at an angle less than 45 degrees relative to the surface of the concrete being removed.
- 3. Use hand tools such as hammers and chisels or small air chisels, water blast cleaning, or abrasive blast cleaning to remove final particles of unsound concrete.

During the removal operation do not damage existing reinforcing steel, prestressing steel, or concrete to remain in place.

Before applying the repair material, clean the surface according to ASTM D 4258 within 24 hours of applying the repair material.

Use water meeting the requirements of Subsection 712-2.01 for removal operations.

501-3.17 CRACK EVALUATION. The Engineer will evaluate concrete that is cracked during execution of the Contract. Measure cracks at their widest point.

For concrete decks and approach slabs, allow the Engineer to inspect any surface cracking immediately after termination of concrete curing operations, before prestressing (if applicable), and before releasing falsework. If any 500 square foot portion of the concrete deck or approach slab has cracks, whose width exceeds 0.020 inches and combined lengths total more than 16 feet, treat the surface by performing low-viscosity resin crack repair.

For other concrete, cracks will be evaluated based on the crack width.

- 1. For crack widths equal to and greater than 0.060 inches, the concrete will be considered unacceptable.
- 2. For cracks widths equal to and greater than 0.013 inches but less than 0.060 inches, the Engineer will evaluate the cracked concrete for structural adequacy and durability. If the Engineer determines the crack may affect structural adequacy or durability, the Engineer may reject the concrete, the structure, or a portion of the

structure. If the Engineer determines the cracked concrete is acceptable, repair the crack by performing low-pressure crack repair according to 501-3.18.

3. For cracks widths less than 0.013 inches wide, the crack will be considered acceptable with no additional evaluation or repairs required.

501-3.18 CRACK REPAIR. Perform crack repairs and replace unacceptable concrete at no cost to the Department. No contract time extension will be given for repairing, removing, and replacing unacceptable material.

- 1. <u>Low-Pressure Crack Repair</u>. Repair cracked concrete according to the following requirements:
 - a. <u>Crack Repair Plan</u>. Submit a crack repair plan to the Engineer. Do not repair the crack until the Engineer has approved the crack repair plan. Include the following in the crack repair plan:
 - (1) Experience of the injection equipment technicians
 - (2) Evaluation of the crack width and the recommended epoxy viscosity allowing the epoxy to achieve and maintain the penetration requirements
 - (3) Material information including manufacturer's product data sheets
 - (4) Equipment
 - (5) Crack preparation, injection procedures, and injection sequence
 - (6) Cleanup procedures
 - b. <u>Experience</u>. Provide epoxy injection technicians who have a minimum of 2 years experience in performing repairs using the methods and materials of the selected system.
 - c. <u>Materials</u>. Use epoxy adhesive for crack sealing meeting the requirements of Subsection 501-2.01.5 and capable of containing the crack injection epoxy. Use epoxy adhesive for crack injection meeting the requirements of Subsection 2.01.5 and of viscosity capable of filling at least 90 percent of the crack volume.
 - d. <u>Equipment</u>. Use positive displacement plural component pumps, specifically designed to meter, mix, and to inject epoxy, and capable of filling at least 90 percent of the crack volume.
 - e. <u>Surface and Crack Preparation</u>. Remove contaminants and other foreign material reducing the effectiveness of the surface seal and repaired crack. Allow adequate time for drying. If cleaning solutions are used, perform trial tests to verify the contaminants can be removed. Prepare the surface and crack according to the epoxy manufacturer's instructions.

- f. <u>Entry and Venting Ports</u>. Install entry/venting ports spaced equal to the thickness of the concrete member along one face of the crack. Acceptable types of entry/venting ports are fittings inserted into drilled holes, bonded flush fittings, and gasket devices covering unsealed portions of interrupted seals, allowing injection of epoxy directly into the crack without leaking epoxy.
- g. <u>Mixing Epoxy for Crack Sealing</u>. Mix the epoxy adhesive for crack sealing to the volume ratio prescribed by the manufacturer.
- h. <u>Surface Sealing</u>. Seal the surface of the crack with epoxy adhesive for crack sealing.
- i. <u>Mixing Epoxy for Crack Injection</u>. Mix the epoxy adhesive for crack injection to the volume ratio prescribed by the manufacturer.
- j. <u>Epoxy Injection</u>. Assure the crack seal is cured and capable of containing the crack injection epoxy. Inject the epoxy according to the epoxy manufacturer's instructions. Do not inject epoxy until the air, substrate, and epoxy are within the manufacturer's application temperature range. Limit injection pressure to prevent propagation of the crack, prevent additional damage, and injection pressure in excess of 50 psi.

Inject the epoxy in the sequence noted in the approved crack repair plan. Ensure at least 90 percent of the crack volume is filled.

Maintain the epoxy temperature within the manufacturer's application temperature range during injection operations and until the epoxy is cured.

- k. <u>Finishing and Cleanup</u>. After the injected epoxy is cured, remove ports and surface seal flush with the concrete surface. Do not damage the injected epoxy and do not heat the surface seal to aid in removal.
- 2. <u>Low-Viscosity Resin Crack Repair</u>. When concrete deck or approach slab crack repair is required, the Engineer will define the repair area with the following boundary limits:
 - a. Beginning and ending on straight lines perpendicular to the direction of traffic and extending across the entire width of the concrete deck or approach slab, between the concrete barriers or curbs.
 - b. Beginning and ending at least 5 feet beyond the furthest opposing cracks, measured from where the crack widths exceeds 0.020 inches

If grinding is required, treat the concrete before grinding.

Before treatment, ensure the concrete surface is clean, sound and free of foreign materials that may reduce the effectiveness of the repaired cracks. If the concrete surface becomes contaminated before placing the resin, repeat the cleaning process.

Apply low-viscosity resin to the repair area. Protect barriers, railing, joints, and drainage facilities to prevent contamination by the treatment material.

Completely cover the deck surface with resin so the resin penetrates and fills cracks. Ensure the relative humidity is less than 80 percent, the prepared area is dry, and the surface temperature is at least 50°F and not more than 90°F when the resin is applied. Apply the resin and distribute excess material within the manufacturer's listed pot life. For textured surfaces, including grooved surfaces, remove excess material from the texture indentations.

For concrete decks and approach slabs not receiving a waterproofing membrane, apply aggregate for abrasive finish within 20 minutes of resin application and before setting occurs. Broadcast the aggregate for abrasive finish evenly over the entire treated area at a rate of 1.5 to 2.5 pounds per square yard.

501-3.19 CLEANUP. Remove concrete splatter, paint marks, laitance, rust staining, chamfer strips, and other material not providing a uniform texture and color to the concrete surface.

501-4.01 METHOD OF MEASUREMENT. Section 109 and the following:

<u>Cubic Yard</u>. The lesser of the actual volume or neat line volume of each class of concrete accepted in place in the finished structure.

<u>Class DS Concrete</u>. The sum of the lengths of drilled shafts complete in place, measured along the centerline of the drilled shaft from the bottom to the top.

Precast Concrete Members. Measured per unit, complete in place.

Crack repair for unacceptable concrete will not be measured for payment.

501-5.01 BASIS OF PAYMENT.

Material not appearing in the Bid Schedule and is contained within, embedded, or attached to concrete elements is subsidiary.

Crack repair for unacceptable concrete is subsidiary.

<u>Precast Concrete Member</u>. Payment for precast concrete member includes materials and work for the following items: Class P concrete, reinforcing steel contained in the

member, prestressing steel, plates, nuts, inserts contained within the concrete member, bolts, studs, anchor bars, blockouts, elastomeric bearing pads, grout, drains, and other miscellaneous steel embedded in or attached to the precast concrete member.

SECTION 503

REINFORCING STEEL

503-1.01 DESCRIPTION. Furnish and place reinforcing steel for reinforced concrete structures.

503-1.02 DEFINITIONS.

BAR SIZE / DIAMETER. Nominal dimensions equivalent to those of a circular area having the same weight per foot as the AASHTO/ASTM designated bar.

COVER. The minimum distance between the surface of embedded reinforcing steel and the outer surface of the concrete.

HOOK. A bend in the end of a bar.

HOOP. A one-piece closed tie or continuously wound tie, with hooked or welded ends, enclosing the longitudinal reinforcing steel.

LATERAL REINFORCING STEEL. Reinforcing steel perpendicular to the length of a concrete member.

LONGITUDINAL REINFORCING STEEL. Reinforcing steel parallel to the length of a concrete member.

LOT. A defined quantity.

SPIRAL. Continuously wound reinforcing steel in the form of a cylindrical helix.

STIRRUP. Lateral reinforcing steel formed of individual or paired units, open or closed, used to resist shear and diagonal tension stresses in a structural member.

TIE. Reinforcing steel with hooked ends tied at right angles to and enclosing the other reinforcing steel, and used to provide confinement.

503-2.01 MATERIALS.

Reinforcing Steel Bars

Subsection 709-2.01

Tununak River Bridge #2276

Epoxy-Coated Reinforcing Steel Bars	Subsection 709-2.01
Headed Reinforcing Steel Bars	Subsection 709-2.01
Epoxy Coating Patch Material	Subsection 709-2.01
Bar Supports	Subsection 709-2.03
Epoxy for Bonding Dowels	Subsection 712-2.21

CONSTRUCTION REQUIREMENTS

503-3.01 PLACING DRAWINGS. Submit placing drawings, detailed according to ACI 315, Chapter 3, to the Engineer.

Do not substitute reinforcing steel bars of different size, material, coating, or grade without prior approval of the Engineer. When substituting epoxy-coated reinforcing steel for uncoated reinforcing steel, protect and repair epoxy-coated bars according to Subsection 503-3.02.

503-3.02 PROTECTION OF MATERIALS. Protect reinforcing steel from damage. Before placing reinforcing steel in the work, ensure that the reinforcing steel is free of salt and foreign substances that may affect the performance of the reinforcing steel.

Do not weld or tack weld reinforcing steel, unless otherwise noted.

Do not drop or drag the epoxy-coated reinforcing steel bars or bundles.

Store epoxy-coated reinforcing steel off the ground.

Protect epoxy-coated reinforcing steel from sunlight, salt spray, and weather exposure. The Engineer may reject epoxy-coated reinforcing steel when the cumulative environmental exposure time, including uncovered storage time after coating application to full embedment in concrete, exceeds 2 months.

The Engineer may reject epoxy-coated reinforcing steel when the extent of damaged coating exceeds 2 percent of the surface area in any 1-foot length of bar. When the extent of damaged coating does not exceed 2 percent of the surface area in any 1-foot length of bar, repair damaged coating. Coating damage includes cracks, abrasions, chips, bond loss (the coating can be removed with a peeling action by the finger), and exposed steel areas visible to a person with normal or corrected vision. Repair coating damage before visible oxidation appears on the steel surface.

Protect mechanical splice assemblies, headed bar assemblies, and connecting elements (including bar ends) against physical damage, corrosion, and coating damage. Keep assemblies and connecting elements clean and free of foreign materials that adversely affect the performance of the assembly.

 <u>Repairing Damaged Epoxy-Coating</u>. Clean and remove disbonded areas of coating. Remove loose and deleterious materials. The Engineer may reject epoxy-coated reinforcing steel when the removed coating exceeds 2 percent in any 1-foot length of bar or if the weight, dimensions, cross-sectional area, or tensile properties are less than the minimum requirements of the applicable specification.

Use an approved epoxy coating patch material according to the material manufacturer's recommendations. Apply patching material according to the patching material manufacturer's instructions. Allow the patching material to cure before placing concrete. The Engineer may reject epoxy-coated reinforcing steel when the surface area covered by patching material exceeds 5 percent in any 1-foot length of bar.

Rejected epoxy-coated reinforcing steel may not be substituted for uncoated reinforcing steel or used as bar supports.

503-3.03 FABRICATION. Fabricate reinforcing steel to the size and dimension shown on the Plans. Reinforcing steel dimensions shown are out-to-out of bar, unless otherwise noted.

Meet fabrication tolerances in ACI 117, Section 2.1.

Weld reinforcing steel according to AWS D1.4.

1. <u>Bends</u>. Bend bars when the bar temperature is above 45°F and less than 150°F. Bend bars to the diameter shown on the Plans. If the bend diameter is not shown, bend the bar with inside diameters as shown in Table 503-1. The Engineer may reject reinforcing steel bent with an inside diameter less than the minimum diameter shown in Table 503-1.

Do not re-bend or straighten bars without approval by the Engineer.

BAR SIZE	STIRRUPS AND TIES	STANDARD HOOKS AND OTHER BENDS
No. 3	11⁄2"	21⁄4"
No. 4	2"	3"
No. 5	21⁄2"	3¾"
No. 6	41⁄2"	41⁄2"
No. 7	5¼"	5¼"
No. 8	6"	6"
No. 9	-	91⁄2"
No. 10	-	10¾"

TABLE 503-1 BEND DIAMETER

No. 11	-	12"
No. 14	-	18¼"
No. 18	-	24"

Fabricate bar end hooks meeting the following requirements:

a. Stirrup and Tie Hooks.

- (1) <u>90° Hook</u>: 90° bend plus:
 - (a) For No. 5 bar and smaller, a 6.0 nominal bar diameter extension at the free end of the bar.
 - (b) For No 6, No. 7, and No. 8 bars, a 12.0 nominal bar diameter extension at the free end of the bar.
- (2) <u>135° Hook</u>: 135° bend plus a 6.0 nominal bar diameter extension, but not less than 2.5 inches, at the free end of the bar.
- b. Standard Hooks.
 - (1). <u>Std 180° Hook</u>: 180° bend plus a 4.0 nominal bar diameter extension, but not less than 2.5 inches, at the free end of the bar.
 - (2). <u>Std 90° Hook</u>: 90° bend plus a 12.0 nominal bar diameter extension at the free end of the bar.
- 2. <u>Bar Repairs</u>. The Engineer will evaluate improperly bent bars and bars bent at locations not required by the Plans for structural adequacy and durability. Do not repair improperly bent bars until the bars are inspected by the Engineer and the Engineer approves repairing the bar. Bars repaired prior to inspection by the Engineer may be rejected. If, in the opinion of the Engineer, the bend is of such extent or character as to affect the strength or durability of the bar, the Engineer may reject the bar. Otherwise, the bar may be re-bent or straightened by means meeting the requirements of this Section and in a manner that will not damage the material, coating, or concrete.

If the Engineer approves repairing the bar, preheat the reinforcing steel before bending. Apply heat by any method that does not damage the reinforcing steel or concrete. Preheat the reinforcing steel at least 5.0 nominal bar diameters in each direction from the center of the bend but do not extend preheating below the surface of the concrete. Insulate concrete within 6 inches of the heated bar area. Do not allow the temperature of the reinforcing steel at the concrete interface to exceed 500°F. Preheat the reinforcing steel to at least 1100°F. Ensure the maximum reinforcing steel temperature never exceeds 1200°F. Maintain a uniform temperature

throughout the thickness of the bar by using at least 2 heat tips simultaneously at opposite sides of bars larger than No. 6. Maintain the preheat temperature of the reinforcing steel until bending or straightening is complete. Make the bend gradually with smooth continuous application of force. When straightening, move a bender progressively around the bend. When bending or straightening is complete, gradually reduce the temperature of the reinforcing steel to the ambient air temperature. Do not artificially cool the bars with water, forced air, or any other means.

503-3.04 PLACING AND FASTENING. Place reinforcing steel in the position as shown on the Plans. Secure the reinforcing steel to prevent movement during concrete placement. Do not place bars in addition to those shown on the Plans without prior approval of the Engineer. Do not place bars of different size, material, or grade without prior approval of the Engineer. Space reinforcing steel evenly unless noted otherwise. Provide 2 inches of concrete clear cover, measured from the surface of the reinforcing steel to the outside surface of the concrete, unless noted otherwise.

Do not place bars on layers of fresh concrete or adjust bars while placing concrete.

 <u>Fastening Requirements</u>. Tie the bars with No. 14 or No.16 gauge steel wire. When the spacing between bars is 1 foot or more, tie the bars at all intersections. When the bar spacing is less than 1 foot, tie every other intersection. If the Plans require bundled bars, tie bundled bars together at not more than 6-foot centers. Tie all intersections of epoxy-coated reinforcing steel in the top mat of concrete decks and approach slabs. Use wire coated with plastic, epoxy, or similar non-conductive material when tying epoxy-coated reinforcing steel. Obtain the Engineer's written authorization before welding reinforcing steel. Provide at least 1 inch clear cover to the tie wire by turning the tie wire away from concrete surfaces.

For slip-formed concrete, tie reinforcing steel at all intersections. Provide additional reinforcing steel cross bracing to keep the cage form moving during concrete placement. Place cross bracing both longitudinally and transversely.

2. <u>Bar Supports</u>. Maintain distances from the forms using approved precast mortar blocks, metal supports, or plastic supports strong enough to resist permanent movement under construction loads. If supports extend to exposed concrete surfaces, use metal or plastic supports. To support and fasten epoxy-coated reinforcing steel, use plastic supports or metal supports coated with plastic, epoxy, or similar non-conductive material. Do not use wooden or aluminum supports.

Place supports at frequent intervals to maintain the cover between the reinforcing and the surface of the concrete. Space supports under concrete deck reinforcing steel and approach slab reinforcing steel not more than 4 feet apart in each direction. **503-3.05 SPLICING.** Splice reinforcing steel bars at locations shown on the Plans and specified in this Section. Obtain the written approval of the Engineer before splicing bars at other locations. The Engineer will evaluate splices at locations not designated in the Contract documents for structural adequacy.

Splice reinforcing steel bars using lap splicing, welded butt joints, welded lap splicing, mechanical butt splicing, or mechanical lap splicing, unless noted otherwise. Do not splice reinforcing steel bars at locations where splices in the reinforcing steel are not allowed.

Splices will not be permitted in bars 40 feet or less in plan length, unless otherwise noted in the Contract documents. For bars exceeding 40 feet in plan length, ensure the distance center-to-center of splices is not less than 30 feet, with no individual bar length less than 10 feet. Stagger splices in adjacent bars, unless otherwise noted. Stagger lap splices a distance greater than the lapped splice length. Stagger butt splices at least 2 feet.

Reinforcing steel may be continuous at locations where splices are noted in the Contract documents.

Do not use lap splicing for No. 14 or No. 18 bars.

Do not lap splice spiral reinforcing steel. Anchor each end unit of reinforcing steel spiral by lapping the free end of the spiral to the continuous spiral and using either a welded lap splice or a mechanical lap splice.

Do not field weld epoxy-coated reinforcing steel bars.

- 1. Lap Splicing.
 - a. <u>General</u>. Place reinforcing steel bars in contact and securely tie the bars together. Provide a minimum clear distance of 2 inches between the spliced bars and the nearest adjacent bar. Do not reduce the minimum clearance to the surface of the concrete.

Use lapped splices meeting the minimum lengths as shown in Table 503-2, unless otherwise noted:

BAR SIZE	UNCOATED	EPOXY-COATED
No. 3	1' - 4"	1'- 11"
No. 4	1' - 9"	2' - 7"
No. 5	2' - 2"	3' - 3"

TABLE 503-2 LAPPED SPLICE LENGTH

No. 6	2' - 7"	3' - 10"
No. 7	3' - 5"	5' - 2"
No. 8	4' - 6"	6' - 9"
No. 9	5' - 9"	8' - 7"
No. 10	7' - 3"	10' - 10"
No. 11	8' - 11"	13' - 4"

- b. <u>Qualifications and Submittals</u>. No qualifications apply when lap splicing.
- c. <u>Testing/Inspection</u>. Field verify lap splice length.
- 2. Welded Butt Joints.
 - a. <u>General.</u> Use complete joint penetration (CJP) groove welds conforming to the requirements in AWS D1.4 except as noted below.

Use the joint details and dimensions as shown in Figure 3.2 (A) (B) (D) and (E), "Direct Butt Joints" of AWS D1.4. Do not use split pipe backing.

Do not deviate the bar alignment at a welded splice more than 1/8 inch per 10-foot length.

Use electrodes classified as "Nickel-Steel" as referenced in AWS A5.5, A5.28, or A5.29.

Protect welding areas from precipitation and wind velocities in excess of 5 mph.

Do not weld or tack brackets, clips, shipping devices or other material not required by the Contract documents to the reinforcing steel, unless shown on the working drawings and approved by the Engineer.

b. <u>Qualifications and Submittals.</u> Perform welds using qualified welders and qualified Welding Procedure Specifications (WPS) meeting AWS D1.4. The operator and procedure qualification tests may be performed simultaneously.

Perform quality control inspection necessary to ensure the materials and workmanship meets the requirements of the Contract documents using an inspector currently certified as an AWS Certified Welding Inspector (CWI) according to the provisions of AWS QC1.

Perform nondestructive testing other than visual testing as required in the Contract documents using personnel currently qualified for NDT Level II or NDT Level I working directly under the NDT Level II according to the provisions of the American Society for Nondestructive Testing's *Recommended Practice No. SNT-TC-1A*.

Submit a welding plan stamped and signed by the CWI responsible for quality control and consisting of the following documents:

- (1) Quality control inspector qualifications including CWI number.
- (2) Welding Procedure Specifications (WPS).
- (3) Procedure Qualification Records (PQR) and test results.
- (4) Welder Performance Qualification Records (WPQR) with documentation of current welder certification.
- (5) Type and extent of Nondestructive Examination (NDE) to be conducted, as required in the specifications.
- (6) Nondestructive testing personnel qualifications.
- (7) Methods of protecting the welding area.
- (8) Certified test report(s).

Submit quality control inspection documents and test results to the Engineer.

c. <u>Testing/Inspection</u>.

(1) <u>Shop Welds</u>. Perform job control tests consisting of the fabrication, under conditions used to produce the splice, and tensile testing of 6 sample splices for each lot of splices. The Engineer will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of shop produced complete joint penetration welded butt joints is defined as no more than 150 splices of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

Make splice samples using the same splice materials, position, equipment, and following the same procedures as used to make splices in the work. Make splice samples at least 5 feet long with the splice at mid-length. Shorter sample splice bars may be used if approved by the Engineer.

Perform job control tests in the presence of the Engineer. Splices tested in the absence of the Engineer may be rejected. Notify the Engineer, in writing, at least 48 hours prior to performing testing.

Identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

Test each sample according to ASTM A 370, including Appendix A9. Tensile test each sample until partial or total fracture of the parent bar material or weld occurs.

All splices in the lot represented by a test will be considered to meet the tensile strength requirements when both of the following conditions are met:

- (a) The average tensile strength of the sampled splices is not less than 80000 psi, based on the nominal bar area.
- (b) The individual tensile strength of at least 5 sample splices have a minimum tensile strength of at least 80000 psi, based on the nominal bar area.
- (2) <u>Field Welds</u>. Perform radiographic testing on a random sample, selected by the Engineer, of at least 25 percent of the total number of direct butt joint welds.

Perform tests in the presence of the Engineer. Welds tested in the absence of the Engineer may be rejected. Notify the Engineer, in writing, at least 48 hours prior to performing radiographic testing.

Perform nondestructive examination using radiographic testing according to AWS D1.4.

Make 2 exposures for each complete joint penetration direct butt joint. For each of the exposures, center the radiation source on each bar to be radiographed. Make the first exposure with the radiation source placed at zero degrees from the top of the weld and perpendicular to the weld root and identify with a station mark of "0". Make the second exposure at 90 degrees to the "0" station mark and identify with a station mark of "90".

Clearly identify each direct butt joint on each radiograph. Establish the radiograph identification and marking system with the Engineer before radiographic inspection begins. Identify film using lead numbers and letters. Do not use etching, flashing or writing to identify film. Legibly mark each piece of film with identification information including, as a minimum, the following information:

- (a) Contractor's name
- (b) Date
- (c) Name of nondestructive testing firm
- (d) Initials of radiographer
- (e) Weld number

Identify a repaired weld by placing the letter "R" followed by the weld repair number on the radiographic film using lead numbers and letters.

Record the results of radiographic interpretations on a signed certification. Keep a copy of the certification with the film packet.

If more than 10 percent of the tested welds do not meet AWS D1.4, test a second random sample from untested welds, selected by the Engineer, of at least 25 percent of the total number of welds. If more than 10 percent of the tested welds in the second sample do not meet AWS D1.4, perform radiographic testing on remaining untested welds.

Repair weld defects according to the requirements of AWS D1.4.

3. Welded Lap Splicing.

a. <u>General.</u> Use direct lap joint welds conforming to the requirements in AWS D1.4 except as noted below.

Use the joint details and dimensions as shown in Figure 3.4 (A), "Direct Lap Joint with Bars in Contact" of AWS D1.4.

Use electrodes classified as "Nickel-Steel" as referenced in AWS A5.5, A5.28, or A5.29.

b. <u>Qualifications and Submittals.</u> Perform welds using qualified welders and qualified Welding Procedure Specifications (WPS) meeting AWS D1.4. The operator and procedure qualification tests may be performed simultaneously.

Perform quality control inspection necessary to ensure the materials and workmanship meets the requirements of the Contract documents using an inspector currently certified as an AWS Certified Welding Inspector (CWI) according to the provisions of AWS QC1.

Submit a welding plan stamped and signed by the CWI responsible for quality control and consisting of the following documents:

- (1) Quality control inspector qualifications including CWI number.
- (2) Welding Procedure Specifications (WPS).
- (3) Procedure Qualification Records (PQR) and test results.
- (4) Welder Performance Qualification Records (WPQR) with documentation of current welder certification.
- (5) Type and extent of Nondestructive Examination (NDE) to be conducted, as required in the specifications.
- (6) Nondestructive testing personnel qualifications.
- (7) Methods of protecting the welding area.
- (8) Certified test report(s).

Submit quality control inspection documents, test results, and required test assemblies to the Engineer.

- c. <u>Testing/Inspection</u>. Perform inspection according to AWS D1.4.
- 4. Mechanical Butt Splices.
 - a. <u>Types</u>. Use one of the following types of mechanical butt splices:
 - (1) <u>Sleeve-Threaded Mechanical Butt Splices</u>. Use a sleeve-threaded mechanical butt splice consisting of a steel splice sleeve with tapered interior threads that joins the bars with matching tapered threads.
 - (2) <u>Sleeve-Swaged Mechanical Butt Splices</u>. Use a sleeve-swaged mechanical butt splice consisting of a seamless steel sleeve applied over the ends of the reinforcing steel bars and swaged to the bars by means of a hydraulic press.
 - (3) <u>Sleeve-Lock Shear Bolt Mechanical Butt Splices</u>. Use a sleeve-lock shear bolt mechanical butt splice consisting of a seamless steel sleeve with serrated steel strips welded to the inside of the sleeve, center hole with centering pin, and bolts tightened until the bolt heads shear off and the bolt ends are embedded in the reinforcing steel bars.
 - (4) <u>Two-Part Sleeve-Forged Ends Mechanical Butt Splices</u>. The two-part sleeveforged ends bar type of mechanical butt splices consists of a shop machined two-part threaded steel sleeve coupling forged ends of the reinforcing steel bar.
 - b. <u>General</u>. Conform to the manufacturer's instructions when splicing.

Cut the reinforcing steel bars perpendicular to the long axis of the bar.

Provide a clear cover of not less than 1-1/2 inches measured from the surface of the concrete to the outside of the splice sleeve. Adjust stirrups, ties and other reinforcing steel if necessary to provide clear cover.

For epoxy-coated bars, use epoxy-coated mechanical splices.

Mark each splice with the lot, heat, or batch number that identifies the splice.

c. <u>Qualifications and Submittals</u>. A splice will be considered qualified if the splice can develop a minimum tensile strength of 80000 psi, based on the nominal bar area, and the bars within the splice do not exceed a total slip, after loading in tension to 29000 psi and relaxing to 2900 psi, of 10 mils for bars smaller than a

No. 18 bar or 30 mils for No. 18 bar when tested according to ASTM A 370, including Appendix A9.

Submit the following information:

- (1) the manufacturer's name;
- (2) the name of the product or assembly;
- (2) the lot, heat, or batch number that identifies the splice;
- (3) the bar grade and size number to be spliced by the material;
- (4) a complete description of the splice and installation procedure; and,
- (5) test results indicating the splice, used according to the manufacturer's procedures, complies with the minimum tensile strength requirements and the total slip requirements.
- d. <u>Testing/Inspection</u>. Perform job control tests consisting of the fabrication, under conditions used to produce the splice, and tensile testing of 6 sample splices for each lot of splices. The Engineer will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of mechanical butt joints is defined as no more than 150 splices of the same type of mechanical butt splice used for each combination of bar size and bar deformation pattern that is used in the work.

Make splice samples using the same splice materials, position, equipment, and following the same procedures as used to make splices in the work. Make splice samples at least 5 feet long with the splice at mid-length. Shorter sample splice bars may be used if approved by the Engineer.

Perform job control tests in the presence of the Engineer. Splices tested in the absence of the Engineer may be rejected. Notify the Engineer, in writing, at least 48 hours prior to performing testing.

Identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

Test each sample according to ASTM A 370, including Appendix A9. Tensile test each sample until partial or total fracture of the parent bar material, mechanical splice material, or bar-to-splice connection.

All splices in the lot represented by a test will be considered to meet the tensile strength requirements when the minimum individual tensile strength of the sampled splices is not less than 80000 psi, based on the nominal bar area.

5. Mechanical Lap Splices.

a. <u>General</u>. Conform to the manufacturer's instructions when splicing.

Provide a clear cover of not less than 1-1/2 inches measured from the surface of the concrete to the outside of the splice sleeve. Adjust stirrups, ties and other reinforcing steel if necessary to provide clear cover.

For epoxy-coated bars, use epoxy-coated mechanical splices.

Mark each splice with the lot, heat, or batch number that identifies the splice.

b. <u>Qualifications</u>. A splice will be considered qualified if the splice can develop a minimum tensile strength of 75000 psi, based on the nominal bar area, when tested according to ASTM A 370, including Appendix A9.

Submit the following information:

- (1) the manufacturer's name;
- (2) the name of the product or assembly;
- (2) the lot, heat, or batch number that identifies the splice;
- (3) the bar grade and size number to be spliced by the material;
- (4) a complete description of the splice and installation procedure; and,
- (5) test results indicating the splice, used according to the manufacturer's procedures, complies with the minimum tensile strength requirements.
- c. <u>Testing/Inspection</u>. Perform job control tests consisting of the fabrication, under conditions used to produce the splice, and tensile testing of 6 sample splices for each lot of splices. The Engineer will designate when samples for job control tests are to be fabricated and will determine the limits of the lot represented by each job control test.

A lot of mechanical butt joints is defined as no more than 150 splices of the same type of mechanical butt splice used for each combination of bar size and bar deformation pattern that is used in the work.

Make splice samples using the same splice materials, position, equipment, and following the same procedures as used to make splices in the work. Make splice samples at least 5 feet long with the splice at mid-length. Shorter sample splice bars may be used if approved by the Engineer.

Perform job control tests in the presence of the Engineer. Splices tested in the absence of the Engineer may be rejected. Notify the Engineer, in writing, at least 48 hours prior to performing testing.

Identify sample splices with weatherproof markings prior to shipment to the testing laboratory.

Test each sample according to ASTM A 370, including Appendix A9. Tensile test each sample until partial or total fracture of the parent bar material, mechanical splice material, or bar-to-splice connection.

All splices in the lot represented by a test will be considered to meet the tensile strength requirements when the minimum individual tensile strength of the sampled splices is not less than 75000 psi, based on the nominal bar area.

503-3.06 HEADED BAR REINFORCING STEEL. Use Headed bar reinforcing steel consisting of deformed reinforcing steel bars with a head attached to one or both ends. Attachment can be accomplished through welding or forging of heads onto the bar ends, by internal threads in the head mating to threads on the bar end or by a separate threaded nut to secure the head to the bar. Heads may be forge formed, machined from bar stock, or cut from plate.

Perform production control tests consisting of the installation, using the same procedure as used in the work, and tensile testing of 3 sample splices for each lot of heads.

A production lot of headed bar reinforcing steel is defined as no more than 150 splices of the same bar size, with heads of the same size and type, and manufactured by the same method, produced from bar material of a single heat number and head material of a single heat number. For bars having heads on both ends, the bar will be counted as 2 reinforcing steel bars for the purposes of establishing and testing production lots.

Test each sample according to ASTM A 970.

All splices in the lot represented by a test will be considered to meet the tensile strength requirements when the minimum individual tensile strength of the sampled splices meets the tensile strength requirements of ASTM A 970.

503-3.07 DRILLING AND BONDING DOWELS. Install dowels at locations shown on the Plans or as authorized by the Engineer. Drill holes by methods that do not shatter or damage the concrete adjacent to the holes. Do not damage reinforcing steel or prestressing steel when drilling through reinforced concrete members, unless approved by the Engineer. The Engineer will evaluate holes in which reinforcing steel or prestressing steel is encountered during drilling for structural adequacy and durability.

Drill each hole to the diameter and depth recommended by the manufacturer to develop the ultimate strength of the dowel or to the depth shown on the Plans, whichever is greater. Prepare each hole according to the manufacturer's instructions before placing the epoxy and the dowels. Fill the hole with epoxy and install the dowel according to the manufacturer's instructions. Completely fill drilled holes with epoxy using a method that will not trap air or create voids. Support dowels and prevent movement during curing. Do not disturb the dowels until the epoxy has cured.

Do not use dowels made from epoxy-coated reinforcing steel.

503-3.08 PLACEMENT TOLERANCES. When placing reinforcing steel, do not reduce the total number of bars specified. Place reinforcing steel within the following tolerances:

- 1. <u>Clear Cover</u>: +1/4 inch, -3/8 inch, but not reducing the clear cover to less than 1 inch.
- 2. <u>Placement of Reinforcing Steel</u>: ±1/2 inch.
- 3. <u>Spacing of Reinforcing Steel</u>: ± One-quarter of the specified spacing, but not to exceed 1 inch.
- 4. <u>Spacing for Bundled Reinforcing Steel</u>: 1 inch or 2 times the individual nominal bar diameter between bundles, whichever is greater.
- 5. <u>Embedment Length and Length of Lap Splices</u>: -1 inch for No. 3 through No. 11 bars, -2 inches for No. 14 and No. 18 (embedment only).
- 6. Location of Bends in Bars and Ends of Bars: ±2 inch.

SECTION 505

PILING

505-1.01 DESCRIPTION. Furnish and drive piles, of the type and dimensions designated to the Driving Resistance and the Minimum Penetration as shown on the plans and assist in pile testing.

505-1.02 DEFINITIONS.

CUT-OFF. The cut off end of a pile, or cutting a pile end at the finish elevation.

DRIVECAP. A pile driver component that is used to transmit impact forces from the hammer ram to the pile top. The drivecap includes the anvil or striker plate, hammer cushion (capblock), helmet, and pile cushion, if used. (Also termed the driving head).

DRIVING RESISTANCE. The required axial resistance, in units of force, to be achieved during pile driving.

ESTIMATED PILE TIP ELEVATION. The elevation at which the Department expects the driving resistance to be achieved.

FRESH HEADING. Cutting the end of a pile perpendicular to the long axis to remove damage, and to obtain a proper driving or splicing surface.

FOLLOWER. A pile driving aid placed between the helmet and the pile top when the pile head is below the reach of the hammer.

HAMMER CUSHION. A disk of material placed on top of the helmet but below the anvil or striker plate to relieve impact shock and provide protection for the hammer and pile.

HAMMER ENERGY:

MAXIMUM RATED HAMMER ENERGY. The theoretical maximum amount of gross energy that a pile driving hammer can generate.

TRANSFERRED HAMMER ENERGY. The amount of energy transferred to the pile for a given blow accounting for friction energy during the ram down stroke, energy retained in the ram and drivecap during rebound, and other impact losses.

HELMET. A pile driver component that fits closely on top of the pile to ensure the impact force is transmitted uniformly across the top of the pile and concentric with the axis of the pile.

Tununak River Bridge #2276

LEADS. Pile driver components used to maintain pile and hammer alignment during driving, and on which the pile hammer may travel. Types of leads include :

FIXED LEADS. Pile driving leads that are attached at the top of the boom by a pivot and to the crane at the bottom with a brace. The pile is held at the top by the helmet and is guided at the bottom by the pile gate.

SEMI-FIXED LEADS. Pile driving leads that are attached at the top of the boom by a pivot and supported by the lead line. The lead can slide axially along the pivoted boom point and may be fitted with an extendable brace at the bottom of the leads.

SWINGING LEADS. Pile driving leads that are suspended from the boom by the cable and are not attached to the crane at the bottom with a brace. (Also known as offshore leads)

MINIMUM PENETRATION. The minimum length of pile below the footing or finished ground elevation to which the pile must be driven.

OBSTRUCTION. An unanticipated object projecting within the path of the pile that causes pile refusal or impedes the pile's advance within required tolerances.

PILE GATE. A device at the base of the leads that is closed around the pile to maintain alignment.

REFUSAL. Refusal occurs when the hammer requires 15 or more blows to move the pile one inch, and the hammer is operating near the maximum allowable compressive driving stress (within 80-90% of the specified pile yield stress).

SUBSTRUCTURE UNIT. A unit of the substructure such as an abutment or pier that transmits loads directly from the superstructure to the ground.

TEST PILE. A pile that has a high-strain dynamic test performed on it.

TEMPLATE. A structure affixed to the ground used to maintain proper pile alignment during driving.

WAVE EQUATION ANALYSIS. A numerical method of analysis for the behavior of driven piles that predicts the pile capacity versus blow count relationship (bearing graph) and pile driving stress. Wave equation analysis is performed using the wave equation analysis program (WEAP) with a version dated 1987 or later.

505-2.01 MATERIALS. Use materials that conform to the following:

Structural Steel Piles	Section 715
Sand	Subsection 703-2.12

505-2.02 PILES. Furnish piles sufficient in length to obtain the Driving Resistance and to extend to the Estimated Pile Tip Elevation shown on the plans. Furnish full-length piles where practical. Where splices are required, follow the provisions of Subsection 505-3.04. Furnish additional pile length to provide for fresh heading and to suit the method of installation. Use metal shoes or reinforced tips as required. Store and handle piles in a manner that protects them from damage.

1. <u>Steel Piles</u>. Furnish H-pile sections, pipe piles, sheet piles or other structural steel sections described in the Contract.

The Engineer will reject steel piles that exceed the camber and sweep permitted by allowable mill tolerance.

Hot-dip galvanize steel piles a minimum thickness of 4 mils from the top to a distance not less than 10 feet below the finished ground line according to Subsection 716-2.07. Steel piles and pile shells that do not protrude above the final ground line do not require galvanizing.

CONSTRUCTION REQUIREMENTS

505-3.01 PILE DRIVING EQUIPMENT.

1. <u>Pile Driving System</u>. Use impact hammers to drive piles and to determine resistance during pile driving. Vibratory hammers may only be used to install test piles for initial placement of up to a maximum penetration of 15 feet. If a vibratory hammer is used on a production pile, use an impact hammer to determine pile resistance by driving the pile an additional penetration of at least 5 feet. Use pile driver leads that allow the hammer to move freely. Do not use followers to drive piles.

Fit the pile driving hammer with a cast-steel driving head (or similar device) that is recommended in the hammer manufacturer's guidelines, is compatible with the pile, and aligns concentrically and fits closely with the top of the pile.

If the pile driving hammer is fitted with a hammer cushion, use a cushion that satisfies the recommendation in the hammer manufacturer's guidelines, is appropriate to prevent damage to the hammer or pile, and ensures uniform driving performance. If not new, ensure the hammer cushion is at least 75 percent of the manufactured thickness. Replace driving hammer cushions with a reduction in cushion thickness exceeding 25 percent of the manufactured thickness. Do not use wood, wire rope, or asbestos hammer cushions.

For piles that will not be exposed in the completed work, use fixed leads, a ground template, or other means to ensure proper placement and alignment of piles.

For piles that will be exposed in the completed work, use fixed leads, a two-tiered template that laterally supports the pile within 5 feet of the finished ground or water elevation and within 5 feet of the cut-off elevation, or other means to ensure proper placement and alignment of piles.

To ensure rigid lateral support to the pile during driving when using fixed leads, hold the leads in position at the top and bottom by using guys, steel braces, or other means of restraint that provide sufficient lateral support to prevent movement of the pile. Do not use semi-fixed leads or swinging leads without other means of providing sufficient lateral support to prevent movement of the pile. Wooden templates are not permitted.

Use only equipment included in the approved pile driving plan. The Engineer will inspect the pile driving equipment for conformance with the approved pile driving plan after it has been mobilized to the site and prior to beginning pile driving operations. Remove and replace pile driving equipment found out of conformance with the approved pile driving plan at no extra cost to the Department and with no adjustment to contract time.

2. <u>Impact Hammer Approval</u>. At least 30 days before mobilizing any pile driving equipment, submit for approval a wave equation analysis for all pile driving systems used to drive piling showing the suitability of the proposed hammer. The wave equation analysis will be performed using the latest version of GRLWEAP for all pile driving systems used to drive piling according to the requirements of this subsection and the user's manual for the program. Verify that the pile driving system proposed does not produce stresses greater than 90-percent of the pile yield stress and that the rate of pile penetration is 100-blows per foot or less at the Driving Resistance specified in the Contract. Include a completed Pile Driving Equipment Data Form (Form 25D-098) with the submittal. The Department will perform an independent wave equation analysis using the computer program "GRLWEAP" and GRLWEAP industry standard hammer input data, which will be used as basis for hammer approval.

Unless otherwise specified, use the following default values and the applicable values from Table 505-1 as input to the wave equation analysis program:

Output option (IOUT)	0
Factor of safety applied to (Rult)	1.0
Type of damping	Smith
Residual stress option	No

Hammer Type	For Analysis of Driving Resistance	For Analysis of Driving Stresses
Single acting diesel hammers	0.72	0.84
Closed-ended diesel hammers	0.72	0.84
Single acting air/steam hammers	0.60	0.70
Double acting air/steam hammers	0.45	0.53
Hydraulic hammers or other external combustion hammers having ram velocity monitors that may be used to assign an equivalent stroke.	0.85	1.00

TABLE 505-1 HAMMER EFFICIENCIES USED IN HAMMER APPROVAL

- 3. <u>Pile Driving Plan</u>. No less than 30 days prior to the anticipated start of pile driving, submit for review the details of each proposed pile driving system. Include in the pile driving plan:
 - b. Manufacturer's catalog cuts, specifications, manuals, guidelines, and technical bulletins for all pile driving equipment to be used.
 - c. A description of the techniques to be used for ensuring proper placement and alignment of the piles, obtaining the driving resistance, and advancing the piles to the estimated pile tip elevation.
 - d. Alternate methods of pile installation in the event obstructions are encountered.

Review by the Engineer of the pile driving plan will not relieve the Contractor of responsibility for piles damaged during pile driving operations.

Submit all revisions to the pile driving plan to the Engineer for review. For all pile driving equipment not previously identified in the pile driving plan, include in the submittal all of the information required above for the pile driving plan. Explain to the Engineer, in writing, which portions of the approved pile driving plan will be

superseded by the revision and which portions remain unchanged. Allow at least 5 days for the Engineer's review of pile driving plan revisions.

505-3.02 PILE TESTING AND PILE DRIVING CRITERIA. The Engineer will use one or more of the following to set criteria to monitor pile driving performance and the resistance of the pile during driving.

- 1. <u>Wave Equation Analysis</u>. The Engineer will provide pile driving criteria based on the Department's wave equation analysis. The wave equation analysis computer program to be used will be the "GRLWEAP" program (latest version) using the GRLWEAP industry standard hammer input data.
- 2. <u>High-Strain Dynamic Testing</u>. The Engineer may perform high-strain dynamic testing. Attend a meeting with the Engineer at least 14 days prior to the beginning of pile driving operations to evaluate and discuss the test pile program. Give the Engineer 7 days advance notice before driving each test pile. The Engineer will perform the high-strain dynamic testing in accordance with ASTM D 4945. Piles tested using high-strain dynamic testing may be incorporated into the work. The results of the high strain dynamic tests will be used to determine the driving criteria for the production piles.

The Engineer may also perform high strain dymaic testing to confirm hammersystem efficiency, pile driving stresses and pile integrity.

The Engineer will test the first pile driven at each substructure unit designated for pile testing. Do not drive any production piles, except the test pile, at the substructure unit until the test pile has been driven to the driving resistance and minimum penetration specified in the Contract documents. The Engineer will require 4 hours at each test pile to set up and install the test equipment. The Engineer will attach testing instruments near the top of the test pile through drilled and threaded holes. The Department will furnish the testing equipment and labor necessary to mount the testing instruments to the pile. Provide a reasonable and safe means of access to the top of the test pile after the pile is placed in the leads. Furnish electrical power (a 115 volt, 55-60 cycle AC outlet, 10 amp minimum) for the Engineer's use during the installation and operation of the testing instruments.

Drive each test pile to the Driving Resistance and Minimum Penetration specified in the Contract documents as indicated by driving criteria established from the Department's wave equation analysis. The Engineer will record driving data for the test pile. If an obstruction is encountered during driving of the test pile, testing will stop on that pile and the next pile driven at the substructure unit will be designated as a test pile.

If the results from the high-strain dynamic testing are acceptable to the Engineer, drive the remaining piles at the substructure unit using the criteria from the wave equation analysis. Otherwise, drive the remaining piles at the substructure unit using
criteria set by the Engineer and based on the results of the high-strain dynamic testing. The Engineer will provide new driving criteria within 1 day of the completion of high-strain dynamic testing that confirms the driving resistance of a test pile.

If the dymanic test results do not indicate the Driving Resistance has been obtained at the Minimum Tip Elevation stated on the plans, the Engineer may direct suspension of pile driving operations for up to 72 hours and then require restriking the pile with the Engineer present to record driving data and monitor the pile using the Pile Driving Analyzer (PDA). Perform the restrike with the same hammer as the one used at end of initial driving (EOID), after the hammer has been in use for at least ½ hour.. Restrike the test pile with 60 consecutive blows or until the pile penetrates an additional 3 inches, whichever comes first. The Engineer may terminate the re-strike after 25 blows if pile penetration is less than 1 inch.

Account for the entire allotted equipment installation time and restrike suspension time required by the Engineer in the progress schedule submitted under Subsection 108-1.03 or Section 646, as applicable. Suspension of pile driving operations at a testing location to allow for testing instrument installation or a re-strike of a test pile is not a suspension of work per Subsection 108-1.06 and additional contract time will not be allowed.

The Contractor shall repair all pile coatings that are damaged during dynamic testing, to the satisfaction of the Engineer.

505-3.03 DRIVING PILES. Drive all piles to the driving resistance and minimum penetration specified in the Contract documents using the pile driving criteria provided by the Engineer. Use the same pile driving system used to set pile driving criteria to drive all piles. Install piles in groups starting from the center of the group and proceed outward in either direction.

If the pile is driven to the estimated pile tip elevation and does not achieve the driving resistance, continue driving the pile to a penetration established by the written direction of the Engineer.

- 1. <u>Driving Through New Embankment</u>. When driving piles through new embankment and the depth of the embankment at the pile location is in excess of 5 feet, drive the pile in a hole made through the embankment. Make the hole diameter 6 inches greater than the pile. After driving the pile, fill the annular space around the pile with sand.
- 2. <u>Placement and Alignment</u>. Ensure proper placement and alignment of the piles. The Engineer will reject piles that are bent or otherwise damaged by forcing the pile into the leads or template.

Drive piles within an allowed variation as to direction of pile of not more than 1/4 inch per foot. Limit the rotation of steel piles about their longitudinal axis to 15 degrees from the plan position. In addition, position piles to the following tolerances:

- a. <u>Abutments</u>. Position the piles at the bottom of an abutment within 3 inches of the position specified in the Contract documents. Do not vary the distance between any two piles more than 3 inches from that specified in the Contract documents, and keep the clear distance from the edge of pile to the edge of footing to at least 9 inches.
- b. <u>Pier Footings</u>. Position the piles at the bottom of a footing within 6 inches of the position specified in the Contract documents. Do not vary the distance between any 2 piles more than 6 inches from that specified in the Contract documents, and keep the clear distance from the edge of pile to the edge of footing to at least 9 inches.
- c. <u>Exposed Pile Piers</u>. Position the piles within 2 inches of the position specified in the Contract documents at cut-off elevation and within 3 inches of the position specified in the Contract documents at the original ground line elevation.
- 3. <u>Protection of New Concrete</u>. When driving a pile near concrete placed within 28 days, ensure the distance between the pile being driven and the nearest edge of concrete is not less than the distance determined by the following formula:

D = C·√Ē

Where: D = Distance in feet

E = Maximum rated hammer energy in foot-pounds

C = Vibration coefficient shown in Table 505-2 based on the number of calendar days after concrete placement

4. <u>Obstructions</u>. Use alternate methods to drive through or remove obstructions. Obtain written approval from the Engineer before employing any alternative methods of pile advancement.

After exhausting all practicable means to obtain the minimum penetration, but without success, the Engineer will evaluate the structural adequacy of the bridge at a lesser penetration. This review will be based on the resistance of the pile during driving. If the Engineer finds the structure to be adequate, the pile will be accepted at the lesser pile penetration.

5. <u>Concrete Filled Pipe Piles</u>. After driving pile, clean out the pile to the bottom of concrete elevation specified in the Contract documents. If there is a delay between

cleanout and placing concrete, verify that the soil level in the pile has not rebounded before placing concrete.

Concrete Age (days)	Coefficient
1	0.34
2	0.23
3	0.18
4	0.15
5	0.13
6	0.12
7-9	0.11
10-13	0.10
14-20	0.09
21-28	0.08

TABLE 505-2VIBRATION COEFFICIENT

505-3.04 SPLICES, EXTENSIONS AND BUILD-UPS. If the length of a steel pile is not sufficient to obtain the estimated pile tip elevation and driving resistance specified in the Contract documents, the pile may be spliced in order to obtain the length required to reach the minimum penetration and driving resistance. Use additions with cross sections identical to the pile cross sections.

Make splices with complete joint penetration welds over the entire cross section. If approved, piles may be spliced using pile cut-offs and short pieces if no piece used is less than 10 feet long.

Meet the welding requirements of Section 504. Align the piles at a splice to meet the dimensional tolerances for the allowable variation in straightness of welded columns in AWS D1.1.

505-3.05 DEFECTIVE PILES. Use a pile driving method which does not damage the pile. Do not manipulate the piles to force them into proper position. Correct damaged or improperly driven piles using a method approved by the Engineer. Drive down all piles pushed up by driving adjacent piles or by any other cause. Approved methods may include one of the following:

1. Withdraw and replace the pile with a new and, when necessary, longer pile.

Tununak River Bridge #2276

- 2. Drive a second pile adjacent to the defective pile.
- 3. Splice or build up the pile.
- 4. Extend a sufficient portion of the footing to properly imbed the pile.

505-3.06 CUTTING OFF PILES. Cut off the piles at the elevations indicated on the Plans. Ensure that all injured material is removed.

When steel piles are shown embedded in concrete footings or pile caps, cut off piles within -1/2 inch to +3 inches of the plan embedment, but do not interfere with reinforcing steel or other items embedded in concrete. When steel pipe piles are shown cutoff below concrete footings or pile caps, cut off piles within -1/2 inch to +1/2 inch of the plan elevation. In pile bents with steel cap beams, make accurate cut-offs to ensure full bearing between the caps and piles.

PREFABRICTED MODULAR BRIDGE

521-1.01 DESCRIPTION.

Furnish and erect a prefabricated modular, truss-panel bridge for the Tununak River Bridge Number 2276 as shown on the Plans.

521-2.01 MATERIALS.

Use one of the following modular, truss-panel bridges:

- Acrow Bridges, 181 New Road, Parsippany, NJ 07054-4208, Phone: 1-973-244-0080, <u>http://www.acrowusa.com/</u>, Model: Series 700XS, 2L24, DDR2
- Bailey Bridges, Inc., 119 40th Street N.E., Fort Payne, AL 35967, Phone: 1-800-477-7320, <u>http://www.baileybridge.com/</u>, Model: Bailey L Style L2-Q6x6
- Mabey Bridge and Shore, Inc., 6770 Dorsey Road, Baltimore, MD 21075, Phone: 1-410-379-2800, <u>http://www.mabey.com/</u>, Model: DDHR2H

Use only new galvanized structural steel.

521-3.01 DESIGN REQUIREMENTS.

For the prefabricated modular bridge superstructure meet the following:

- 1. 160 foot span
- 2. Two-lane roadway width between railings or curbs: 24'-0" minimum,
- Design in accordance with AASHTO Standard Specifications for Highway Bridges, 17th Edition with the latest interim specifications or the latest edition of the AASHTO LRFD Bridge Design Specifications and latest interim specifications
- 4. Design Vehicle: HS20-44 for AASHTO Standard Specifications for Highway Bridges or HL-93 for AASHTO LRFD Bridge Design Specifications
- 5. Orthotropic steel plate skid-resistant deck per the manufacturer of the selected bridges,
- 6. Nested Thrie beam bridge rail.

521-3.02 DELIVERABLES.

Provide the following documents prior to erecting the bridge:

- 1. Design calculations.
- 2. Fabrication drawings.
- 3. Erection procedures.

521-3.03 ERECTION.

Follow the manufacturer's assembly and erection instructions. Erect the bridge to the line and grade shown on the Plans. Perform all assembly and erection procedures under the direct supervision and control of an on-site technical representative from the bridge manufacturer.

DIVISION 700 -- MATERIALS

SECTION 701

HYDRAULIC CEMENT AND SUPPLEMENTARY CEMENTITIOUS MATERIALS

701-1.01 GENERAL. Meet the following general requirements for all cementitious materials furnished:

Before using, retest Portland cement stored longer than 3 months in bags or 6 months in bulk for compressive strength, time of setting, and loss on ignition according to AASHTO M 85. Store separately different types or brands of cementitious materials, or cementitious materials from different mills.

Protect cementitious materials from dampness during shipment and storage. Do not use partially set cement or cement which contains caked lumps. Do not use cement salvaged from discarded or used bags.

701-2.01 PORTLAND CEMENT. Meet AASHTO M 85, Type I, II, or III including the lowalkali cement requirement shown in Table 2.

701-2.02 BLENDED HYDRAULIC CEMENT. Meet AASHTO M 240, Type IP, or Type IS. Report the weight of pozzolan and ground granulated blast furnace slag as percent of weight of the total cementitious material. Do not vary the pozzolan and ground granulated blast furnace slag constituent content from the certified value more than ± 5 percent by weight of the total cementitious material. Limit pozzolan in Type IP to fly ash. Meet the replacement limits in Table 701-1

Cement Type	Constituent	Percent of Total Cementitious Material by Weight
		Maximum
Type IP	Fly Ash	35%
Type IS	Slag cement	40%

TABLE 701-1 BLENDED HYDRAULIC CEMENT LIMITS

701-2.03 GROUT. Non-shrink, non-corrosive, non-metallic, cement-based grout meeting ASTM C 1107, except develop a 28-day compressive strength of at least 9,000 psi when tested according to AASHTO T 106 or ASTM C 109.

701-2.04 FLY ASH. Meet AASHTO M 295, Class C or Class F, including optional chemical requirements as set forth in Table 2.

701-2.05 GROUND GRANULATED BLAST-FURNACE SLAG. Meet AASHTO M 302, Grade 100 or Grade 120.

701-2.06 SILICA FUME. Meet AASHTO M 307.

701-2.07 DS GROUT. Use drilled shaft (DS) grout conforming to the following requirements:

- 1. <u>Portland Cement</u> Type I or Type II cement meeting the requirements of Subsection 701-2.01.
- 2. <u>Fine Aggregate:</u> Use fine aggregate meeting Subsection 703-2.01, except 100 percent passing the No. 4 sieve.
- 3. <u>Potable Water</u>: Use water meeting the requirements of Subsection 712-2.01.
- 4. <u>Proportioning</u>: Mix grout in proportions using at least 564 lbs/yd³ of Portland cement, fine aggregate, and with enough water to produce a flowable mixture. Do not exceed 67 gal/yd³ of water.

Thoroughly mix DS grout to a uniform consistency before injecting into soil surrounding drilled shaft casing and filling CSL tubes.

701-2.08 POST-TENSION GROUT. Use pre-packaged thixotropic grout formulated specifically for bonded post-tensioned concrete structures in aggressive exposures.

Ship grout in weather proof packages, plainly marked with the name, weight, and volume of the grout, together with the lot number, date of manufacture, mixing instructions, and the name and address of the manufacturer.

Protect grout against dampness. Do not use grout that has become partially set or which contains lumps of caked grout. Do not use grout salvaged from discarded or used bags. Do not use grout with a total time from manufacture to usage in excess of six months unless the manufacturer tests and certifies the product meets the requirements in Table 701-2.

Batch grout using the entire contents of each bag in accordance with all of the manufacturer's written recommendations and instructions.

- 1. <u>Materials</u>. Use grout that conforms to the following requirements:
 - a. <u>Portland Cement</u>. Type I or Type II cement meeting the requirements of Subsection 701-2.01.
 - b. <u>Potable Water</u>. Use water meeting the requirements of Subsection 712-2.01.
 - c. <u>Fly Ash</u>. Class C or Class F fly ash meeting the requirements of Subsection 711-2.03. Limit fly ash content to a maximum of 20% by weight of Portland cement.
 - d. <u>Ground Granulated Blast Furnace Slag</u>. Grade 120 slag conforming to Subsection 701-2.05. Limit blast furnace slag content to a maximum of 40% of the weight of Portland cement.
 - e. <u>Silica Fume</u>. Silica fume conforming to Subsection 701-2.06. Limit silica fume content to a maximum of 15% of the weight of Portland cement.
 - f. <u>Set Control and Water-Reducing Admixtures</u>. Type D, Type F, and Type G admixtures conforming to AASHTO M 194. Limit Type F and Type G admixtures to 45 oz. per 100 pounds of Portland cement.
 - g. <u>Air Entraining Admixtures</u>. Do not use grout with air entraining admixtures.
 - h. <u>Expansion Causing Admixtures</u>. Do not use grout with expansive cement or expansion causing admixtures that contain aluminum powder or components that produce hydrogen, carbon dioxide or oxygen gas.
 - i. <u>Corrosion Inhibitor Admixtures</u>. Do not use grout with corrosion inhibitor admixtures.
 - j. <u>Pumping Aid Admixtures</u>. Do not use pumping aid admixtures.
- 2. <u>Physical Properties</u>. Use grout that satisfies the requirements in Table 701-2.

TABLE 701-2 POST TENSION GROUT

Property	Requirements		Test Method			
Total Chloride Ions	Max.	0.08%	by	weight	of	ASTM C 1152
	cemer	ntitious ma	ateria	ls		
Setting Time	Min. 3	hours				ASTM C 953

	Max. 12 hours	
Strength	Strength Min 3000 psi after 7 days	
	Min 5000 psi after 28 days	
Permeability @ 28	Max. 2500 Coulombs at 30 V	ASTM C 1202
days	after 6 hours	
Volume Change	Maximum 0.0% after 24 hours	ASTM C 1090
	Maximum +0.2% after 28 days	(modified)*
Expansion	\leq 2.0 % for up to 3 hours	ASTM C 940
Fluidity a) Immediately after mixing:		ASTM C 939
	Min. 9 sec.	(modified)**
Max. 20 sec.		
	b) 30 minutes after mixing:	
	Max. 30 sec.	
Wick Induced	Max 0.0%	ASTM C 940
Bleed		(modified)***
Wet Density Report maximum and minimum		ASTM C 185
	obtained test value in pounds per	
	cubic foot	

* Modify ASTM C1090 to include verification at both 24 hours and 28 days.

** Modify the ASTM C 939 test by filling the flow cone to the top instead of to the standard level. The efflux time is the time to fill a one liter container placed directly under the flow cone.

*** Modify ASTM C940 to conform with the wick induced bleed test as follows:

- (a) Use a wick made of a 20-inch length of ASTM A416 seven-wire 1/2 inch diameter strand. Wrap the strand with 2-inch wide duct or electrical tape at each end prior to cutting to avoid splaying of the wires when it is cut. Degrease (with acetone or hexane solvent) and wire brush to remove any surface rust on the strand before temperature conditioning.
- (b) Condition the dry ingredients, mixing water, prestressing strand and test apparatus overnight at 65° F to 75° F.
- (c) Mix the conditioned dry ingredients with the conditioned mixing water and place 800 ml of the resulting grout into the 1,000 ml graduate cylinder. Measure and record the level of the top of the grout.
- (d) Completely insert the strand into the graduated cylinder. Center and fasten the strand so it remains essentially parallel to the vertical axis of the cylinder. Measure and record the level of the top of the grout.
- (e) Store the mixed grout at the temperature range listed above in (b).
- (f) Measure the level of the bleed water every 15 minutes for the first hour and hourly for two successive readings thereafter.
- (g) Calculate the bleed water, if any, at the end of the three hour test period and the resulting expansion per the procedures outlined in ASTM C940, with the quantity of bleed water expressed as a percent of the initial grout volume. Note if the bleed water remains above or below the top of the original grout height. Note if any bleed water is absorbed into the specimen during the test.

701-2.09 CERTIFICATION. Furnish 5 copies of a Certified Test Report from the manufacturer or an independent testing laboratory containing a list of dimensional, chemical, metallurgical, electrical, physical, and other required test results of the specified material certifying that the product or assembly has passed all specified tests. Include the following:

- 1. the project name and number;
- 2. the manufacturer's name;
- 3. the name of the product or assembly;
- 4. a complete description of the material;
- 5. country of origin;
- 6. the lot, heat, or batch number that identifies the material;
- 7. all required test results for the specified material from the same lot, heat, or batch defined in Subsection 701-2.09.6;
- 8. a statement, signed by a person having legal authority to act for the manufacturer or the independent testing laboratory, that the test results show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

Tag, stencil, stamp, or otherwise mark all materials or assemblies furnished under certification to the project with the lot number, heat number, batch number, or other appropriate identification, which can be readily recognized and legible, and is identical to the accompanying Certified Test Report.

AGGREGATES

703-2.01 FINE AGGREGATE FOR CONCRETE. Meet AASHTO M 6, Class A, except as follows:

Delete paragraph 8.2 of AASHTO M 6.

Delete the following	methods of sampling and testing:
AASHTO T 11	Amount of Material Finer than No. 200 Sieve
AASHTO T 27	Sieve Analysis
AASHTO T 103	Soundness (freezing and thawing)

And substitute the following:

WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates and Material Finer Than No. 200 Sieve in Mineral Aggregates by Washing

Add the following: Meet AASHTO T 104 using sodium sulfate solution.

In AASHTO M 6, Section 7.1, table entitled "Deleterious Substances Limits", change the maximum percent of material by mass finer than No. 200 Sieve in a. (concrete subject to surface abrasion), from 2.0 to 3.0.

703-2.02 COARSE AGGREGATE FOR CONCRETE. AASHTO M 80, class B, except as follows:

Delete the following methods of sampling and testing:

AASHTO T 11Amount of Material Finer than No. 200 SieveAASHTO T 27Sieve Analysis

And substitute the following:

WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates and Material Finer Than No. 200 Sieve in Mineral Aggregates by Washing

Add the following: Meet AASHTO T 104 using sodium sulfate solution.

703-2.06 MINERAL FILLER. Meet AASHTO M 17.

703-2.07 SELECTED MATERIAL. Meet the following requirements for the type specified. Obtain the Engineer's approval for the intended purpose, prior to use on the project.

1. <u>Type A</u>. Aggregate containing no muck, frozen material, roots, sod or other deleterious matter and with a plasticity index not greater than 6 as tested by WAQTC FOPs for AASHTO T 89 and T 90. Meet the following gradation as tested by WAQTC FOP for AASHTO T 27/T 11:

<u>Sieve</u>	Percent Passing by Weight
No. 4	20-55%
No. 200	0-6%, determined on the minus 3-inch portion of the sample

703-2.10 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 703-7 (WAQTC FOP for AASHTO T 27/T 11).

TABLE 703-7 REQUIREMENTS FOR GRADING FOR POROUS BACKFILL MATERIAL

SIEVE	PERCENT PASSING BY WEIGHT
3 in.	100
1 in.	0-10
No. 200	0-5

703-2.13 STRUCTURAL FILL. Aggregate containing no muck, frozen material, roots, sod or other deleterious matter and with a plasticity index not greater than 6 as tested by WAQTC FOPs for AASHTO T 89 and T 90. Meet the following gradation as tested by WAQTC FOP for AASHTO T 27/T 11:

TABLE 703-9 REQUIREMENTS FOR GRADING FOR STRUCTURAL FILL MATERIAL

SIEVE	PERCENT PASSING BY WEIGHT
3 in.	100
3/4 in.	75-100
No. 4	35-65
No. 40	0-50
No. 200	0-6

JOINT MATERIALS

705-2.01 JOINT FILLERS. Meet AASHTO M 213.

705-2.02 JOINT SEALER.

Silicone Joint Sealer Hot Pour Joint Sealer (Asphalt) Hot Applied Joint Sealer (Concrete) Hot Pour Joint Sealant (Concrete, Fuel-Resistant) ASTM D 5893 AASHTO M 324, Type IV AASHTO M 282 ASTM D 3581

705-2.03 BRIDGE SEALS.

 Preformed Strip Seals and Compression Seals. Use preformed seals constructed with only virgin natural polyisoprene (natural rubber) as the raw polymer in the elastomeric compound. Do not use polychloroprene (neoprene). Use steel extrusions meeting ASTM A 709 Grade 36. Galvanize steel extrusions in accordance with Subsection 716-2.07. Use preformed material meeting the following requirements of ASTM D 2000:

M4AA 514 A13B13C12F17

Use a lubricant-adhesive for installing preformed strip seals and compression seals meeting ASTM D4070.

- a. <u>Certification</u>. Furnish 5 copies of a Certified Test Report from the manufacturer or an independent testing laboratory containing a list of dimensional, chemical, metallurgical, electrical, physical, and other required test results of the specified material certifying that the product or assembly has passed all specified tests. Include the following:
 - (1) the project name and number;
 - (2) the manufacturer's name;
 - (3) the name of the product or assembly;
 - (4) a complete description of the material;
 - (5) country of origin;
 - (6) the lot, heat, or batch number that identifies the material;
 - (7) all required test results for the specified material from the same lot, heat, or batch defined in Subsection 705-2.03.1.a.(6);
 - (8) an affidavit, signed by a person having legal authority to act for the manufacturer or the independent testing laboratory, that the test results

show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

Tag, stencil, stamp, or otherwise mark all materials or assemblies furnished under certification to the project with the lot number, heat number, batch number, or other appropriate identification, which can be readily recognized and legible, and is identical to the accompanying Certified Test Report.

- 2. <u>Silicone Expansion Joint Seals</u>. Use materials that conform to the following:
 - a. Silicone Joint Sealants.
 - (1) <u>Horizontal Joints</u>. Use formed-in-place sealant composed of 100 percent silicone that is self-leveling, cold applied, and two-part formulation meeting the requirements in Table 705-1.
 - (2) <u>Vertical Joints</u>. Use formed-in-place sealant composed of 100 percent silicone meeting the requirements of ASTM D 5893, Type NS (Non-Sag). Do not use acid cure sealants. Ensure the silicone sealant is compatible with the surface to which it is applied.
 - b. <u>Bond Breaking Backing Material</u>. Use closed-cell expanded polyethylene foam backer rod meeting the requirements of ASTM D 5249.

Property	Requirements	Test Method
Extrusion Rate	Min, 50 mL/minute	ASTM C 1183 (type S)
Specific Gravity	Min. 1.25	ASTM D 1475
	Max. 1.35	
Joint Elongation	Min. 600%	ASTM D 5329
_		(modified)*
Joint Modulus (at	Min. 3 psi	ASTM D 5329
100% elongation)	Max. 12 psi	(modified)*

TABLE 705-1SELF-LEVELING SEALANT REQUIREMENTS

Modify the ASTM D5329 test by using a pull rate of 2 inches per minute and a joint size of 1/2 inch x 1/2 inch x 2 inch.

705-2.06 EXPANDED POLYETHYLENE. Use closed-cell expanded polyethylene with a density of at least 2.1 lb/ft³ as determined by ASTM D3575 and with a minimum compressive stress of 9 psi at 25% deflection as determined by ASTM D3575.

REINFORCING STEEL AND WIRE ROPE

709-2.01 REINFORCING STEEL.

- 1. <u>Reinforcing Steel Bars</u>. Furnish deformed reinforcing steel bars of the type, grade, and size as specified. For steel reinforcing bars used in bridge structures, use bars meeting ASTM A 706, Grade 60. For all other structures, use bars meeting AASHTO M 31, Grade 60.
- 2. <u>Headed Reinforcing Steel Bars</u>. Furnish headed reinforcing steel bars meeting the requirements of ASTM A 970, Class HA. Use reinforcing steel meeting Section 709-2.01.1 unless otherwise noted.
- 3. <u>Epoxy-Coated Reinforcing Steel Bars</u>. Furnish epoxy-coated steel bars meeting the requirements of AASHTO M 284. Coat epoxy-coated reinforcing steel in an epoxy coating applicator plant certified in accordance with the Concrete Reinforcing Steel Institute (CRSI) Voluntary Certification Program. Use reinforcing steel meeting Section 709-2.01.1 unless otherwise noted.
- 4. <u>Steel Wire</u>. Furnish plain steel wire of the size specified that meets the requirements of AASHTO M 32.
- 5. <u>Steel Bar Mats</u>. Furnish deformed steel bar mats of the type, grade, size, and spacing as specified. Unless otherwise noted, furnish steel bar mats meeting the requirements of AASHTO M 54, Grade 60.
- 6. <u>Steel Welded Wire Fabric</u>. Furnish plain steel welded wire fabric of the size and spacing specified that meets the requirements of AASHTO M 55.
- 7. <u>Epoxy-Coating Patch Material</u>. Furnish epoxy-coating patch material meeting the requirements of AASHTO M 317.
- 8. <u>Certification</u>. Furnish 5 copies of a Certified Test Report from the manufacturer or an independent testing laboratory containing a list of dimensional, chemical, metallurgical, electrical, physical, and other required test results of the specified material certifying that the product or assembly has passed all specified tests. Include the following:
 - a. the project name and number;
 - b. the manufacturer's name;
 - c. the name of the product or assembly;

Tununak River Bridge #2276

- d. a complete description of the material;
- e. country of origin;
- f. the lot, heat, or batch number that identifies the material;
- g. all required test results for the specified material from the same lot, heat, or batch defined in Subsection 709-2.01.8.f; and,
- h. an affidavit, signed by a person having legal authority to act for the manufacturer or the independent testing laboratory, that the test results show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

Tag, stencil, stamp, or otherwise mark all materials or assemblies furnished under certification to the project with the lot number, heat number, batch number, or other appropriate identification, which can be readily recognized and legible, and is identical to the accompanying Certified Test Report.

709-2.02 WIRE ROPE OR WIRE CABLE. Meeting AASHTO M 30, 3/4 inch Type 1, Class A.

709-2.03 BAR SUPPORTS.

- 1. <u>Precast Mortar Blocks</u>. Provide mortar blocks meeting the following:
 - a. Ensure the mortar blocks have compressive strength at least equal to the strength of the concrete in which the mortar blocks are embedded. Sample and test the mortar for compressive strength according to AASHTO T 106. Each test will be considered to represent no more than 2,500 mortar blocks made of the same mortar and cured under the same conditions.
 - b. Ensure the bearing area of the mortar block is less than 2 inches in each dimension.
 - c. Secure to the reinforcing steel with either a grooved top that will hold the bar in place or a protruding embedded wire that is tied to the reinforcing steel.
- 2. <u>Metal Supports</u>. Provide metal supports meeting at least one of the following:
 - a. Galvanized after fabrication according to AASHTO M 232 Class D,
 - b. Stainless steel meeting the requirements of ASTM A 493, Type 302, or
 - c. Plastic coated using coatings that do not react chemically with the concrete, have a minimum thickness of 3/32 inch where the support touches the form, do not crack at or above -5°F, and do not deform enough to expose the metal at or below 200°F.
- 3. <u>Plastic Supports</u>. Provide plastic supports meeting the following:
 - a. Non-porous.
 - b. Chemically inert in concrete.

Tununak River Bridge #2276

- c. Have rounded seats.
- d. Do not deform under load during normal temperatures.
- e. Do not shatter or crack under impact loading in cold weather.
- f. Have at least 25 percent of their gross area perforated.

Do not use plastic supports that prevent complete concrete consolidation in and around the support or require supports less than 1 foot apart along the length of the bar.

CONCRETE CURING MATERIALS AND ADMIXTURES

711-2.01 CURING MATERIALS.

Burlap Cloth made from Jute or Kenaf	AASHTO M 182, Class 4
Sheet Materials for Curing Concrete	AASHTO M 171
Liquid Membrane-Forming	
Compounds for Curing Concrete	AASHTO M 148, Type I-D Class B, except do not use compounds
	containing linseed oil.

711-2.02 CHEMICAL ADMIXTURES.

Air-Entraining Admixtures	AASHTO M 154
Water-Reducing Admixtures	AASHTO M 194, Type A
Set-Retarding Admixtures	AASHTO M 194, Type B
Set-Accelerating Admixtures	AASHTO M 194, Type C
Water-Reducing and Set-Retarding Admixtures	AASHTO M 194, Type D
Water-Reducing and Set-Accelerating Admixtures	AASHTO M 194, Type E
Water-Reducing Admixtures	AASHTO M 194, Type F
High Range Water-Reducing	
and Set-Retarding Admixtures	AASHTO M 194, Type G
Specific Performance Admixtures	ASTM C 494, Type S

MISCELLANEOUS

712-2.01 WATER. Use water in mixing or curing concrete that is clean and free of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished product. Meet the suggested requirements of AASHTO T 26. Use mix water that contains less than 500 parts per million of chlorides as CI and contains less than 500 parts per million of sulphates as SO_4 . Water known to be of potable quality will not require testing. Where the source of water is relatively shallow, enclose the intake to exclude silt, mud, grass, or other foreign materials.

Use water for irrigating trees, plants, and seeded areas that is free of elements harmful to plant growth.

712-2.19 LOW-VISCOSITY RESIN. Meet AASHTO M 235, Type IV, Grade 1, with the following revisions:

Amend Table 1 as follows:

Replace "2.0[20]" with "0.105[1.05]" in the row labeled "Grade 1, max".

712-2.20 CONCRETE ANCHOR INSERTS.

1. <u>Coil Anchor Inserts</u>. Use 1 inch diameter galvanized inserts with a minimum safe working load of 7,500 pounds. Hot-dip galvanize anchors according to AASHTO M 111 or AASHTO M 232.

2. <u>Threaded Anchor Inserts</u>. Use 1 inch diameter galvanized ferrule inserts with a minimum safe working load of 6,500 pounds.

712-2.21 EPOXY FOR BONDING DOWELS. Use an epoxy cartridge system appropriate for the service temperature and ambient concrete temperature at the time of installation.

Use epoxy cartridge systems that meet the requirements of the "Acceptance Criteria for Adhesive Anchors in Concrete and Masonry Elements," AC58, by the International Code Council Evaluation Service (ICC-ES) including the suitability requirements for creep, in-service temperature, dampness, freezing and thawing, and seismic tests.

1. <u>Certification</u>. Furnish 5 copies of a Certified Test Report from the manufacturer or an independent testing laboratory containing a list of dimensional, chemical,

metallurgical, electrical, physical, and other required test results of the specified material certifying that the product or assembly has passed all specified tests. Include the following:

- a. the project name and number;
- b. the manufacturer's name;
- c. the name of the product or assembly;
- d. a complete description of the material;
- e. country of origin;
- f. the lot, heat, or batch number that identifies the material;
- g. all required test results for the specified material from the same lot, heat, or batch defined in Subsection 712-2.21.1.f;
- h. a statement, signed by a person having legal authority to act for the manufacturer or the independent testing laboratory, that the test results show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

STEEL FOR PILES

715-2.01 SCOPE. Steel used for Structural Steel Piling and Sheet Piling.

715-2.02 GENERAL REQUIREMENTS. Furnish steel piles of the dimensions, weights, cross-sections, and grades specified. Satisfy the impact test requirements of Subsection 716-2.02. Meet the following:

- 1. <u>Structural Steel HP Piling</u>. Furnish "HP" shape piles meeting ASTM A 709, Grade 50T3.
- 2. <u>Pile Tip Reinforcing</u>. Use pile tip reinforcement conforming to the requirements of ASTM A 27 Grade 65-35 or ASTM A 148 Grade 90-60. Make each pile tip in one piece of cast steel. Weld tip reinforcing to the piles in conformance with the manufacturer's written directions.

715-2.03 CERTIFICATION. Furnish 5 copies of a certified test report from the manufacturer or an independent testing laboratory containing a list of dimensional, chemical, metallurgical, electrical, physical, and other required test results of the specified material certifying that the product or assembly has passed all specified tests. Include the following:

- 1. the project name and number;
- 2. the manufacturer's name;
- 3. the name of the product or assembly;
- 4. a complete description of the material;
- 5. country of origin;
- 6. the lot, heat, or batch number that identifies the material;
- 7. all required test results for the specified material from the same lot, heat, or batch defined in Subsection 715-2.03.6; and,
- 8. an affidavit, signed by a person having legal authority to act for the manufacturer or the independent testing laboratory, that the test results show that the product or assembly to be incorporated into the project has been sampled and tested and the samples have passed all specified tests.

715-2.04 MARKING. Tag, stencil, stamp, or otherwise mark all materials or assemblies furnished under certification to the project with the lot number, heat number, batch

number, or other appropriate identification, which can be readily recognized and legible, and is identical to the accompanying certified test report.

Appendix N

Material Sales Agreement (Not Included for PPS&E)

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

Appendix O

Power Extension Technical Specifications

State of Alaska Department of Transportation and Public Facilities

> Tununak Airport Tununak Airport Improvements Project 51791 / AIP 3-02-0486-001-2012

SECTION 16120 WIRE AND CABLE

PART 1 GENERAL

1.1 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.

ASTM INTERNATIONAL (ASTM)

ASTM B 3		Soft or Annealed Copper Wire
ASTM B 8		Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM B230		Aluminum Wire, EC-H19 for Electrical Purposes
ASTM B231		Aluminum Conductors, Concentric-Lay- Stranded
ASTM B232		Aluminum Conductors, Concentric-Lay- Stranded Steel Reinforced (ACSR)
ASTM B496		Compact Round Concentric-Lay-Stranded Copper Conductors
	NATIONAL ELECTI (NEMA)	RICAL MANUFACTURERS ASSOCIATION
NEMA WC 7	0	Non-Shielded Power Cables Rated 2000

Energy

Volts or less for the Distribution of Electrical

1.2 SUBMITTALS

The following shall be submitted in accordance with Specification U-500:

1.2.1 Manufacturer's Data:

Medium and Low Voltage Cable shall be as specified. Submit product data and Installation Instructions.

1.2.2 Test Reports

Cable test reports for testing required by paragraph paragraph 3.1.

1.3 DELIVERY, STORAGE, AND HANDLING

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

PART 2 PRODUCTS

2.1 MATERIALS

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

2.1.1 Overhead Medium-Voltage Open Wire Cables (Primary)

Conductors shall be #2 ACSR Sparate conductor as scheduled on the drawings, staking sheets, and bid units, and shall be RUS approved.

2.1.2 Low-Voltage Cables (Secondary and Services)

Low-voltage line conductors shall be of the neutral-supported secondary and service drop type with thermosetting insulation. Neutral-supported secondary and service drop conductors shall be insulated aluminum with bare ACSR neutrals. Cables shall be rated 600 volts and shall be RUS approved.

2.1.3 Grounding Conductors

Grounding conductors shall be bare copper, ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable.

PART 3 EXECUTION

3.1 TESTING INSTRUCTIONS

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

END OF SECTION 16120

ELECTRICAL DISTRIBUTION SYSTEM, AERIAL

PART 1 GENERAL

1.1 REFERENCES

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

	AMERICAN NATIO	NAL STANDARDS INSTITUTE (ANSI)		
ANSI C42.100		Standard Dictionary of Electrical and Electronics Terms		
	ALLIANCE FOR TE SOLUTIONS (ATIS	LECOMMUNICATIONS INDUSTRY)		
ATIS O5.1		Specifications and Dimensions (for Wood Poles)		
	AMERICAN WOOD	-PRESERVERS' ASSOCIATION (AWPA)		
AWPA C4		Poles - Preservative Treatment by Pressure Processes		
AWPA P8		Standard for Oil-Borne Preservatives		
AWPA P9		Standards for Solvents and Formulations for Organic Preservative Systems		
ASTM INTERNATIONAL (ASTM)				
ASTM A 153/A 153M		Zinc Coating (Hot-Dip) on Iron and Steel Hardware		
ASTM A 475		Zinc-Coated Steel Wire Strand		
ASTM B 117		Operating Salt Spray (Fog) Apparatus		
ASTM B 8		Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft		
ASTM D 1654		Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments		
(IEEE	INSTITUTE OF ELE)	ECTRICAL AND ELECTRONICS ENGINEERS		
IEEE C2		National Electrical Safety Code (NESC)		

IEEE C62.11		Metal-Oxide Surge Arresters for Alternating Current Power Circuits (>1KV)
IEEE Std 81		Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System (Part 1)Normal Measurements
	NATIONAL ELECTI (NEMA)	RICAL MANUFACTURERS ASSOCIATION
NEMA HV 2		Application Guide for Ceramic Suspension Insulators
NEMA LA 1		Surge Arresters
	NATIONAL FIRE PI	ROTECTION ASSOCIATION (NFPA)
NFPA 70		(2008) National Electrical Code
	U.S. DEPARTMEN	T OF AGRICULTURE (USDA)
RUS Bull 172	28H-701	Wood Crossarms (Solid and Laminated), Transmission Timbers and Pole Keys
	UNDERWRITERS I	LABORATORIES (UL)
UL 467		Grounding and Bonding Equipment
UL 486A-486	6B	Wire Connectors

1.2 GENERAL REQUIREMENTS

1.2.1 Terminology

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

1.3 SUBMITTALS

The following shall be submitted in accordance with Specification U-500:

1.3.1 Product Data

Catalog cuts, brochures, circulars, specifications, product data, and printed information in sufficient detail and scope to verify compliance with the requirements of the contract documents. Where materials or equipment are specified to conform to the standards of the UL, ANSI, IEEE, or NEMA, the label of, listing by, certification, or a published catalog specification data statement, to the effect that the item is in accordance with the referenced standard, will be acceptable as evidence that the item conforms. Separate certification is not required.

1.3.2 Test Reports

Field Testing, see Part 3 paragraph "Field Testing."

1.3.3 As-Built Drawings

The Contractor shall submit the as-built drawings as a record of the construction as installed. The drawings shall include the information shown on the contract drawings as well as deviations, modifications, and changes from the contract drawings, however minor. The as-built drawings shall be kept at the job site and updated daily. The as-built drawings shall be a full sized set of prints marked to reflect deviations, modifications, and changes. The as-built drawings shall be complete and show the location, dimensions, part identification, and other information. Additional sheets may be added. Upon completion of the work, the Contractor shall submit full sized sets of the marked prints to the Engineer to incorporate into the digital drawing file.

1.4 DELIVERY, STORAGE, AND HANDLING

Devices and equipment shall be visually inspected by the Contractor when received and prior to acceptance from conveyance. Stored items shall be protected from the environment in accordance with the manufacturer's published instructions. Damaged items shall be replaced. Oil filled transformers and switches shall be stored in accordance with the manufacturer's requirements. Wood poles held in storage for more than 2 weeks shall be stored covered and supported on dunnage providing not less than 3" of clearance above ground. Handling of wood poles shall be in accordance with RUS recommendations, and pointed tools capable of producing indentations more than ³/₄-inch in depth shall not be used.

1.5 EXTRA MATERIALS

One additional spare fuse or fuse element for each furnished fuse or fuse element shall be delivered to the Contracting Officer when the electrical system is accepted.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

Provide products as indicated in staking sheets and on the drawings.

- 1. Connectors and Splices
- 2. Poles and Hardware
- 3. Guys and Anchors
- 4. Insulators
- 5. Crossarm Assemblies
- 6. Surge Arresters
- 7. Grounding and Bonding

- 8. Pole mounted transformer (does not require submittal if purchased directly from AVEC for this project)
- 9. Markerballs
- 10. Piling

2.2 STANDARD PRODUCT

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

2.3 CORROSION PROTECTION

2.3.1 Aluminum Materials

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

2.3.2 Ferrous Metal Materials

2.3.2.1 Hardware

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

2.3.2.2 Equipment

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

2.4 CONDUCTORS, CONNECTORS, AND SPLICES

2.4.1 Conductors

Conductors shall be as specified in SECTION 16120 WIRE AND CABLE.

2.4.2 Connectors and Splices

Connectors and splices shall be of copper alloys for copper conductors, aluminum alloys for aluminum-composition conductors, and a type designed to minimize galvanic corrosion for copper to aluminum-composition conductors. Aluminum-composition, aluminum-composition to copper, and copper-to-copper shall be RUS approved connectors and splices.

2.5 POLES AND HARDWARE

Poles shall be of lengths and classes indicated.

2.5.1 Wood Poles

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

2.5.2 Pole Line Hardware

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

2.5.3 Guy Assemblies

Guy assemblies shall be zinc-coated steel in accordance with ASTM A 475. Guy assemblies, including insulators and attachments, shall provide a strength exceeding the required guy strength. H-pile anchors shall be provided with TG-92-2 guy link assemblies. Three-eye thimbles shall be provided on anchor rods to permit attachment of individual primary, secondary, and communication down guys. Anchors shall provide adequate strength to support all loads. Guy strand shall be 7 strand. Guy material shall be Class A zinc-coated-steel extra-high-strength grade, with a minimum breaking strength not less than 18,000 pounds, except where two or more guys are used to provide the required strength. Guy marker shall be not less than 8 feet in length by 1-1/4 inch in diameter.

2.6 INSULATORS

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

suspension insulators and hardware shall exceed the rated breaking strength of the attached conductors.

2.6.1 Medium-Voltage Line Insulators

Medium-voltage line insulators shall be as indicated.

2.7 CROSSARM ASSEMBLIES

Crossarms shall comply with RUS Bull 1728H-701 and shall be solid wood, distribution type. Cross-sectional area minimum dimensions shall be 4-3/4 inches in height by 3-3/4 inches in depth, and 8' in length unless noted otherwise in specifications and drawings. Crossarms shall be machined, chamfered, trimmed, and bored for stud and bolt holes before pressure treatment. Factory drilling shall be provided for pole and brace mounting, for four pin or four vertical line-post insulators.

2.8 FUSES, MEDIUM-VOLTAGE

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

2.9 SURGE ARRESTERS

Surge arresters shall comply with NEMA LA 1 and IEEE C62.11, and shall be provided for protection of aerial-to-underground transitions. Arresters shall be distribution class, rated as shown. Arresters shall be equipped with mounting brackets suitable for the indicated installations. Arresters shall be of the metal-oxide varistor type suitable for outdoor installations.

2.10 GROUNDING AND BONDING

2.10.1 Driven Ground Rods

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

2.10.2 Grounding Conductors

Grounding conductors shall be bare, except where installed in conduit with associated phase conductors. Insulated conductors shall be of the same material as the phase conductors and green color-coded, except that conductors shall be rated no more than 600 volts. Bare conductors shall be ASTM B 8 soft-drawn unless otherwise indicated. Aluminum is not acceptable. Vertical pole ground shall be #6 bare solid copper and

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

2.11 POLE MOUNTED TRANSFORMER

Provide pole mounted transformer as specified on drawings.

2.12 MARKER BALLS

Provide marker balls as specified and detailed on drawings.

2.13 PILING

Provide piling for pole and guy anchor foundations as specified and detailed on drawings.

PART 3 EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

Equipment and devices shall be installed and energized in accordance with the manufacturer's published instructions.

3.1.1 Conformance to Codes

The installation shall comply with the requirements and recommendations of IEEE C2 (NESC) for heavy loading districts, Grade B construction. No reduction in clearance shall be made. The installation shall also comply with the applicable parts of NFPA 70.

3.1.2 Verification of Dimensions

The Subcontractor shall become familiar with details of the work, shall verify dimensions in the field, and shall notify the Engineer of any discrepancy before performing any work.

3.2 POLE INSTALLATION

Electric poles for overhead electric lines shall be wood poles utilizing crossarm construction. Pole equipment mounts shall be as indicated on drawings.

3.2.1 Wood Pole Setting

Wood Pole Setting: Wood poles shall be set straight and firm. Where indicated, poles shall be set on pile foundations as detailed. For direct set poles in normal firm ground, minimum pole-setting depths shall be as listed below. Poles in straight runs shall be in a straight line. Curved poles shall be placed with curvatures in the direction of the pole line. Poles shall be set to maintain as even a grade as practicable. When the average ground run is level, consecutive poles shall not vary more than 5 feet in height. When the ground is uneven, poles differing in length shall be kept to a minimum by locating poles to avoid the highest and lowest ground points. If it becomes necessary to shorten a pole, a piece shall be sawed off the top end and roofed. If any pole is shortened after treatment, the shortened end of the pole shall be given a heavy application of copper napthenate. Where poles are set on hilly terrain, along edges of cuts or embankments, or where soil may be washed out, special precautions shall be taken to ensure durable pole foundations, and the setting depth shall be measured from the lower side of the pole. Holes shall be dug large enough to permit proper use of tampers to the full depth of a hole. Earth shall be placed into the hole in 6 inch maximum layers, then thoroughly tamped before the next layer is placed. Surplus earth shall be placed around each pole in a conical shape and packed tightly to drain water away from poles.

MINIMUM POLE-SETTING DEPTH (FEET)

Length Overall Feet	Pole Setting Depth
30	6.0
35	6.5
40	7.0
45	7.5
50	8.0
55	8.5
60	9.0
65	9.5
70	10.0
75	10.5
80	11.0

3.3 CROSSARM MOUNTING

Crossarms shall be bolted to poles with 5/8 inch through-bolts with square washers at each end. Bolts shall extend not less than 1/8 inch nor more than 2 inches beyond lock nuts. On single crossarm construction, the bolt head shall be installed on the crossarm side of the pole. Wood crossarm braces shall be provided on crossarms. Provide 60 inch span crossarm braces, 1 inch by 1-3/4 inch. Crossarm braces shall

be bolted to crossarms with 3/8 inch carriage bolts, and secured to poles with 5/8 inch through-bolts and 2-1/4 inch square washers and nut. Double crossarms shall be securely held in position by means of 5/8 inch double-arming bolts. Each double-arming bolt shall be equipped with four nuts and four square washers.

3.3.1 Line Arms and Buck Arms

Line arms and buck arms shall be set at right angles to lines for straight runs and for angles 10 degrees and greater; and line arms shall bisect angles of turns of less than 10 degrees. Dead-end assemblies shall be used for turns where shown. Buckarms shall be installed, as shown, at corners and junction poles. Deadends shall utilize manufactured deadend assemblies as indicated in drawings.

3.3.2 Equipment Arms

Equipment arms shall be set parallel or at right angles to lines as required to provide climbing space. Equipment arms shall be located below line construction to provide necessary wire and equipment clearances.

3.4 GUY INSTALLATION

Guys shall be provided where shown, with loads and strengths as indicated, and wherever conductor tensions are not balanced, such as at angles, corners, and deadends. Where a single guy will not provide the required strength, two or more guys shall be provided. Approved guy grips shall be provided at each guy terminal. Orange, yellow or orange and yellow polyvinyl, plastic guy marker, not less than 8 feet in length with reflective 2" wide white tape at 8" on center, shall be provided at the anchor end of each guy shown, securely clamped to the guy or anchor at the bottom and top of the marker. Holding capacities for down guys shall be based on a lead angle as indicated.

3.5 CONDUCTOR INSTALLATION

3.5.1 Line Conductors

Unless otherwise indicated, conductors shall be installed in accordance with manufacturer's approved tables of sags and tensions. Proper care shall be taken in handling and stringing conductors to avoid abrasions, sharp bends, cuts, kinks, or any possibility of damage to insulation or conductors. Conductors shall be paid out with the free end of conductors fixed and cable reels portable, except where terrain or obstructions make this method unfeasible. Bend radius for any insulated conductor shall not be less than the applicable NEMA specification recommendation. Conductors shall not be drawn over rough or rocky ground, nor around sharp bends. When installed by machine power, conductors shall be drawn from a mounted reel through stringing sheaves in straight lines clear of obstructions. Initial sag and tension shall be checked by the Subcontractor, in accordance with the manufacturer's
approved sag and tension charts, within an elapsed time after installation as recommended by the manufacturer.

3.5.2 Connectors and Splices

Connectors and splices shall be mechanically and electrically secure under tension and shall be of the nonbolted compression type. The tensile strength of any splice shall be not less than the rated breaking strength of the conductor. Splice materials, sleeves, fittings, and connectors shall be noncorrosive and shall not adversely affect conductors. Aluminum-composition conductors shall be wire brushed and an oxide inhibitor applied before making a compression connection. Connectors which are factory-filled with an inhibitor are acceptable. Inhibitors and compression tools shall be of types recommended by the connector manufacturer. Primary line apparatus taps shall be by means of hot line clamps clamped over line guards. Low-voltage connectors for copper conductors shall be of the solderless pressure type. Noninsulated connectors shall be smoothly covered and taped with RUS approved covers to provide insulation equivalent to the original insulation, when installed on insulated conductors. Stem connectors shall be used at transformer connections. On overhead connections of aluminum and copper, the aluminum shall be installed above the copper, and the connections shall be made with an approved "H" type compression top connector.

3.5.3 Conductor-To-Insulator Attachments

Conductors shall be attached to insulators by means of factory formed wire ties for securing conductors to pin and spool insulators.

3.5.4 Armor Rods

Armor rods shall be provided for AAC, AAAC, and ACSR conductors. Armor rods shall be installed at all supports, except armor rods will not be required at primary dead-end assemblies. Aluminum or aluminum-lined zinc-coated steel curved, bolted deadend shoes shall be provided for primary deadends. Lengths and methods of fastening armor rods shall be in accordance with the manufacturer's recommendations. Preformed deadend grips shall be provided at neutral deadends.

3.5.5 Vibration Dampeners

Vibration dampeners shall be provided on all primary conductors (phase(s) and neutral) at all attachments. For example: at a single phase tangent structure, four (4) vibration dampeners are required.

3.5.6 Low-Voltage Insulated Cables

Low-voltage cables shall be supported on clevis fittings using spool insulators. Clevis attachments shall be provided with not less than 5/8 inch through-bolts. The neutral of the calbe shall be secured to the spool with a deadend grip.

3.6 CONNECTIONS TO UTILITY LINES

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

3.7 GROUNDING

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

3.7.1 Grounding Electrodes

Driven rod electrodes - Unless otherwise indicated, ground rods shall be located not less than 2 feet out from base of the pole and shall be driven into the earth until the tops of the rods are approximately 1 foot below finished grade. Where a pole is installed on an H-pile foundation, the H-pile shall serve as the grounding electrode conductor and no ground rod is required.

3.7.2 Grounding and Bonding Connections

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

3.7.3 Grounding Electrode Conductors

On multi-grounded circuits, as defined in IEEE C2 (NESC), provide a single continuous vertical grounding electrode conductor. Neutrals, surge arresters, and equipment grounding conductors shall be bonded to this conductor. Grounding electrode conductors shall be sized as shown. Secondary system neutral conductors shall be connected directly to the transformer neutral bushings on transformer poles. Grounding electrode conductors shall be stapled to wood poles at intervals not exceeding 2 feet, except for the top and bottom 8 feet where the staples shall be at intervals not less than 6 inches.

3.8 FIELD TESTING

3.8.1 General

The Contractor shall furnish materials, labor, and equipment necessary to conduct field tests. The Contractor shall perform tests and inspections recommended by the manufacturer unless specifically waived by the Engineer. The Contractor shall maintain a written record of tests which includes date, test performed, personnel involved, devices tested, serial number and name of test equipment, and test results. Field reports will be signed and dated by the Contractor.

3.8.2 Safety

The Contractor shall provide and use safety devices such as rubber gloves, protective barriers, and danger signs to protect and warn personnel in the test vicinity. The Contractor shall replace any devices or equipment which are damaged due to improper test procedures or handling.

3.8.3 Sag and Tension Test

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

3.9 ACCEPTANCE

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

END OF SECTION 16300