

**STATE OF ALASKA  
DEPARTMENT OF TRANSPORTATION  
AND PUBLIC FACILITIES**



**STANDARD SPECIFICATIONS  
FOR  
AIRPORT CONSTRUCTION**

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

**Revised 3/18**

**US Customary**

**NOTE:** Special Provisions for each project are marked as changes to the text of the Standard Specifications. Deleted text is identified by strikethrough. Additions are underlined. The location of each Special Provision is shown by a vertical bar in the margin.

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## **PART I**

### **GENERAL CONTRACT PROVISIONS**

## 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. 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.

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 and 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	<i>Alaska Administrative Code</i>
AASHTO	American Association of State Highway and Transportation Officials
AC	<i>FAA Advisory Circular</i>
ACI	American Concrete Institute
AIA	American Institute of Architects
AIP	Airport Improvement Program
AKOSH	Alaska Occupational Safety and Health
ANSI	American National Standards Institute
AOA	Air Operations Area
AS	<i>Alaska Statute</i>
ASDS	<i>Alaska Sign Design Specifications</i>
ASTM	American Society for Testing & Materials
ATM	Alaska Test Method (See <i>Alaska Test Methods Manual</i> )
CFR	Code of Federal Regulations
CSP	Construction Safety Plan
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 <i>Alaska Test Methods Manual</i> )
FSS	Flight Service Station
ICEA	Insulated Cable Engineers Association (formerly IPCEA)
MRP	<i>Mining and Reclamation Plan</i>
NEC	<i>National Electrical Code</i>
NEMA	National Electrical Manufacturers Association

NOTAMs	<i>Notices to Airmen</i>
SSAC	<i>DOT&amp;PF Standard Specifications for Airport Construction</i>
SSPC	<i>Society for Protective Coatings</i>
SPCC	<i>Spill Prevention, Control, and Countermeasure (Plan)</i>
SWPPP	<i>Storm Water Pollution Prevention Plan</i>
TCP	<i>Traffic Control Plan</i>
UL	<i>Underwriters Laboratory</i>
WAQTC	<i>Western Alliance for Quality in Transportation Construction (See Alaska Test Methods Manual)</i>

### **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 movement of aircraft, in addition to its associated runway, runway safety area, taxiway, taxiway safety area and 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.

**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.

**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.

**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.

**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".

**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: <http://apps.fss.gsa.gov/pub/fedspecs/index.cfm>

**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 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).** 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.

**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 of 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.

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

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

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

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

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

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

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

**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.

**STANDARD SPECIFICATIONS.** A book or electronic file of specifications approved by the Department for general application and repetitive use.

**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.

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

**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.

**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 responsive bid conforms to all significant terms and conditions contained in the Department's invitation to bid.

- 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 completely fill out, sign (with written or electronic signature) and submit bid forms that are required for bid. These documents include but are not limited to:
    - a. Bid Form
    - b. Bid Schedule
    - c. Acceptable Bid Guaranty
    - d. Bid Modifications (if paper bid is revised)
    - e. Certification of Buy American Compliance (Form 25D-151 or Form 25D-152)
    - f. Certification for Tax Delinquency and Felony Convictions (Form 25D-159);
  - (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;
- l. Failure to satisfy the responsibility standards set out in state regulations;
- m. Lack of skill, ability, financial resources, or equipment required to perform the contract; or
- n. Lack of legal capacity to contract.

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

**20-14 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 States 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.

## 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 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 of 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.

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.

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

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

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

- 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 (Project Name and Number). 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.

#### **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, flagpersons, 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.

**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

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;
- (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. 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 be permitted on a pavement, base or structure that will remain in place in the completed project. The Contractor shall be responsible for all damage done by their equipment due to overloads, and for damage done by a load placed on a material that is curing and has not reached adequate strength to support the load.

**50-13 MAINTENANCE DURING CONSTRUCTION.** The Contractor shall maintain the airport and related airport facilities located within the project from the date construction begins until the Contractor receives a letter of 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.

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.



## 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.

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.

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 state-owned 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.** 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.** 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 Contractor's satisfaction.

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

- (a)** The quality or quantity of materials producible from an Available Source, even if such information is indicated in a Materials Report or Soils Investigation Report;
- (b)** Whether boring logs, test results or data reliably represent current existing subsurface conditions;
- (c)** Whether interpretations of the boring logs, test results, or other data are correct;
- (d)** Whether moisture conditions and indicated water tables vary from those found at the time borings were made;
- (e)** Whether the ground at the location of the borings was physically disturbed or altered after the boring was made; and
- (f)** The condition, materials, or proportions of the materials between borings, regardless of any subsurface information the Department may make available.

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

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

- (5) Excluded Material Sources.** 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 reseeded.
- (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.

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.

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 Department will review resubmittals within 15 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 PREFERENCE.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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



- a. Description of each unit or system and the component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests. Systems shall include:
- (1) Heating System
  - (2) Fuel Oil Storage and Supply System
  - (3) Runway Lighting System
- b. Product data with each sheet marked to clearly identify the specific products, component parts, and data applicable to installation. Delete inapplicable information. Product data shall include:
- (1) Lighting Fixtures
  - (2) Wiring Devices
  - (3) Electric Power Distribution Components
  - (4) Runway Lighting System Components
  - (5) Thaw Wire and Heat Trace System Components
- c. Include drawings to supplement product data and illustrate relations of component parts of equipment and systems. Show control and flow diagrams. Provide copies of all approved shop drawings. Drawings shall include:
- (1) Equipment Storage Building Plans
  - (2) Electrical Equipment Enclosure Plans
  - (3) Runway Lighting One-line Control and Power Diagrams
  - (4) Electric Power One-line Diagrams
  - (5) Electric Power Panel Directories
  - (6) Thaw Wire and Heat Trace Systems
- d. Type text as required to supplement product data and show logical sequence of operations for each procedure, incorporating the manufacturer's instructions.
- e. Operating procedures to include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include any special operating instructions. Include reprogramming instructions for all programmable equipment. Systems shall include:
- (1) Runway Lighting System
  - (2) Heating System
  - (3) Fuel Oil Storage and Distribution System
- f. Maintenance requirements and repair data. Include routine procedures. Provide a guide for troubleshooting, disassembly, repair, and reassembly. Provide alignment, adjusting, and checking instructions. Maintenance and repair data shall include:
- (1) Heating System
  - (2) Fuel Oil Storage and Distribution System
- g. Supplies and replacement parts. For each item of equipment and each system list names, addresses, and telephone numbers of subcontractors and suppliers. Provide local source of supplies and replacement parts with complete nomenclature and commercial number of replacement parts. Provide a copy of manufacturer's recommended spare parts list for applicable equipment. Provide data for:
- (1) Lamps for Runway Lighting System
  - (2) Lamps for Lighting Fixtures
  - (3) Fuel Oil System
- h. Warranties. Include copies of warranties.

- i. Tests. Include logs of all tests performed.

## 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.

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.

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 and licenses from those agencies;
- 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.

**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 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 SUBCONTRACTING 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 subcontracts, sells, transfers, assigns, or otherwise disposes of the Contract or any portion of the Contract. The Department has authority to review subcontracts and to deny permission to subcontract work. The Department may penalize the Contractor for false statements or omissions made in connection with Form 25D-042.

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

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

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

- (1)** The Department is furnished with one completed Contractor Self Certification, Form 25D-042, for each subcontract;
- (2)** The subcontractors have submitted a Bidder Registration, Form 25D-6;
- (3)** The required prompt payment provisions of AS 36.90.210 are included in all subcontracts;
- (4)** A clause is included requiring the Contractor to pay the subcontractor for satisfactory performance according to AS 36.90.210 and within eight (8) working days after receiving payment from the Department from which the subcontractor is to be paid;
- (5)** A clause is included requiring the Contractor to pay the subcontractor interest, according to AS 45.45.010(a), for the period beginning the day after the required payment date and ending on the day payment of the amount due is made;
- (6)** A clause is included requiring the Contractor to pay the subcontractor all retainage due under the subcontract, within eight (8) working days after final payment is received from the Department, or after the notice period under AS 36.25.020(b) expires, whichever is later;
- (7)** A clause is included requiring the Contractor to pay interest on retainage, according to AS 36.90.250 and AS 45.45.101(a);
- (8)** Other required items listed in Form 25D-042 are included in the subcontracts;
- (9)** The subcontractors pay current prevailing rate of wages as per Subsection 60-04 and file certified payrolls with the Engineer and DOLWD for all work performed on the project; and
- (10)** Upon receipt of a request for more information regarding subcontracts, the requested information is provided to the Department within 5 calendar days.

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

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

- (2) A clause is included requiring the subcontractor to pay the lower tier subcontractor for satisfactory performance according to AS 36.90.210, and within eight (8) working days after receiving payment from the Department from which the subcontractor is to be paid;
  - (3) A clause is included requiring the subcontractor to pay the lower tier subcontractor interest, according to AS 45.45.010(a), for the period beginning the day after the required payment date and ending on the day payment of the amount due is made;
  - (4) A clause is included requiring the subcontractor to pay the lower tier subcontractor all retainage due under the subcontract, within eight (8) working days after final payment is received from the Department, or after the notice period under AS 36.25.020(b) expires, whichever is later;
  - (5) A clause is included requiring the subcontractor to pay the lower tier subcontractor interest on retainage, according to AS 36.90.250 and AS 45.45.101(a);
  - (6) Other required items listed in Form 25D-042 are included in the lower tier subcontracts;
  - (7) The lower tier subcontractors pay current prevailing rate of wages as per Subsection 60-04 and file certified payrolls with the Engineer and DOLWD for all work performed on the project; and
  - (8) Upon receipt of a request for more information regarding subcontracts, the requested information is provided to the Department within 5 calendar days.
- c. The following will be considered as subcontracting, unless performed by the Contractor:
- (1) **Roadside Production.** Roadside production of crushed stone, gravel, and other materials with portable or semi-portable crushing, screening, or washing plants set up or reopened in the vicinity of the project to supply materials for the project, including borrow pits used exclusively or nearly exclusively for the project.
  - (2) **Temporary Plants.** Production of aggregate mix, concrete mix, asphalt mix, other materials, or fabricated items from temporary batching plants, temporary mixing plants, or temporary factories that are set up or reopened in the vicinity of the project to supply materials exclusively or nearly exclusively for the project.
  - (3) **Hauling.** Hauling from the project to roadside production, temporary plants, or commercial plants, from roadside production or temporary plants to the project, from roadside production or temporary plants to commercial plants, and all other hauling not specifically excluded in this subsection.
  - (4) **Other Contractors.** All other contractors working on the project site under contract with the Contractor are considered subcontractors unless specifically excluded in this subsection.
- d. The following will not be considered as subcontracting, but the Contractor shall comply with the prompt payment provisions of AS 36.90:
- (1) **Commercial Plants.** The purchase of sand, gravel, crushed stone, crushed slag, batched concrete aggregates, ready-mixed concrete, asphalt paving mix, and any other material or fabrication produced at and furnished from established and recognized commercial plants that sell to both public and private purchasers.
  - (2) **Hauling.** Delivery of materials from a commercial plant to a different commercial plant, and delivery from a commercial plant to the project site by vehicles owned and operated by the commercial plants or by commercial freight companies that have a contract with the commercial plant. Commercial freight companies are trucking or hauling companies that deliver multiple types of materials to multiple clients, both public and private, on an established route and on a recurrent basis.
  - (3) **Contractors' General Business.** Work within permanent home offices, branch plants, fabrication plants, tool yards, and other establishments that are part of a contractor's or subcontractor's general business operations.

- e. **Owner-Operators.** Hauling of materials for the project by bona fide truck owner-operators who are listed as such on the 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.

Notwithstanding the Department's definitions of contracting and subcontracting, the Contractor shall be responsible for determining and complying with all federal and state laws and regulations regarding contracting, subcontracting, and payment of wages. The Contractor shall promptly pay any fines or penalties assessed for violations of those laws and regulations, and shall promptly comply with the directives of any government agency having jurisdiction over those matters.

**80-02 NOTICE TO PROCEED.** The Department will issue a Notice to Proceed authorizing construction to begin and indicating the date when Contract time will begin. The Contractor shall not begin construction before the effective date of the Notice to Proceed. The 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 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, as required under Subsection GCP-70-09 and Section G-710.
- l. A Utility Repair Plan, as required under Subsection GCP-50-06.e.

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.

**80-04 LIMITATION OF OPERATIONS.** The Contractor shall not open up work to the detriment of work already started. The Contractor shall minimize interference with traffic within the project. The Contractor shall not stop or otherwise impede traffic outside the project limits without the Engineer's prior written permission. The Engineer may require the Contractor to finish a section of work in progress before starting additional sections if the Engineer determines it is necessary for the convenience of the public or the Department.

The Contractor shall control its operations and the operations of its subcontractors and all suppliers, so as to provide for the least inconvenience to traffic and the free and unobstructed movement of aircraft in the Air Operations Areas of the airport, except as specifically provided in this Contract. Under all circumstances, safety shall be the most important consideration.

- a. **Environmental Limitations.** The Contractor shall comply with all environmental commitments, permit stipulations, and construction limitations, in the Contract permits and specifications. These may include time periods in which certain construction activities are not allowed. The Contractor shall avoid disturbing wetlands unless permitted to do so. The Contractor shall avoid disturbing threatened and endangered species, historic sites, and hazardous materials sites.
- b. **Construction Safety Plan (CSP).** A CSP is included within the contract documents. The CSP specifies minimum requirements for operational safety during construction activities. The Contractor 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.

- 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 Contractor'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. If the primary contact is unavailable, contact the Chairman of Long Term Outage Committee, Operations Engineering Section, FAA Airways Facilities Division at (907) 271-5552.

- 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.

**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.

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

Original Contract Amount		Daily Charge
From More Than	To and Including	
\$ 0	\$ 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

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 specifications and requirements shall remain in effect, except that the Department will make subsequent Contract payments directly to the Surety. The Contractor forfeits any right to claim for the work and is not entitled to receive any further balance of the amount to be paid under the Contract.

The Contractor and the Contractor's Surety are jointly and severally liable for any damage to the Department resulting from the Contractor's delay, neglect, or default, whether or not the Department terminates the Contractor's right to prosecute the work. The Department's damages include any increased costs incurred by the Department in completing the work or paying for the work to be completed. The Department's rights and remedies are in addition to any other rights and remedies provided by law or under the Contract.

If, after notice of termination of the Contractor's right to proceed under this clause, it is determined that the Contractor was not in default, or that the default was excusable, the rights and obligations of the parties will be determined under Subsection 80-09, Termination for Convenience.

#### **80-09 TERMINATION FOR CONVENIENCE.**

- a. **Notice.** The Contracting Officer may terminate the Contract in whole or in part due to:
  - (1) Executive Orders of the President of the United States or the Governor of the State of Alaska with respect to the prosecution of war or the interest of national defense, or any disaster declaration.
  - (2) Restraining orders or injunctions by a court of competent jurisdiction affecting prosecution of the work based on acts or omissions of persons or agencies other than the Contractor.
  - (3) Any reason determined by the Contracting Officer to be in the best interest of the Department.

The Contracting Officer will issue a written Notice of Termination to the Contractor. The Notice of Termination shall state the extent to which performance of work under the Contract is terminated, the

effective date of the termination, and for which of the above-listed reasons the Contract is terminated.

**b. Required Actions.** Unless otherwise directed by the Contracting Officer, upon receipt of a Notice of Termination the Contractor shall immediately:

- (1) Stop work as directed in the Notice.
- (2) Place no further orders or subcontracts for materials, services, or facilities except as approved to complete work not terminated.
- (3) Terminate all orders and subcontracts for the terminated work.
- (4) Accomplish either (a) or (b) below as directed by the Contracting Officer:
  - (a) Assign to the Department all right, title and interest in any terminated orders or subcontracts. The Contracting Officer will settle all claims on the terminated orders or subcontracts.
  - (b) Settle any outstanding liabilities and claims arising from termination of orders and subcontracts. Settlements must be limited to costs allowed under this Section.
- (5) Submit to the Contracting Officer a list, certified as to quantity and quality, of all materials acquired or produced for incorporation into the project and that are properly allocable to the terminated portion of the project, exclusive of items disposed of under Subsection 80-09.b.(6), below.
- (6) Dispose of materials in the Contractor's possession or control that were acquired or produced but not incorporated into the project as of the termination date as directed by the Contracting Officer under either (a) or (b) below:
  - (a) Transfer title and deliver the materials to the Department. The Department will pay for the materials at the actual cost delivered to the project or storage site, including transportation charges, to which cost 15% will be added.
  - (b) Sell the materials. Credit will not have to be extended to prospective purchasers.

The Contractor may acquire the materials if the Contracting Officer approves the sale price and the Contractor meets any other conditions prescribed by the Contracting Officer.

At the sole discretion of the Contracting Officer, the proceeds of any sale, transfer, or disposition of materials may be:

  - (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 Contractor-owned 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.
- l. **Definitions.** In this Subsection 80-09, the term "cost" and the term "expense" mean a monetary amount in U.S. Dollars actually incurred by the Contractor, actually reflected in the Contractor's contemporaneously maintained accounting or other financial records and supported by original source documentation.
- m. **Cost Principles.** The Department may use the federal cost principles at 48 CFR §§ 31.201-1 to 31.205-52 (or succeeding cost principles for fixed price contracts) as guidelines in determining allowable costs under this Subsection to the extent they are applicable to airport construction contracts and consistent with the specifications of this Contract. The provisions of this contract control where they are more restrictive than, or inconsistent with, these federal cost principles.

## SECTION 90

### MEASUREMENT AND PAYMENT

**90-01 GENERAL.** Wherever the Contract provides that certain work is subsidiary or it is without extra compensation, the payment for that work is included in the payment for other items of work, and no further or additional payment shall be made for that work.

When more than one type of material or work is specified for a pay item, 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.

**90-02 MEASUREMENT OF QUANTITIES.** All work completed under the Contract will be measured using the U.S. Customary system of measure. The Engineer may agree for purposes of making progress payments to use a method of measurement other than the methods described below. However, all final payments for quantities will be calculated using one or more of the methods of measurement described below and in the applicable pay item section. Unless otherwise specified, work will be measured as follows:

- a. **Acre (43,560 ft<sup>2</sup>).** Horizontally, unless specified on the ground surface. No deductions will be made for individual fixtures with an area of 500 ft<sup>2</sup> or less.
- b. **Contingent Sum.** Measured as specified in the Contract or Directive authorizing the work. The method of payment may include: (1) a lump sum basis, (2) a price multiplied by the units of work performed, (3) a pay adjustment based on the quality of work, or (4) a deduction from the contract amount.
- c. **Cubic Yard (yd<sup>3</sup>).** 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 ft<sup>2</sup> 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 (ft<sup>2</sup>).** Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 ft<sup>2</sup> or less. Transverse measurement for area computations will be the neat dimensions shown on the Plans or as directed by the Engineer.
- k. **Square Yard (yd<sup>2</sup>).** Parallel to the surface being measured. No deductions will be made for individual fixtures with an area of 1 yd<sup>2</sup> or less. Transverse measurement for area computations will be the neat dimensions shown on the Plans or as directed by the Engineer.
- l. **Station (100 feet).** Horizontally, parallel to centerline.
- m. **Ton (2,000 pounds).** By 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.

**(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 Department's discretion, a progress payment may be made twice monthly if the value of the estimate exceeds \$10,000.

Contractor's failure to pay subcontractors, or subcontractor's failure to pay lower tier subcontractors, according to prompt payment provisions required under Subsection 80-01 is considered unsatisfactory performance.

The Department will not withhold payment as retainage but may withhold payment for unsatisfactory performance. If satisfactory progress is being made and subcontractors are paid according to Subsection 80-01 and AS 36.90.210, the Engineer will authorize 100 percent payment for the estimated value of work accomplished, less any authorized deductions.

If the Engineer finds that satisfactory progress is not being made or payment for satisfactory work by a subcontractor or lower tier subcontractor is not paid according to Subsection 80-01, the Engineer may withhold up to 100 percent of the total amount earned from subsequent progress payments. The Engineer may withhold up to 200 percent of the estimated cost to complete final punch list items for unsatisfactory performance until those items are complete. The Engineer will notify the Contractor in writing within eight (8) working days of a request for a progress payment of the reasons why part or all of the payment is being withheld for unsatisfactory performance and what actions may be taken by the Contractor to receive full payment.

Payments of withheld amounts will be made in accordance with AS 36.90.200. No interest will be paid to the Contractor for amounts withheld for unsatisfactory performance except if the Department fails to pay the amount withheld within twenty one (21) calendar days after the Contractor satisfactorily completes the remedial actions identified by the Engineer, as provided in AS 36.90.200(e).

The Contractor shall pay interest on retainage withheld from subcontractors, and at an interest rate according to AS 36.90.250 and AS 45.45.010(a).

#### **90-07 PAYMENT FOR MATERIAL ON HAND.**

- a. **Partial Payment.** The Engineer will make partial payment for materials designated for incorporation into the work. The material shall:
  - (1) Meet Contract requirements;
  - (2) Be delivered and stockpiled at the project or other approved location;
  - (3) Be supported by invoices, freight bills, and other required information; and
  - (4) Not be living or perishable.
- b. **Payment Requests.** The Contractor shall make each payment request in writing and:
  - (1) List stockpiled items, quantities of each, and stockpile location(s);

- (2) Certify that materials meet the applicable Contract specifications;
  - (3) For purchased materials, attach copies of invoices, freight bills, and manufacturer's published storage recommendations;
  - (4) For Contractor-produced materials, attach production statements showing quantities and dates produced and copies of process quality control test results; and
  - (5) Include other information requested by the Engineer.
- c. **Storage Conditions.** The Contractor shall protect material from damage or loss while in storage. The Contractor shall:
- (1) Physically separate stockpiled materials from other materials at the storage location;
  - (2) Clearly label materials with the project name and number; and
  - (3) Store materials per the manufacturer's recommendations.
- If storage conditions become unsatisfactory, liens are filed on any materials, or the storage location is changed without approval, the Engineer will deduct any previous payments made for such materials.
- d. **Method of Payment.** The Engineer will include payments for acceptably stockpiled materials in the progress estimate following receipt of the Contractor's written request and all required documentation. The Engineer will:
- (1) Pay for materials purchased by the Contractor at the delivered cost but not to exceed 85% of the Contract amount for those items.
  - (2) Pay for materials produced by the Contractor at up to 50% of the Contract amount for those items.
  - (3) Deduct the Department's cost to inspect materials stored off the limits of the project.
  - (4) Deduct partial payment quantities as they are incorporated into the project.

The Contractor shall release and discharge the Department from any liability for damages or delays related to the storage or transport of, and to the payment for, material on hand.

The Department's payment for material on hand will not constitute final acceptance by the Department.

**90-08 FINAL PAYMENT.** When the project has been completed as provided in Subsection 50-15, the Engineer will prepare the final estimate of the quantities of the various classes of work performed. All prior progress estimates and payments shall be subject to correction in the final estimate and payment. The final estimate will not be processed until the Alaska Department of Labor and Workforce Development has verified that final payment can be released. The Department will not process the final estimate until the Contractor completes Items **a** through **d** in the first paragraph of Subsection 50-16.

If the Contractor 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 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 ( $\bar{X}$ ) and sample standard deviation ( $S_n$ ) 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 pay 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 subplot 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 ( $\bar{X}$ ) for all remaining subplot values within the lot by using the following formula:

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

Where:

$\bar{X}$  = Sample average of all subplot values within a lot

$x_1, x_2$  = Individual subplot values

$n$  = 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 subplot values in the set

$d_1, d_2, \dots$  = Deviations of the individual subplot values  $x_1, x_2, \dots$  from the average value  $X$   
that is:  $d_1 = (x_1 - X), d_2 = (x_2 - X) \dots d_n = (x_n - X)$

$n$  = Number of sublots

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

$$Q_L = (X - L) / S_n$$

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:

$$Q_L = (X - L) / S_n \quad \text{and} \quad Q_U = (U - X) / S_n$$

Where:

$L$  and  $U$  = specification lower and upper tolerance limits

$Q_L$  = Lower Quality Index

$Q_U$  = Upper Quality Index

$Q_L$  and  $Q_U$  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).

$$x_1 \text{ (D-1)} = 93$$

$$x_2 \text{ (D-2)} = 94$$

$$x_3 \text{ (D-3)} = 92$$

$$x_4 \text{ (D-4)} = 95$$

$$x_5 \text{ (D-5)} = 95$$

2. Calculate average density (X) for Lot 1.

$$X = (x_1 + x_2 + x_3 + x_4 + x_5)/n$$

$$X = (93 + 94 + 92 + 95 + 95)/5$$

$$X = 93.8 \text{ percent density}$$

3. Calculate the standard deviation ( $S_n$ ) for Lot 1.

$$S_n = [(\{x_1 - X\}^2 + \{x_2 - X\}^2 + \{x_3 - X\}^2 + \{x_4 - X\}^2 + \{x_5 - X\}^2)/n - 1]^{1/2}$$

$$S_5 = [(\{93 - 93.8\}^2 + \{94 - 93.8\}^2 + \{92 - 93.8\}^2 + \{95 - 93.8\}^2 + \{95 - 93.8\}^2)/5 - 1]^{1/2}$$

$$S_5 = [(0.64 + 0.04 + 3.24 + 1.44 + 1.44)/4]^{1/2}$$

$$S_5 = [1.70]^{1/2}$$

$$S_5 = 1.30$$

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 ( $Q_U$ ) 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.

$$\text{For } n = 5 \text{ and } Q_L = 1.38, P_L = 94$$

7. Determine the percent within upper specification limits ( $P_U$ ) from Table 1.

$$\text{For } n = 5 \text{ and } Q_U = 3.23, P_U = 100$$

8. Calculate mat density PWL for LOT 1.

$$PWL = (P_L + P_U) - 100$$

$$PWL = (94 + 100) - 100$$

$$PWL = 94$$

**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  $P_L$ .

$P_U$ or $P_L$	n = 3	n = 4	n = 5	n = 6	n = 7
Upper or Lower Quality Index ( $Q_U$ or $Q_L$ )					
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	1.04	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	1.01	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	0.90-0.91	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	0.79-0.81	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	0.80-0.82	0.73-0.75	0.70-0.72	0.69-0.71	0.68-0.70
74	0.77-0.79	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	0.51-0.53	0.50-0.52
68	0.60-0.62	0.52-0.54	0.48-0.51	0.48-0.50	0.47-0.49
67	0.57-0.59	0.49-0.51	0.46-0.47	0.45-0.47	0.45-0.46
66	0.53-0.56	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	0.47-0.49	0.40-0.42	0.38-0.40	0.37-0.39	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	0.40-0.43	0.34-0.36	0.32-0.34	0.31-0.33	0.31-0.32
61	0.37-0.39	0.31-0.33	0.29-0.31	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	0.24-0.25	0.23-0.25	0.22-0.24
58	0.26-0.29	0.22-0.24	0.21-0.23	0.20-0.22	0.20-0.21
57	0.23-0.25	0.19-0.21	0.18-0.20	0.17-0.19	0.17-0.19
56	0.19-0.22	0.16-0.18	0.15-0.17	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	0.08-0.11	0.07-0.09	0.07-0.08	0.06-0.08	0.06-0.08
52	0.05-0.07	0.04-0.06	0.04-0.06	0.04-0.05	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	0.00	0.00	0.00

P <sub>U</sub> or P <sub>L</sub>	n = 8	n = 9	n = 10 to 11	n = 12 to 14	n = 15 to 18
	Upper or Lower Quality Index (Q <sub>U</sub> or Q <sub>L</sub> )				
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

## **PART II**

# **TECHNICAL SPECIFICATIONS**

(In Alphabetical Order)

## 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 for Pipe, Pipe-Arches, and Arches	ASTM A 761
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 Corrugated Steel Sewer, Culvert, and Underdrain Pipe	ASTM A 885
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 on Controlled Inside Diameter	ASTM F 794
Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings	ASTM F 949
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 Based on Controlled Inside Diameter	AASHTO M 304

**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).

### 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. 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 12 inches or 1/2 inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than 75% of the nominal diameter of the pipe. The width of the excavation shall be at least 1 foot greater than the horizontal outside diameter of the pipe. The excavation below grade shall be backfilled with selected fine compressible material, such as silty clay or loam, and lightly compacted in layers not over 6 inches in uncompacted depth to form a uniform but yielding foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The Engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes that are placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the Plans.

**701-3.2 BEDDING.** The pipe bedding shall conform to the class specified on the Plans. When no bedding class is specified or detailed on the Plans, the requirements for Class B bedding shall apply.

- 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 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 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

**701-3.3 LAYING PIPE.** The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced 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 polyethylene pipe shall conform to the requirements of ASTM D 3212 when water tight joints are required. Joints for PVC and polyethylene 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.

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.



## 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.

## 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.

Payment will be made under:

Item D-701a	(Type) Pipe, (Diam.) inch - per linear foot
Item D-701b	Concrete for pipe cradles - per cubic yard
Item D-701c	Rock 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
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 Materials--Sponge or Expanded Rubber
ASTM D 3034	Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
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-702 SLOTTED DRAINS

### DESCRIPTION

**702-1.1** This item shall consist of the construction of steel slotted drains or cast iron slotted vane drains according to these Specifications and in reasonably close conformity with the lines and grades shown on the Plans. Type detail shall be shown on the Plans.

### MATERIALS

**702-2.1 GENERAL.** All slotted drains shall meet the requirements shown on the Plans and specified below. All slotted drains shall meet specified hydraulic design requirements and shall support the loadings specified.

Standard details can be found in AASHTO-AGC-ARTBA publication A Guide to Standardized Highway Drainage Products. All products used shall meet the strict airport loading and tire pressure requirements.

#### **702-2.2 PIPE.**

- a. **Steel slotted Drain.** Pipe shall be metallic coated (galvanized or aluminized steel type II) corrugated steel type I meeting the requirements of AASHTO M 36. Pipe diameter and gage shall be as shown on the Plans.

The corrugated steel pipe shall have a minimum of two rerolled annular ends.

- b. **Cast Iron Slotted Vane Drain.** Polyvinyl Chloride (PVC) pipe shall meet the requirements of ASTM D 3034. Pipe diameter shall be as shown on the Plans. The pipe shall have an open slot to accept the cast iron slotted vane drain castings.

#### **702-2.3 GRATES AND CASTINGS.**

- a. **Steel Slotted Drain.** Grates shall be manufactured from ASTM A 36 or A 570, Grade 36 steel. Spacers and bearing bars (sides) shall be 3/16 inch material. The spacers shall be welded to each bearing bar with four 1-1/4 inch long by 3/16 inch wide fillet welds on each side of the bearing bar at spacings not exceeding 6 inches. The grates shall be 6 inches high or as shown on the Plans and shall have a maximum 1-3/4 inch opening in the top.

Grates shall be galvanized according to AASHTO M111 except with a 2 ounces per square foot galvanized coating.

The grates shall be fillet welded to the corrugated steel pipe with a minimum weld 1 inch long on each side of the grate at every other corrugation. Weld areas and the heat affected zones where the slot is welded to the corrugated pipe shall be thoroughly cleaned and painted with a zinc-rich paint according to repair of damaged coatings in AASHTO M 36.

Each 20 foot length of drain delivered to the job site shall be within the following tolerances: vertical bow  $\pm 3/8$  inch, horizontal bow  $\pm 5/8$  inch, twist  $\pm 1/2$  inch.

- b. **Cast Iron Slotted Vane Drain.** Castings shall meet the requirements of ASTM A 48, Class 35B gray iron. Castings shall be furnished with no coatings.

Castings shall be designed to fit on open slots in 15 inch PVC pipe. Casting sections shall not exceed 3 feet in length. Casting sections shall have a built-in vane configuration with bar spacing not exceeding 6 inches. The opening at the surface shall not exceed 3-3/4 inches, and the vane shall be constructed on a radius so that the opening shall be less than 1-1/2 inches at a depth of 1-1/2 inches

as measured vertically from the surface. Casting sections shall integrally lock into the concrete by use of top and bottoms flanges and shear tabs. Castings shall accept bolts for bolting sections together and shall accept wire for fitting to pipe.

**702-2.4 CONCRETE.** Plain or reinforced concrete used shall conform to the requirements of Item P-610.

- a. **Steel Slotted Drain.** Concrete shall have a minimum compressive strength of 1,000 psi at 28 days when tested according to AASHTO T 22.
- b. **Cast Iron Slotted Vane Drain.** Concrete shall have a minimum compressive strength of 3,000 psi at 28 days when tested according to AASHTO T 22.

### CONSTRUCTION METHODS

**702-3.1 EXCAVATION.** The width of the trench shall be sufficient to permit satisfactory installation and jointing of the slotted drain and placing of a high slump concrete backfill material under and around the drain, but shall not be less than the external pipe diameter plus 6 inches on each side. The depth of the trench shall be a minimum of 2 inches below the invert for steel slotted drain and 6 inches below the invert for cast iron slotted vane drain.

The trench may be roughly shaped to the slotted drain bed.

**702-3.2 INSTALLATION.** Steel slotted drain shall be laid in sections joined firmly together with coupling bands, or as shown on the Plans. Cast iron drains shall be wired to the top of the PVC pipe in the slot cut in to receive the castings. The top of all drains shall be held firmly in place to the proper grade, to preclude movement during the backfilling operation.

**702-3.3 JOINING.** Slotted steel drain joints shall be firmly joined by modified hugger type bands, or as indicated, to secure the pipe and prevent infiltration of the backfill. When the slotted steel drain is banded together, the adjacent grates shall have a maximum 3-inch gap. Cast iron drain castings shall be bolted together.

**702-3.4 BACKFILLING.** Slotted drains shall be inspected before any backfill is placed. Damaged drains shall be aligned or replaced at the expense of the Contractor.

The slotted drain assembly shall be backfilled with concrete that will easily flow under and around the drain and the trench wall. The opening in the top of grates and castings shall be covered to prevent unwanted material from entering the drain during the backfilling and subsequent surfacing operations.

### METHOD OF MEASUREMENT

**702-4.1** The length of slotted drain will be measured in linear feet of slotted drain in place, completed, and approved. It will be measured along the centerline of the drain from end or inside face of structure to the end or inside face of structure, whichever is applicable. The several classes, types, and sizes will be measured separately. All fittings will be included in the length as typical pipe sections being measured.

### BASIS OF PAYMENT

**702-5.1** Payment will be made at the contract unit price per linear foot for each kind of slotted drain type and size designated and at the contract unit price per cubic yard of concrete for backfill.

Payment will be made under:

Item D-702a	Slotted Drain, [diam.] inch diameter, [gage] gage pipe - per linear foot
Item D-702b	Concrete for backfill - per cubic yard

### TESTING REQUIREMENTS

AASHTO T 22	Compressive Strength of Cylindrical Concrete Specimens
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### MATERIAL REQUIREMENTS

AASHTO M 36	Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
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AASHTO M 111	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
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ASTM A 36	Structural Steel
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ASTM A 570	Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality
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ASTM D 3034	Polyvinyl Chloride (PVC) Pipe
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Information	<i>A Guide to Standardized Highway Drainage Products</i> disseminated under the sponsorship of the American Association of State Highway and Transportation Officials, Associated General Contractors, and the American Road and Transportation Builders Association
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## ITEM D-705 PIPE UNDERDRAINS

### DESCRIPTION

**705-1.1** This item shall consist of the construction of pipe drains according to these Specifications and in reasonably close conformity with the lines and grades shown on the Plans.

### MATERIALS

**705-2.1 GENERAL.** Materials shall meet the requirements shown on the Plans and specified below.

**705-2.2 PIPE.** The pipe shall be of the type called for on the Plans or in the bid and shall be according to the following appropriate requirements.

Perforated Concrete Pipe	ASTM C 444
Porous Concrete Pipe	ASTM C 654
Polymer Precoated Perforated Corrugated Steel Pipe	ASTM A 762
Perforated Corrugated Aluminum Alloy Pipe	AASHTO M 196
Smooth-Wall Perforated PVC Pipe	ASTM F 758
Poly (Vinyl Chloride) Ribbed Drain Pipe & Fittings Based on Controlled Inside Diameter	ASTM F 794
Poly (Vinyl Chloride)(PVC) Corrugated Sewer Pipe With a Smooth Interior and Fittings	ASTM F 949
Perforated Corrugated Steel Pipe	AASHTO M 36
Bituminous-Coated Perforated Corrugated Aluminum Alloy Pipe	AASHTO M 196 and M 190
Corrugated Polyethylene Drainage Tubing	AASHTO M 252
Corrugated Polyethylene Pipe, 300 to 1200 mm Diameter	AASHTO M 294
Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter	AASHTO M 304

**705-2.3 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.

**705-2.4 ELASTOMERIC SEALS.** Elastomeric seals shall conform to the requirements of ASTM F 477.

**705-2.5 POROUS BACKFILL.** Porous backfill shall be free of clay, humus, or other objectionable matter, and shall conform to the gradation in Table 1 when tested according to WAQTC FOP for AASHTO T 27/T 11.

**TABLE 1. GRADATION OF POROUS BACKFILL**

Sieve Designation (square openings)	Percentage by Weight Passing Sieves	
	Porous Material No. 1	Porous Material No. 2
1-1/2 in.		100
1 in.		90 - 100
3/8 in.	100	25 - 60
No. 4	95 - 100	5 - 40
No. 8	---	0 - 20
No. 16	45 - 80	---
No. 50	10 - 30	---
No. 100	0 - 10	---

When two courses of porous backfill are specified in the Plans, the finer of the materials shall conform to particle size tabulated herein for porous material No. 1. The coarser granular material shall meet the gradation given in the tabulation for porous material No. 2.

**705-2.6. GRANULAR MATERIAL.** Granular material used for bedding and 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.

**705-2.7. FILTER FABRIC.** The filter fabric shall conform to the requirements of AASHTO M 288, Class 2.

## **CONSTRUCTION METHODS**

**705-3.1 EQUIPMENT.** All equipment necessary and required for the proper construction of pipe underdrains shall be on the project, in first-class working condition, and approved by the Engineer before construction is permitted to start.

**705-3.2 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 shall not be less than the external diameter of the pipe plus 6 inches on each side. The trench walls shall be approximately vertical.

Where rock, hardpan, or other unyielding material is encountered, it shall be removed below the foundation grade for a depth of at least 4 inches. 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 material for the full trench width. The engineer shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

Excavated material not required or acceptable for backfill shall be disposed of by the Contractor as directed by the Engineer. The excavation shall not be carried below the required depth; when this is done, the trench shall be backfilled at the Contractor's expense with material approved by the Engineer and compacted to the density of the surrounding earth material.

The bed for the pipe shall be so shaped that at least the lower quarter of the pipe shall be in continuous contact with the bottom of the trench. Spaces for the pipe bell shall be excavated accurately to size to clear the bell so that the barrel supports the entire weight of the pipe.

The Contractor shall do such trench bracing, sheathing, or shoring necessary to perform and protect the excavation as required for safety and conformance to governing laws. Unless otherwise provided, the bracing, sheathing, or shoring shall be removed by the Contractor after the completion of the backfill to at least 12 inches over the top of the pipe. The sheathing or shoring shall be pulled as the granular backfill is placed and compacted to avoid any unfilled spaces between the trench wall and the backfill material. The cost of bracing, sheathing, or shoring, and the removal of same, shall be included in the unit price bid per linear foot for the pipe.

### **705-3.3 LAYING AND INSTALLING PIPE.**

- a. **Clay or Concrete Pipe.** The laying of the pipe in the finished trench shall be started at the lowest point and laid upgrade. When bell and spigot pipe is used, the bells shall be laid upgrade. If tongue and groove pipe is used, the groove end shall be laid upgrade. Holes in perforated pipe shall be placed down, unless otherwise shown on the Plans. The pipe shall be firmly and accurately set to line and grade so that the invert will be smooth and uniform. Pipe shall not be laid on frozen ground.

Pipe which is not true in alignment, or which shows any settlement after laying, shall be taken up and relaid without extra compensation.

- b. **Metal and Fiber Pipe.** The metal pipe shall be laid with the separate sections joined firmly together with bands, with outside laps of circumferential joints pointing upgrade, and with longitudinal laps on the sides. Any metal in the pipe or bands which is not protected thoroughly by galvanizing shall be coated with a suitable asphaltum paint.

The sections of bituminized-fiber pipe shall be securely fastened together with suitable fittings. When the fiber couplings are tapered, they shall provide a tight, driven fit.

During installation, the asphalt-protected pipe shall be handled without damaging the asphalt coating. Any breaks in the bitumen or treatment of the pipe shall be refilled with the type and kind of bitumen used in coating the pipe originally.

- c. **PVC or Polyethylene Pipe.** PVC or polyethylene pipe shall be installed according to the requirements of ASTM D 2321 or AASHTO Standard Specification for Highway Bridges Section 30. Perforations shall meet the requirements of AASHTO M 252 or M 294 Class 2, unless otherwise indicated on the Plans. The pipe shall be laid accurately to line and grade.
- d. **All Types of Pipe.** The upgrade end of pipelines, not terminating in a structure, shall be plugged or capped as approved by the Engineer.

Unless otherwise shown on the Plans, a 4-inch bed of granular backfill material shall be spread in the bottom of the trench throughout the entire length under all perforated pipe underdrains.

Pipe outlets for the underdrains shall be constructed when required or shown on the Plans. The pipe shall be laid with tight-fitting joints. Porous backfill is not required around or over pipe outlets for underdrains. All connections to other drainage pipes or structures shall be made as required and in a satisfactory manner. If connections are not made to other pipes or structures, the outlets shall be protected and constructed as shown on the Plans.

- e. **Filter Fabric.** The filter fabric shall be installed according to the manufacturer's recommendations, or according to AASHTO M 288 APPENDIX, unless otherwise shown on the Plans.

**705-3.4 MORTAR.** The mortar shall be of the desired consistency for caulking and filling the joints of the pipe and for making connections to other pipes or to structures. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted.

**705-3.5 JOINTS IN CLAY OR CONCRETE PIPE.** When open or partly open joints are required or specified, they shall be constructed as indicated on the Plans. The pipe shall be laid with the ends fitted together as designed. If bell and spigot pipe is used, mortar shall be placed along the inside bottom quarter of the bell to center the following section of pipe.

The open or partly open joints shall be surrounded with granular material meeting requirements of porous backfill No. 2 or as indicated on the Plans. This backfill shall be placed so its thickness will be not less than 3 inches nor more than 6 inches, unless otherwise shown on the Plans.

When the original material excavated from the trench is impervious, commercial concrete sand or granular material meeting requirements of porous backfill No. 1 shall surround porous backfill No. 2, as shown on the Plans or as directed by the Engineer.

When the original material excavated from the trench is previous and suitable, it may be used as backfill in lieu of porous backfill No. 1, when indicated on the Plans or as directed by the Engineer.



### 705-3.6 BACKFILLING.

- a. **Earth.** All trenches and excavations shall be backfilled within a reasonable time after the pipes are installed, unless other protection of the pipe is directed. The backfill material shall be selected material from excavation or borrow; material which is placed within a nominal pipe diameter distance at the sides of the pipe and 1 foot over the top shall be material which can be readily compacted. It shall not contain stones retained on a 3-inch sieve, frozen lumps, chunks of highly plastic clay, or any other material which is objectionable to the Engineer. The material shall be moistened or dried, if necessary to be compacted by the method in use. Backfill material shall be approved by the Engineer. Special care shall be taken in placing the backfill. Great care shall be used to obtain thorough compaction under the haunches and along the sides to the top of the pipe.

The backfill shall be placed in loose layers not exceeding 6 inches in depth under and around the pipe, and not exceeding 8 inches over the pipe. Successive layers shall be added and thoroughly compacted by hand and pneumatic tampers, approved by the Engineer, until the trench is completely filled and brought to the proper elevation. Backfilling shall be done in a manner to avoid injurious top or side pressures on the pipe.

In embankments and for other areas outside of pavements, the backfill shall be compacted to the density required for embankments in unpaved areas under Item P-152. Under paved areas, the subgrade and any backfill shall be compacted to the density required for embankments for paved areas under Item P-152.

- b. **Granular Material.** When granular backfill is required, its placement in the trench and about the pipe shall be as shown on the Plans. Special care shall be taken in placing the backfill. The granular backfill shall not contain a damaging amount of foreign matter, nor shall earth from the sides of the trench or from the windrow be allowed to filter into the backfill. When required by the Engineer, a template shall be used to properly place and keep separate the two sizes of backfill. The backfill shall be placed in loose layers not exceeding 6 inches in depth and compacted by hand and pneumatic tampers to the requirements as given for earth backfill. Backfilling shall be done in a manner to avoid injurious top or side pressure on the pipe. The granular backfill shall be made to the elevation of the trench, as shown on the Plans.

When perforated pipe is specified, granular backfill material shall be placed along the full length of the pipe. The position of the granular material shall be as shown on the Plans. If the original material excavated from the trench is pervious and suitable, it shall be used in lieu of porous backfill No. 1.

When porous backfill is to be placed in paved or adjacent areas prior to the completion of grading or subgrade operations, the backfill material shall be placed immediately after laying the pipe. The depth of this granular backfill shall be not less than 12 inches, measured from the top of the underdrain. During subsequent construction operations, this minimum backfill of 12 inches of depth shall not be disturbed until such time as the underdrains are to be completed. When the underdrains are to be completed, the unsuitable material shall be removed until the porous backfill is exposed. That part of the porous backfill which contains objectionable material shall be removed and replaced with suitable material. The cost of removing and replacing any such unsuitable material shall be borne by the Contractor.

Whenever a granular subbase blanket course is to be used under pavements which extends beyond the edge of paving to the outside edge of the underdrain trench, the granular backfill material over the underdrains shall be placed in the trench up to an elevation of 2 inches above the bottom surface of the granular subbase blanket course. Immediately prior to the placing of the granular subbase blanket course, the Contractor shall blade this excess trench backfill from the top of the trench onto the adjacent subgrade where it can be incorporated into the granular subbase blanket course. Any unsuitable material which remains over the underdrain trench shall be removed and replaced. The subbase material shall be placed to provide clean contact between the subbase material and the underdrain granular backfill material for the full width of the underdrain trench.

- c. **Deflection Testing.** The Engineer may at any time, notwithstanding previous material acceptance, reject or require re-installation of pipe that exceeds 5% deflection when measured according to ASTM D 2321, including Appendices.

**705-3.7 CONNECTIONS.** When the Plans call for connections to existing or proposed pipe or structures, these connections shall be watertight and made so that a smooth uniform flow line will be obtained throughout the drainage system.

#### METHOD OF MEASUREMENT

**705-4.1** The length of pipe to be paid for will be the number of linear feet of pipe underdrains in place, completed, and approved; 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 sizes will be measured separately. All fittings will be included in the length as typical pipe sections in the pipeline being measured.

**705-4.2** The quantity of porous backfill to be paid for will be the number of cubic yards of porous backfill No. 1 and No. 2, complete in place and accepted, and will be determined from the dimensions given on the Plans by typical trench sections indicating the placement of porous backfill or dimensions ordered by the Engineer.

**705-4.3** The quantity of filter fabric to be paid for will be the number of square yards of filter fabric in place, completed, and approved; and will be determined from the dimensions given on the Plans by typical trench sections indicating the placement of filter fabric or dimensions ordered by the Engineer.

#### BASIS OF PAYMENT

**705-5.1** Payment will be made at the contract unit price per linear foot for pipe underdrains of the type, class, and size designated; at the contract unit price per cubic yard for porous backfill No.1; at the contract unit price per cubic yard for porous backfill No. 2, and at the contract unit price per square yard for filter fabric.

Payment will be made under:

Item D-705a	[Type, Class] Underdrain, [Diam.] inch - per linear foot
Item D-705b	Porous Backfill No. 1 - per cubic yard
Item D-705c	Porous Backfill No. 2 - per cubic yard
Item D-705d	Filter Fabric - per square yard

#### TESTING REQUIREMENTS

WAQTC FOP for AASHTO T 27/T 11      Sieve Analysis of Aggregates & Soils

#### MATERIAL REQUIREMENTS

AASHTO M 36	Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
AASHTO M 45	Aggregate for Masonry Mortar
AASHTO M 85	Portland Cement
AASHTO M 190	Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 196	Corrugated Aluminum Alloy Culverts and Underdrains
AASHTO M 252	Corrugated Polyethylene Drainage Tubing

AASHTO M 288	Geotextile Specification for Highway Applications
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	<i>Standard Specifications for Highway Bridges</i>
ASTM A 762	Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM C 444	Perforated Concrete Pipe
ASTM C 654	Porous Concrete Pipe
ASTM D 2321	Underground Installation of Flexible Thermoplastic Sewer Pipe
ASTM D 3034	Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F 477	Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F 758	Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F 949	Poly (Vinyl Chloride)(PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

## ITEM D-751 MANHOLES, CATCH BASINS, INLETS, AND INSPECTION HOLES

### DESCRIPTION

**751-1.1** This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, according to these Specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the Plans or required by the Engineer.

### MATERIALS

**751-2.1 BRICK.** The brick shall conform to the requirements of ASTM C 32, Grade SM.

**751-2.2 MORTAR.** 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.

**751-2.3 CONCRETE.** Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

**751-2.4 PRECAST CONCRETE PIPE MANHOLE RINGS.** Precast concrete pipe manhole rings shall conform to the requirements of ASTM C 478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches nor more than 48 inches.

**751-2.5 CORRUGATED METAL.** Corrugated metal shall conform to the requirements of AASHTO M 36.

**751-2.6 FRAMES, COVERS, AND GRATES.** The castings shall conform to one of the following requirements:

- a. Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.
- b. Malleable iron castings shall meet the requirements of ASTM A 47.
- c. Steel castings shall meet the requirements of AASHTO M 103.
- d. Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.
- e. Ductile iron castings shall conform to the requirements of ASTM A 536.
- f. Austempered ductile iron castings shall conform to the requirements of ASTM A 897.

All castings or structural steel units shall conform to the dimensions shown on the Plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of AASHTO M 111.

**751-2.7 STEPS.** The steps or ladder bars shall be gray or malleable cast iron, injection-molded polypropylene, or galvanized steel. The steps shall be the size, length, and shape shown on the Plans and those steps that are not galvanized shall be given a coat of bituminous paint, when directed.

### CONSTRUCTION METHODS

#### 751-3.1 UNCLASSIFIED EXCAVATION.

- a. **Limits of Excavation.** The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the Plans, or as staked by the Engineer. The

excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximately only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.

- b. **Excavation.** Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.
- c. **Shoring.** The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.
- d. **Shoring Removal.** Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner which will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.
- e. **Engineer's Approval.** After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

#### **751-3.2 BRICK STRUCTURES.**

- a. **Foundations.** A prepared foundation shall be placed for all brick structures after the foundation excavation is completed and accepted. Unless otherwise specified, the base shall consist of reinforced concrete mixed, prepared, and placed according to the requirements of Item P-610.
- b. **Laying Brick.** All brick shall be clean and thoroughly wet before laying so that they will not absorb any appreciable amount of additional water at the time they are laid. All brick shall be laid in freshly made mortar. Mortar that is not used within 45 minutes after water has been added shall be discarded. Retempering of mortar shall not be permitted. An ample layer of mortar shall be spread on the beds and a shallow furrow shall be made in it which can be readily closed by the laying of the brick. All bed and head joints shall be filled solid with mortar. End joints of stretchers and side or cross joints of headers shall be fully buttered with mortar and a shoved joint made to squeeze out mortar at the top of the joint. Any bricks that may be loosened after the mortar has taken its set, shall be removed, cleaned, and relaid with fresh mortar. No broken or chipped brick shall be used in the face, and no spalls or bats shall be used except where necessary to shape around irregular openings or edges; in which case, full bricks shall be placed at ends or corners where possible, and the bats shall be used in the interior of the course. In making closures, no piece of brick shorter than the width of a whole brick shall be used; and wherever practicable, whole brick shall be used and laid as headers.
- c. **Joints.** All joints shall be slushed with mortar at every course, but slushing alone will not be considered adequate for making an acceptable joint. Exterior faces shall be laid up in advance of backing. Exterior faces shall be back plastered or pargeted with a coat of mortar not less than 3/8 inch thick before the backing is laid up. Prior to pargeting, all joints on the back of face courses shall be cut flush. Unless otherwise noted, joints shall be not less than 1/4 inch nor more than 1/2 inch wide and whatever width is adopted shall be maintained uniform throughout the work.

- d. **Pointing.** Face joints shall be neatly struck, using the weather joint. All joints shall be finished properly as the laying of the brick progresses. When nails or line pins are used the holes shall be immediately plugged with mortar and pointed when the nail or pin is removed.
- e. **Cleaning.** Upon completion of the work all exterior surfaces shall be thoroughly cleaned by scrubbing and washing down with water and, if necessary to produce satisfactory results, cleaning shall be done with a 5% solution of muriatic acid which shall then be rinsed off with liberal quantities of clean fresh water.
- f. **Curing and Cold Weather Protection.** In hot or dry weather, or when directed by the Engineer, the brick masonry shall be protected and kept moist for at least 48 hours after laying the brick. Brick masonry work or pointing shall not be done when there is frost in the brick or when the air temperature is below 50 °F unless the Contractor has on the project ready to use, suitable covering and artificial heating devices necessary to keep the atmosphere surrounding the masonry at a temperature of not less than 60 °F for the duration of the curing period.

**751-3.3 CONCRETE STRUCTURES.** Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the Plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the Plans and shall be approved by the Engineer before the concrete is poured.

All invert channels shall be constructed and shaped accurately so as to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped downward toward the outlet.

**751-3.4 PRECAST CONCRETE PIPE STRUCTURES.** Precast concrete pipe structures shall be constructed on prepared or previously placed slab foundations and shall conform to the dimensions and locations shown on the Plans. All precast concrete pipe sections necessary to build a completed structure shall be furnished. The different sections shall fit together readily, and all jointing and connections shall be cemented with mortar. The top of the upper precast concrete pipe member shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal steps which are embedded or built into the side walls shall be aligned and placed at vertical intervals of 12 inches. When a metal ladder replaces the steps, it shall be securely fastened into position.

**751-3.5 CORRUGATED METAL STRUCTURES.** Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the Plans. The structures shall be prefabricated. standard or special fittings shall be furnished to provide pipe connections or branches of correct dimensions. The connections or branches shall be of sufficient length to accommodate connecting bands. The fittings shall be welded in place to the metal structures. When indicated, the structures shall be placed on a reinforced concrete base. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to which can be fastened a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the Plans.

**751-3.6 INLET AND OUTLET PIPES.** Inlet and outlet pipes shall extend through the walls of the structures for a sufficient distance beyond the outside surface to allow for connections but shall be cut off flush with the wall on the inside surface, unless otherwise directed. For concrete or brick structures, the mortar shall be placed around these pipes so as to form a tight, neat connection.

**751-3.7 PLACEMENT AND TREATMENT OF CASTINGS, FRAMES, AND FITTINGS.** All castings, frames, and fittings shall be placed in the positions indicated on the Plans or as directed by the Engineer, and shall be set true to line and to correct elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place and position before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are to be placed upon previously constructed masonry, the bearing surface or masonry shall be brought true to line and grade and shall present an even bearing surface in order that the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the Plans or as directed and approved by the Engineer. All units shall set firm and secure.

After the frames or fittings have been set in final position and the concrete or mortar has been allowed to harden for 7 days, then the grates or covers shall be placed and fastened down.

**751-3.8 INSTALLATION OF STEPS.** The steps shall be installed as indicated on the Plans or as directed by the Engineer. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is poured. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least 7 days. After this period has elapsed, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete pipe structures, they shall be cast into the sides of the pipe at the time the pipe sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches.

In lieu of steps, prefabricated ladders may be installed. In the case of brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. In the case of metal structures, the ladder shall be secured by welding the top support and grouting the bottom support into drilled holes in the foundation or as directed.

**751-3.9 BACKFILLING.** After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the Plans or as directed by the Engineer.

Backfilling shall not be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.

## **METHOD OF MEASUREMENT**

**751-4.1** Manholes, catch basins, inlets, and inspection holes will be measured by the unit.

## **BASIS OF PAYMENT**

**751-5.1** The accepted quantities of manholes, catch basins, inlets, and inspection holes will be paid for at the contract unit price per each, complete and in place. This price shall be full compensation for furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the Plans.

All excavation and backfill required to complete the items of this section shall not be measured for payment, and shall be considered as a subsidiary obligation of the Contractor, included in the contract unit price for the structure involved.

Payment will be made under:

Item D-751a	Manholes - per each
Item D-751b	Catch Basins - per each
Item D-751c	Inlets - per each
Item D-751d	Inspection Holes - per each

#### **MATERIAL REQUIREMENT**

AASHTO M 36	Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains
AASHTO M 45	Aggregate for Masonry Mortar
AASHTO M 85	Portland Cement
AASHTO M 103	Steel Castings, Carbon, for General Application
AASHTO M 111	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A 47	Malleable Iron Castings
ASTM A 48	Gray Iron Castings
ASTM A 283	Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars
ASTM A 536	Ductile Iron Castings
ASTM A 897	Austempered Ductile Iron Castings
ASTM C 32	Sewer and Manhole Brick



## **ITEM D-752 CONCRETE CULVERTS, HEADWALLS, AND MISCELLANEOUS DRAINAGE STRUCTURES**

### **DESCRIPTION**

**752-1.1** This item shall consist of plain or reinforced concrete culverts, headwalls, and miscellaneous drainage structures constructed according to these Specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the Plans or required by the Engineer.

### **MATERIALS**

**752-2.1 CONCRETE.** Concrete shall meet the requirements of Item P-610.

### **CONSTRUCTION METHODS**

#### **752-3.1 UNCLASSIFIED EXCAVATION.**

- a. Trenches and foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the Plans. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the Plans, shall be considered as approximate only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.
- b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing steel is to be placed.
- c. The Contractor shall do all bracing, sheathing, or shoring necessary to perform and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for excavation.
- d. Unless otherwise provided, bracing, sheathing, or shoring involved therewith shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner which will not disturb or mar finished concrete. The cost of removal shall be included in the unit price bid for excavation.
- e. After each excavation is completed, the Contractor shall notify the Engineer to that effect, and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.

#### **752-3.2 BACKFILLING.**

- a. After a structure has been completed, backfill with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compact. The field density of the compacted material shall be at least 90% of the maximum density for cohesive soils and 95% of the maximum density for noncohesive soils. The maximum density shall be determined according to WAQTC FOP for AASHTO T 99/T 180 or ATM 212. The field density and moisture content shall be determined according to WAQTC FOP for AASHTO T 310.

- b. No backfilling shall be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under the supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.
- c. Fill placed around concrete culverts shall be deposited on both sides at the same time and to approximately the same elevation. All slopes bounding or within the areas to be backfilled shall be stepped or serrated to prevent wedge action against the structure.
- d. Backfill will not be measured for direct payment. Performance of this work under the contract is not payable directly but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for "unclassified excavation for structures."

**752-3.3 WEEP HOLES.** Weep holes shall be constructed as shown on the Plans.

### **METHOD OF MEASUREMENT**

**752-4.1** Unclassified excavation for structures will be measured in original position, between vertical planes 18 inches outside of and parallel to the neat lines of the footings.

**752-4.2** Concrete will be measured by the dimensions shown on the Plans or ordered by the Engineer, complete in place and accepted. No measurements or other allowances will be made for forms, false work, cofferdams, pumping, bracing, expansion joints, or finishing of the concrete. No deductions will be made for the volumes of reinforcing steel or embedded items.

**752-4.3** Reinforcing steel will be measured by the theoretical weight 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, as the case may be, of equal nominal size.

### **BASIS OF PAYMENT**

**752-5.1** Payment will be made at the contract unit price per cubic yard for unclassified excavation for structures; at the contract unit price per cubic yard for concrete for the structures; and at the contract unit price per pound for reinforcing steel.

Payment will be made under:

Item D-752a	Unclassified Excavation for Structures - -per cubic yard
Item D-752b	Structural Concrete - per cubic yard
Item D-752c	Reinforcing Steel - per pound

### **TESTING REQUIREMENTS**

ATM 212	Standard Density of Coarse Granular Materials Using the Vibratory Compactor
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 D-754 CONCRETE GUTTERS, DITCHES, AND FLUMES

### DESCRIPTION

**754-1.1** This item shall consist of portland cement concrete gutters, ditches, and flumes constructed according to these Specifications at the specified locations according to the dimensions, lines, and grades as shown on the Plans.

### MATERIALS

**754-2.1 CONCRETE.** Plain and reinforced concrete shall meet the requirements of Item P-610.

**754-2.2 JOINTS.** Joint filler materials and premolded joint material shall conform to Item P-610.

### CONSTRUCTION METHODS

**754-3.1 PREPARING SUBGRADE.** Excavation shall be made to the required width and depth, and the subgrade upon which the item is to be built shall be compacted to a firm uniform grade. All soft and unsuitable material shall be removed and replaced with suitable approved material. When required, a layer of approved granular material, compacted to the thickness indicated on the Plans, shall be placed to form a subbase. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started.

**754-3.2 PLACING.** The forms for and the mixing, placing, finishing, and curing of concrete shall conform to the requirements of Item P-610 and shall be according to the following requirements.

The concrete shall be tamped and spaded until it is consolidated and mortar entirely covers and forms the top surface. The surface of the concrete shall be floated smooth and the edges rounded to the radii shown on the Plans. Before the concrete is given the final finishing, the surface shall be tested with a 10-foot straightedge, and any irregularities of more than 1/4 inch in 10 feet shall be eliminated.

The concrete shall be placed with dummy-grooved joints not to exceed 25 feet apart, except where shorter lengths are necessary for closures, but no section shall be less than 4 feet long.

Expansion joints of the type called for in the Plans shall be constructed to replace a dummy groove at spacings of approximately 100 feet. When the gutter is placed next to concrete pavement, expansion joints in the gutter shall be located opposite expansion joints in the pavement. When a gutter abuts a pavement or other structure, an expansion joint shall be placed between the gutter and the other structure.

Forms shall not be removed within 24 hours after the concrete has been placed. Minor defects shall be repaired with mortar containing 1 part cement and 2 parts fine aggregate.

The operations of depositing, compacting, and finishing the item shall be conducted so as to build a satisfactory structure. If any section of concrete is found to be porous, other than minor defects which may be plastered, or is otherwise defective, it shall be removed and replaced by the Contractor without additional compensation.

**754-3.3 BACKFILLING.** After the concrete has set sufficiently, the spaces adjacent to the structure shall be refilled to the required elevation with material specified on the Plans and compacted by mechanical equipment to at least 95% of the maximum density as determined by WAQTC FOP for AASHTO T 99/T 180 or ATM 212. The in-place density and moisture content shall be determined according to WAQTC FOP for AASHTO T 310.

### METHOD OF MEASUREMENT

**754-4.1** Concrete will be measured by the dimensions shown on the Plans or ordered by the Engineer. No deductions will be made for the volume occupied by reinforcing steel, anchors, conduits, weep holes, or piling.

**754-4.2** Reinforcing steel will be measured by the theoretical weight shown on the Plans or ordered by the Engineer. No allowance will be made for clips, wire, or other material used for fastening reinforcement in place.

#### **BASIS OF PAYMENT**

**754-5.1** The accepted quantities of structural concrete will be paid for at the contract unit price per cubic yard, complete in place.

**754-5.2** The accepted quantities of reinforcing steel will be paid for at the contract price per pound, complete in place.

Payment will be made under:

Item D-754a	Structural Concrete - per cubic yard
Item D-754b	Reinforcing Steel - per pound

#### **TESTING REQUIREMENTS**

ATM 212	Standard Density of Coarse Granular Materials Using the Vibratory Compactor
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 F-160 WIRE FENCE WITH WOOD POSTS

(Classes A and B Fences)

### DESCRIPTION

**160-1.1** This item covers the requirements for furnishing materials and constructing wire fences and gates with wood posts according to the details included herein and as shown on the Plans. The class of fence to be erected shall be either Class A, woven wire fencing surmounted by 2 strands of barbed wire, or Class B, 4 strands of barbed wire, as specified.

### MATERIALS

#### 160-2.1 WIRE.

- a. **Woven Wire (Zinc-coated).** Woven wire fabric shall meet AASHTO M 279, Design Number 726-6-12 ½, Grade 60, Coating Type Z, and Coating Class 3.
- b. **Barbed Wire (Zinc-coated).** Barbed wire shall meet AASHTO M 280, Design Number 12-4-5-14R, Standard Grade, Coating Type Z, and Coating Class 3.
- c. **Barbed Wire (Aluminum-coated).** Barbed wire shall meet AASHTO M 280, Design Number 12-4-5-14R, Standard Grade, Coating Type ZA, and Coating Class 60.
- d. **Bracing Wire (Zinc-coated).** Wire used for bracing shall be smooth galvanized wire, and shall meet AASHTO M 181, Tension Wire, except it may be 9-gage thickness.

**160-2.2 GATES AND HARDWARE.** Gate frames shall be constructed of hot-dip galvanized steel tubing conforming to AASHTO M 181, Type 1, Grade 1 or Grade 2, and shall be the size shown on the Plans. Heavily galvanized hinges and latches for wood posts shall be furnished with each gate. Either a bolt or lag screw hinge shall be used, and either a wing or butterfly latch shall be furnished.

#### 160-2.3 POSTS.

- a. **Species.** All posts shall be one of the following species of wood, unless otherwise specified.

##### Group I

Cedar  
Chestnut  
Cypress, Southern  
Locust, Black  
Osage-orange  
Redwood  
Yew, Pacific  
Honey locust  
Oak, White  
Mulberry  
Live Oak

##### Group II

Douglas-Fir  
Gum, Red  
Larch, Western  
Pine, Southern Yellow  
Pine, Lodgepole  
Tamarack  
Ash  
Maple, Sugar  
Oak, Red  
Spruce

Posts of Group I may be used untreated, provided at least 75% of the wood is heartwood. Posts of less than 75% heartwood of Group I shall be given a preservative treatment for the part of the post that will have contact with the ground line according to the method specified under subparagraph e(1) below. Posts of Group II shall be given a preservative treatment according to the method specified under subparagraph e(2) below.

- b. Quality.** Posts shall be peeled, sound, straight-grained, free from decay, cracks, and splits; shakes shall not be in excess of 1/4 inch wide and 3 feet long. Checks (lengthwise separations of the wood in a generally radial direction) are permitted, provided they are not injurious.
- c. Dimensions.** All posts shall be of the length shown on the Plans. Posts shall have the minimum top diameters shown on the Plans or as specified. Sawed and split posts are acceptable in lieu of round posts provided their dimensions are such that round posts of required diameter could be turned therefrom.
- d. Manufacture.** Outer bark shall be completely removed from all posts including depressions. Inner bark shall be removed from all post surfaces to be treated, except inner bark may remain in depressions. The amount of wood shaved off in the removal of inner bark shall be held to a minimum.
- e. Treatment.** Apply preservative to all timber posts. Use the preservatives and treatment processes of AASHTO M133 and Best Management Practices for the Use of Treated Wood in Aquatic Environments (BMPs), published by the Western Wood Preservers Institute, 601 Main Street, Suite 405, Vancouver, WA 98660 (Phone: 800-279-9663). Use Copper Naphthenate CuN, Ammoniacal (or Alkaline) Copper Quat ACQ-B, ACQ-C, ACQ-D or Copper Azole CBA-A, with a retention of preservative conforming to AWWPA Use Category 4A. Pressure treat by empty cell method according to AWWPA Standards C1 and C5.

**160-2.4 BRACES.** Cleats, gate stops, and braces shall be of the size shown on the Plans. They shall be of the same species and quality specified for the posts or approved by the Engineer, and they shall be free from knots larger than one-third the width of the piece. Gate stops shall be made of posts of suitable length. Braces may be made of posts of suitable length or of sawed lumber. All cleats, gate stops, and any braces in contact with the ground and for a distance of at least 6 inches above the ground shall be treated by the hot and cold bath process, specified herein for posts. The wire used in cable for bracing shall conform to 160-2.1e.

**160-2.5 STAPLES.** The staples shall be No. 9 galvanized steel wire, 1 inch long for hardwood posts and 1-1/2 inches long for use in softwood posts.

**160-2.6 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.

## **CONSTRUCTION METHODS**

**160-3.1 GENERAL.** The fence shall be constructed according to the details on the Plans and as specified herein. 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.

When directed, the Contractor shall span the opening below the fence with barbed wire fastened to posts of extra length at locations of small natural or drainage ditches where it is not practical to conform the fence to the general contour of the ground surface. The new fence shall be permanently tied to the terminals of existing fences whenever required by the Engineer. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall stake down the woven wire fence at several points between posts.

When directed, in order to keep stock on adjoining property enclosed at all times, the Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet or such length that the stock can be kept in the proper field. The work shall progress in this manner, and at the close of the working day, the

newly constructed fence shall be tied to the unremoved existing fence. Any openings in the fence shall be guarded when stock is using the adjoining property.

**160-3.2 CLEARING FENCE LINE.** The site of the fence shall be sufficiently clear of obstructions, and surface irregularities shall be graded so that the fence will conform to the general contour of the ground. The fence line shall be cleared to a minimum width of 10 feet on each side of the centerline of the fence. This clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence line shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground as specified in the Plans. When shown on the Plans, existing fences which coincide with, or are in a position to interfere with, the new fence location shall be removed by the Contractor as part of the construction work, unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other material acceptable to the Engineer and shall be compacted properly with tampers.

**160-3.3 SETTING POSTS.** Posts shall be set with large ends down, plumb, and in good line on the side on which the wire is to be fastened. Posts shall be set full depth and shall not be cut off to eliminate rock or other excavation. Where rock is encountered, it shall be removed, even if blasting is necessary, to provide full-depth and full-size holes. The bottoms of all posts shall be cut off square. The diameter of the holes shall be at least 6 inches larger than the diameter of the posts. When cleats are used on posts, the holes shall be dug large enough to accommodate them. After posts are placed and lined, the holes shall be backfilled with suitable material that shall be properly compacted by the use of tampers. The posts adjacent to end, corner, anchor, and gate posts shall be set and braced with braces and wire, as shown on the Plans.

**160-3.4 ANCHORING.** Corner, end, gate, and adjacent intermediate posts shall be anchored, by gaining and spiking cleats to the sides of the posts, as indicated on the Plans. No cleats will be required on other intermediate posts or on anchor posts.

**160-3.5 BRACING.** End, corner, anchor, and gate posts shall be braced by using a post of sufficient length or a piece of sawed lumber of the proper size, together with a wire cable. The wooden brace shall be gained and securely spiked into the end, corner, anchor, or gate posts and into the next intermediate posts about 6 inches from the top of the respective posts. A cable made of a double strand of galvanized soft wire shall be looped around the end, corner, anchor, or gate post near the ground and around the next intermediate post about 12 inches from the top. After the cable has been stapled in this position, it shall be twisted until tight. The staples used to hold the cable shall be not less than 1-1/2 inches long. The tool used for twisting the cable shall be left in place to permit later adjustment of bracing if found necessary. Anchor posts shall be set at approximately 500-foot intervals and braced to the adjacent posts. Posts shall be braced before the wire fencing is placed.

**160-3.6 INSTALLING WIRE.** The wires shall be placed on the side of the posts away from the airport or as directed. The wire fence shall be placed on the posts at the height indicated on the Plans. Longitudinal wires shall be installed parallel and drawn uniformly taut. The vertical stay wires of the woven wire fencing shall be straight and vertical. At end and gate posts the woven wire and barbed wire shall be wrapped once around the post; each longitudinal wire shall be stapled at least three times and the ends of these wires shall be tied with a snug, tight twist. Each longitudinal wire shall be stapled to each intermediate post with one steel wire staple; at the corner and anchor posts, two or more staples shall be used. The top strand of barbed wire of all fences shall be stapled with two staples in each post. All staples shall be set diagonally with the grain of the wood and driven up tight. After the fence has been erected, the tops of the wood posts shall be sawed off with a 1-to-3 pitch. The bottom wire of the wire fencing shall clear the ground by not more than 4 inches or less than 1 inch at any place.

**160-3.7 SPLICING WIRE.** Wire splices in longitudinal wires will be permitted if made with an approved galvanized bolt-clamp splice or a wire splice made as follows: The end of the wires shall be carried 3 inches past the splice tool and wrapped around the other wire away from the tool for at least 6 turns in opposite directions. After the tool is removed, the space occupied by it shall be closed by pulling the ends together. The unused ends of the wires shall be cut off neatly. Woven wire shall be spliced only at posts.

**160-3.8 INSTALLING GATES.** The gates shall be hung on gate fittings, as shown on the Plans. Fittings on the gate posts shall be clamped, screwed, or bolted to prevent slipping. Gates shall be so erected as to swing in the direction indicated and shall be provided with gate stops, as specified or as shown on the Plans. Gates shall be erected locations shown on the Plans.

**160-3.9 EXISTING FENCE CONNECTIONS.** Wherever the new fence joins an existing fence, either at a corner or at the intersection of straight fence lines, a corner or anchor post shall be set at the junction and braced and anchored the same as herein described for corner posts.

If the connection is made at other than the corner of the new fence, the last span of the old fence shall contain a brace span.

#### **METHOD OF MEASUREMENT**

**160-4.1.** Fences will be measured in place from outside to outside of end posts or corner posts and will be the length of fence actually constructed, except for the space occupied by the gates.

**160-4.2.** Gates will be measured in units for each gate installed and accepted.

#### **BASIS OF PAYMENT**

**160-5.1** Payment will be made at the contract unit price per linear foot for fence and per each for gates.

Work involved in clearing and disposal of material along the fence line and any required rock excavation are subsidiary.

Payment will be made under:

Item F-160a	Fence, Class A - per linear foot
Item F-160b	Fence, Class B - per linear foot
Item F-160c	Gates ( <b>Width</b> ) - per each
Item F-160d	Walkway Gates ( <b>Width</b> ) - per each

#### **MATERIAL REQUIREMENTS**

AASHTO M 279	Metallic-Coated, Steel Woven Wire Fence Fabric
AASHTO M 280	Metallic-Coated (Carbon) Steel Barbed Wire
AASHTO M 181	Chain-Link Fence
Fed. Spec. TT-W-571	Wood Preservation: Testing Practices



## ITEM F-161 WIRE FENCE WITH STEEL POSTS

(Classes C and D Fences)

### DESCRIPTION

**161-1.1** This item covers the requirements for furnishing materials and constructing wire fences and gates with steel posts according to the details included herein and as shown on the Plans. The class of fence to be erected shall be either Class C, woven wire fencing surmounted by 2 strands of barbed wire, or Class D, 4 strands of barbed wire, as specified.

### MATERIALS

#### 161-2.1 WIRE.

- a. **Woven Wire (Zinc-coated).** Woven wire fabric shall meet AASHTO M 279, Design Number 726-6-12 ½, Grade 60, Coating Type Z, and Coating Class 3.
- b. **Barbed Wire (Zinc-coated).** Barbed wire shall meet AASHTO M 280, Design Number 12-4-5-14R, Standard Grade, Coating Type Z, and Coating Class 3.
- c. **Barbed Wire (Aluminum-coated).** Barbed wire shall meet AASHTO M 280, Design Number 12-4-5-14R, Standard Grade, Coating Type ZA, and Coating Class 60.
- d. **Bracing Wire (Zinc-coated).** Wire used for bracing shall be smooth galvanized wire, and shall meet AASHTO M 181, Tension Wire, except it may be 9-gage thickness.

**161-2.2 FENCE POSTS, GATES, RAILS, BRACES, AND ACCESSORIES.** These items shall be hot-dip galvanized steel, conforming to AASHTO M 181, Type 1, Grade 1 or Grade 2, and shall be the size shown on the Plans.

**161-2.3 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.

**161-2.4 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.

### CONSTRUCTION METHODS

**161-3.1 GENERAL.** The fence shall be constructed according to the details on the Plans and as specified herein. 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.

When directed, the Contractor shall span the opening below the fence with barbed wire fastened to stakes of the required length at locations of small natural or drainage ditches where it is not practical to conform the fence to the general contour of the ground surface. The new fence shall be permanently tied to the terminals of existing fences whenever required by the Engineer. The finished fence shall be plumb, taut, true to line and ground contour, and complete in every detail. When directed, the Contractor shall stake down the woven wire fence at several points between posts.

When directed, in order to keep stock on adjoining property enclosed at all times, the Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences.

The length of unfenced section at any time shall not exceed 300 feet or such length that the stock can be kept in the proper field. The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence. Any openings in the fence shall be guarded when stock is using the adjoining property.

**161-3.2 CLEARING FENCE LINE.** The site of the fence shall be sufficiently cleared of obstructions, and surface irregularities shall be graded so that the fence will conform to the general contour of the ground. The fence line shall be cleared to a minimum width of 10 feet on each side of the centerline of the fence. This clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions which will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be placed a uniform distance above ground, as specified in the Plans. When shown on the Plans or as directed by the Engineer, the existing fences which coincide with, or are in a position to interfere with, the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other material acceptable to the Engineer and shall be compacted properly with tampers.

**161-3.3 INSTALLING POSTS.** All posts shall be spaced as shown on the Plans. Corner, brace, anchor, end, and gate posts shall be set in concrete bases as shown on the Plans. The top of the base shall be slightly above the ground surface, trowel finished, and sloped to drain. Holes of full depth and size for the concrete bases for posts shall be provided even if blasting of rock or other obstructions is necessary. All line posts may be either driven or set in dug holes to a penetration of 3 feet. All post setting shall be done carefully and to true alignment. Dirt removed for placing posts, anchor bars, flanges, etc., shall be replaced, tamped, and leveled. When posts are driven, care shall be exercised to prevent marring or buckling of the posts. Damaged posts shall be replaced at the Contractor's expense.

**161-3.4 BRACING.** All corner, anchor, end, and gate posts shall be braced as shown on the Plans. Anchor posts shall be set at approximately 500-foot intervals and braced to the adjacent posts.

**161-3.5 INSTALLING WIRE.** All barbed wire and woven wire shall be placed on the side of the post away from the airport, or as directed, at the height indicated on the Plans. The woven wire shall be carefully stretched and hung without sag and with true alignment. Care shall be taken not to stretch the wire so tightly that it will break in cold weather or pull up corner and brace posts. All horizontal wires shall be fastened securely to each post by fasteners or clips designed for use with the posts furnished. The woven wire shall be wrapped around end, corner, and gate posts, and the ends of all horizontal wires shall be tied with snug, tight twists. The wire shall be secured to prevent slipping up and down the post. Barbed wire strands shall be stretched and each strand secured to each post to prevent slipping out of line or becoming loose. At end, corner, and gate posts the barbed wire shall be securely wrapped and anchored once about the post from outside and secured against slipping by tying the ends with snug, tight twists. However, on spans of less than 100 feet, both ends of the span need not be wrapped around the posts. The bottom wire of the woven wire fencing shall clear the ground by not more than 4 inches or less than 1 inch at any place.

**161-3.6 SPLICING WIRE.** Splices in barbed and woven wire will be permitted if made with an approved galvanized bolt-clamp splice or a wire splice made as follows: The ends of each wire shall be carried 3 inches past the splice tool and wrapped around the other wire for at least 6 turns in opposite directions. After the tool is removed, the space occupied by it shall be closed by pulling the ends together. The unused ends of the wire shall be cut off neatly.

**161-3.7 INSTALLING GATES.** The gates shall be hung on gate fittings as shown on the Plans. They shall be attached in such a manner that the gate cannot be lifted off the hinges. Gates shall be erected to swing in the direction indicated and shall be provided with gate stops, as specified or as shown on the Plans. Gates shall be erected at locations shown on the Plans.

**161-3.8 EXISTING FENCE CONNECTIONS.** Wherever the new fence joins an existing fence, either at a corner or at the intersection of straight fence lines, a corner or anchor post shall be set at the junction and braced and anchored the same as herein described for corner posts.

If the connection is made at other than the corner of the new fence, the last span of the old fence shall contain a brace span.

#### **METHOD OF MEASUREMENT**

**161-4.1.** Fences will be measured in place from outside to outside of end posts or corner posts and will be the length of fence actually constructed, except for the space occupied by the gates.

**161-4.2.** Gates will be measured in units for each gate installed and accepted.

#### **BASIS OF PAYMENT**

**161-5.1.** Payment will be made at the contract unit price per linear foot for fence and per each for gates.

Work involved in clearing and disposal of material along the fence line and any required rock excavation are subsidiary.

Payment will be made under:

Item F-161a	Fence, Class C - per linear foot
Item F-161b	Fence, Class D - per linear foot
Item F-161c	Gates ( <b>Width</b> ) - per each
Item F-161d	Walkway Gates - per each

#### **MATERIAL REQUIREMENTS**

AASHTO M 279	Metallic-Coated, Steel Woven Wire Fence Fabric
AASHTO M 280	Metallic-Coated (Carbon) Steel Barbed Wire
AASHTO M 181	Chain-Link Fence

## 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 Ilco Unican Model 1011 or approved equal. A sign, 12 inches by 12 inches, shall be securely mounted on the inside of the gate. The sign shall be shielded from view from outside of the gate by means of a hinged 12-inch by 12-inch cover or other means approved by the Engineer. The cover shall have the legend "LIFT AND RECORD COMBINATION FOR REENTRY". The sign shall be aluminum sheet with white reflective coating. Letters shall be black and a minimum of 3/4 inch tall.

## CONSTRUCTION METHODS

**162-3.1 GENERAL.** The fence shall be constructed according to the details on the Plans and as specified herein using new materials. The Contractor shall be responsible for establishing the fence alignment as shown on the Plans. After the fence line has been staked and prior to fence installation, the Contractor shall review the alignment with the Engineer and make required adjustments to avoid conflicts.

**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	(Height) Chain-Link Fence - per linear foot
Item F-162b	(Width) 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 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 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.

### **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.

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

**120-1.1 DESCRIPTION.** The work consists of providing Disadvantaged Business Enterprises (DBEs), as defined in Title 49, CFR, Part 26, the opportunity to participate fairly with other contractors in the performance of contracts financed with federal funds. The Contractor and subcontractors shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The Contractor will carry out applicable requirements of 49 CFR Part 26 in the award and administration of US DOT assisted contracts.

**120-1.2 INTERPRETATION.** This section implements the requirements of 49 CFR Part 26, and the Department's federally approved DBE Program.

**120-1.3. ESSENTIAL CONTRACT PROVISION.** Failure to comply with the provisions of this section is a material breach of contract, which may result in contract termination or other remedy as DOT&PF deems appropriate. Failure to comply with this section is justification for debarment action as provided in AS 36.30.640(4).

### 120-1.4 DEFINITIONS AND TERMS.

- a. **Administrative Reconsideration.** A process by which the low bidder may request reconsideration when the Department determines the Good Faith Effort (GFE) requirements have not been met.
- b. **Broker.** A certified DBE for the delivery of creditable materials, supplies, equipment, transportation/hauling, insurance, bonding, etc., within its certified category, that is necessary to complete the project. A broker of materials certified in a supply category must be responsible for scheduling the delivery of materials and ensuring that the materials meet specifications before credit will be given.
- c. **Civil Rights Office.** The Department's Civil Rights Office. (CRO)
- d. **Contract Compliance Officer.** Individual within the CRO with the authority to administer the Department's compliance programs.
- e. **Disadvantaged Business Enterprise.** A Disadvantaged Business Enterprise (DBE) which is a for-profit small business concern that is certified in accordance with 49 CFR Part 26 and listed in the Alaska DBE Directory.
- f. **DBE Key Employee.** A permanent, year-round employee of the DBE and whose name is on file with the CRO as a key employee. A key employee may act as an on-site representative when the owner is not on-site.
- g. **DBE Utilization Goal.** The percent of work to be performed by certified DBEs. The goal is established by the Department and specified in the contract.
- h. **DBE Officer.** Individual designated in writing as a representative of the Contractor concerning DBE issues.
- i. **Manufacturer.** A DBE certified in a supply category that changes the shape, form, or composition of original material in some way. The DBE must provide that altered material to the general public of the construction industry at large on a regular basis.
- j. **Race Conscious Participation.** DBE participation used to meet a specified DBE Utilization Goal.
- k. **Race Neutral Participation.** DBE participation that is in excess of the specified DBE Utilization Goal or participation that does not count towards this goal.

I. **Regular Dealer.** A DBE certified in a supply category who operates in a manner consistent with industry practice and who:

- (1) maintains an in-house inventory on a regular basis of the particular product provided to this project; and
- (2) keeps an inventory in an amount appropriate for the type of work using that product; and
- (3) offers that inventory for sale to the general public or construction industry at large (private and public sectors), not just supplied as needed on a project by project basis during the construction season, except where the product requires special or heavy equipment for delivery and the DBE possesses and operates this equipment on a regular basis throughout the construction season in order to deliver the product to the general public or construction industry at large. If the distribution equipment is rented or leased, it must be on a repetitive, seasonal basis; and may additionally fabricate (assemble large components) for use on a construction project, consistent with standard industry practice, for delivery to the project.
- (4) a person may be a regular dealer in such bulk items as petroleum products, steel, cement, gravel, stone, or asphalt without owning, operating, or maintaining a place of business, if the person both owns and operates distribution equipment for the products. Any supplementing of regular dealers' own distribution equipment shall be by a long-term lease agreement and not on an ad hoc or contract-by-contract basis.

m. **Commercially Useful Function.** DBE performs a commercially useful function when it is responsible for execution of the work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. The DBE must also be responsible, with respect to materials and supplies used on the contract, for negotiating price, determining quality and quantity, ordering the material, and installing (where applicable) and paying for the material itself.

**120-2.1 MEETING THE DBE UTILIZATION GOAL.** A DBE's proposed work may be used to demonstrate the successful bidder's ability to meet the DBE Utilization Goal before Contract award. The DBE must be certified in a category covering the Commercially Useful Function to be performed at the time of listing on Form 25A-325C (DBE Utilization Report).

A bidder may meet the DBE Utilization Goal through (1) the participation of certified DBE firms, or (2) documentation of required GFE (Subsection 120-3.1), or (3) a combination of participation and GFE to be eligible for contract award.

DBE participation on contingent sum items will count as Race Neutral DBE participation and not towards fulfilling a minimum DBE Utilization Goal.

### **120-3.1 DETERMINATION OF COMPLIANCE.**

- a. **Phase I-Bid.** All DBE GFEs must be completed prior to bid opening.
- b. **Phase II-Award.** The apparent low bidder shall submit evidence of DBE commitment(s) within five working days after receipt of written notification by the Department of the successful low bid. The apparent low bidder may not supplement its DBE efforts after opening, nor offer new or additional DBE participation after submitting the DBE Utilization Report (Form 25A-325C).
  - (1) **Written DBE Commitment.** Complete Form 25A-326 for each DBE subcontractor.
  - (2) **DBE Utilization Report.** Submit a completed DBE Utilization Report Form 25A-325C. All listed DBEs must be certified in the appropriate work categories prior to bid opening to be used to meet the DBE contract goal.

- (3) **GFE Documentation.** Submit a completed Summary of Good Faith Effort Documentation Form 25A-332A (with attachments) and Contract Report Form 25A-321A if the DBE Utilization Goal is not met on Form 25A-325C.

If the bidder cannot meet the DBE Utilization Goal, and cannot document the minimum required GFE (as specified below), the Contracting Officer will determine the bidder to be not responsible.

### 120-3.2 GOOD FAITH EFFORT (GFE).

- a. **GFE Criteria.** When a bidder fails to meet DBE Utilization Goal, the CRO will use the following criteria to judge whether they have demonstrated sufficient GFE to be eligible for award of the contract.

- (1) **Consider All Subcontractable Items.** Before bid opening, the bidder shall, at a minimum, seek DBE participation for each of the subcontractable items with an established DBE goal as identified on Form 25A-324. It is the bidder's responsibility to facilitate DBE participation by making the work listed on the subcontractable items list available to DBE firms.

If the bidder cannot achieve the DBE Utilization Goal, then the bidder should also consider other items not listed that could be subcontracted to DBEs.

- (2) **Initial DBE Notification.** All DBEs listed in the Department's Plan Holders Self-Registration List for the particular project being bid must be contacted at least seven calendar days prior to bid opening. For GFE purposes, DBEs certified to perform the work items identified on Form 25A-324 and listed as mandatory contact on the Department's Plan Holders Self-Registration List, must be contacted to solicit their interest. Each contact with a DBE firm must be logged on a Contact Report, Form 25A-321A.

The bidder must give DBEs at least seven calendar days to quote. The bidder may reject DBE quotes received after the deadline. Responsive DBE quotes must be accepted unless they are determined non-competitive. Deadline for quote submission and responsiveness determinations for DBEs and non-DBEs must be consistently applied.

The only acceptable methods of initial and follow up notification are:

- (a) By fax with a confirmation receipt of successful transmission to the DBE's fax number listed in the DBE Directory. A fax transmission without receipt of successful transmission is unsatisfactory.
  - (b) By email with confirmation of successful receipt to the DBE's email address listed in the DBE Directory. Email without confirmation of successful receipt is unsatisfactory.
  - (c) By telephone solicitation with a record of the date and time of the telephone call made to the DBE's telephone number listed in the DBE Directory. Telephone solicitation without a record of date and time is unsatisfactory.
- (3) **Non-Competitive DBE Quotes.** DBE quotes more than 10 percent higher than an accepted non-DBE quote will be deemed non-competitive, provided they are for the exact same work or service.

All evidence in support of a non-competitive quote determination must be provided at the time of the GFE submittal. When a DBE quote is rejected as being non-competitive, the work must be performed by the non-DBE subcontractor whose quote was used to provide the basis of the determination. Payments received by the non-DBE subcontractor during the execution of the

Contract shall be consistent with the accepted quote. This does not preclude increases due to change documents issued by the Department.

(4) **Assistance To DBEs.** Contractors must provide DBEs with:

- (a) Information about bonding or insurance required by the bidder.
- (b) Information about securing equipment, supplies, materials, or related assistance or services.
- (c) Adequate information about the requirements of the contract regarding the specific item of work or service sought from the DBE.

(5) **Follow-up DBE Notifications.** If there is no response from the initial DBE notification, you must contact the DBE(s) again to determine if they will be quoting. For acceptable forms of notification and required documentation see 120-3.2, subsection a(2) items (a) through (c).

Failure to submit a quote by the deadline is 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.

(6) **GFE Evaluation.** Subsections (1) through (5) must be completed for a GFE based submission to be considered. Failure to perform and document actions contained in subsections (1) through (5) constitutes insufficient GFE. After submitting a GFE, bidders may only clarify efforts taken before opening. No new efforts or additional DBE participation is permitted after opening.

- b. **Administrative Reconsideration.** 49 CFR Part 26.53(d) provides an opportunity for administrative reconsideration when the Department determines that GFE is insufficient. This opportunity must be exercised within three working days of notification that GFEs were unsatisfactory. For reconsideration, the bidder must provide written documentation or argument concerning efforts to meet the DBE Utilization Goal. No new or additional contact information may be provided. Only contact information the bidder provided in support of its initial request for a GFE determination by the CRO may be presented to support the request for administrative reconsideration.

The process for an Administrative Reconsideration is as follows:

- (1) The bidder will have the opportunity to meet with the DBE Liaison Officer in person to discuss the issue. If so desired, the bidder must be ready to meet with the DBE Liaison Officer within four working days of receipt of notice that it failed to meet the requirements of this subsection.
- (2) The DBE Liaison Officer will render a written decision and provide notification to the bidder within four working days after the meeting. The written decision will explain the basis for finding.
- (3) The finding of the DBE Liaison Officer cannot be appealed to the U.S. DOT.

### 120-3.3 DBE CREDITABLE AND NON CREDITABLE WORK.

- a. **DBE Creditable Work.** The Commercially Useful Function work items and creditable dollar amounts shown on the DBE Utilization Report, Form 25A-325C, shall be included in any subcontract, purchase order or service agreement with that DBE.
- b. **DBE Decertification.**

- (1) If a DBE performing a Commercially Useful Function loses its DBE certification at any time prior to execution of a subcontract, purchase order or service agreement, as the result of a determination of ineligibility pursuant to 49 CFR Part 26.87, the work of that firm will not be credited toward the DBE Utilization Goal and the Contractor must either:
  - (a) meet the contract goal by subcontracting with an eligible DBE firm or demonstrate a GFE to do so; or
  - (b) continue with the decertified DBE and find other work not already committed to DBEs in an amount that meets or exceeds the DBE Utilization Goal.
- (2) If a DBE performing a Commercially Useful Function loses its DBE certification after execution of a subcontract, purchase order or service agreement, as the result of a determination of ineligibility pursuant to 49 CFR Part 26.87, the de-certified DBE may continue to perform, and the work may be credited toward the DBE Utilization Goal.
- (3) If a DBE goes out of business and cannot perform the work, the Contractor must meet the contract goal by subcontracting with an eligible DBE firm or demonstrate a GFE to do so.

The provisions of 120-3.3(c) Termination of a DBE and 120-3.3 (d) DBE Replacement or Substitution do not apply to this section.

A Contractor must notify the CRO within one business day if they become aware of any change in a DBE's circumstances that might lead to a DBE's decertification.

**c. Termination of a DBE.**

- (1) In accordance with 49 CFR 26.53(f)(1) the Contractor shall not terminate a DBE without good cause and the prior written consent of the Engineer. For purposes of this paragraph, good cause includes the following circumstances:
  - (a) DBE defaults on their obligation for any reason;
  - (b) The DBE fails or refuses to perform the work of its subcontract in a way consistent with normal industry standards. Provided, however, that good cause does not exist if the failure or refusal of the DBE to perform its work on the subcontract results from the bad faith or discriminatory action of the Contractor.
  - (c) The DBE fails or refuses to meet the Contractor's reasonable, nondiscriminatory bond requirements;
  - (d) The DBE becomes bankrupt, insolvent, or exhibits credit unworthiness;
  - (e) The DBE is ineligible to work on public works projects because of suspension and debarment proceedings pursuant to 2 CFR Parts 180, 215, and 1,200 or applicable state law.
  - (f) The Engineer determines that the DBE is not a responsible contractor.
  - (g) The DBE voluntarily withdraws from the project and provides a written notice of its withdrawal;
  - (h) The DBE is ineligible to receive DBE credit for the type of work required;
  - (i) A DBE owner dies or becomes disabled with the result that the DBE is unable to complete its work; or

- (j) Other documented good cause that the Engineer determines compels the termination of the DBE, provided that good cause does not exist if the Contractor seeks to terminate a DBE it relied upon to obtain the contract so that the Contractor can self-perform the work for which the DBE was engaged or so that the Contractor can substitute another DBE or non-DBE after contract award.
- (2) The Contractor must give written notice to the DBE of its intent to request to terminate and/or substitute, and the reason for the request. The request to terminate and/or substitute must be submitted to the Engineer.
- (3) The Contractor must give the DBE five working days to respond to the written notice. Any response from the DBE must be submitted to the Engineer.
- (4) DBEs that are terminated must be replaced or substituted in accordance with 120-3.2(d).

**d. DBE Replacement or Substitution.**

- (1) The Contractor shall submit to the Engineer a written request to replace or substitute a DBE who fails or refuses to execute a written subcontract or who is terminated under 120-3.3(c). If approved, the Contractor shall, at a minimum, replace or substitute the DBE with another eligible DBE for the same work in order to fulfill its commitment under the DBE Utilization Goal.
- (2) If the Contractor cannot obtain replacement DBE participation, the DBE Utilization Goal will not be adjusted. However, the Engineer may consider the following criteria as satisfying that portion of DBE participation that cannot be replaced.
  - (a) The Contractor was not at fault or negligent and that the circumstances surrounding the replacement or substitution were beyond the control of the Contractor; and
  - (b) The Contractor is unable to find replacement DBE participation at the same level of DBE commitment and has adequately performed and documented the GFE expended in accordance with Subsection 120-3.2; or
  - (c) It is too late in the project to provide any real subcontracting opportunities for DBEs.

If the Engineer agrees that additional DBE participation is not available, the DBE may be replaced or substituted with a non-DBE or the Contractor may self-perform the work.

**120-3.4 COMMERCIALY USEFUL FUNCTION.**

- a. **Creditable Work.** Measuring the DBE Utilization Goal will be based upon the actual dollars paid to the DBEs for creditable Commercially Useful Function work on this project. This is determined by the Engineer in accordance with this Section.

Commercially Useful Function is limited to:

- (1) Prime Contractors;
- (2) Subcontractors;
- (3) Manufacturers;
- (4) Regular Dealers;
- (5) Brokers; or

(6) Joint Ventures

- b. **Determination of Commercially Useful Function.** In order for the Commercially Useful Function work of the DBE to be credited toward the goal, the Contractor will ensure that the DBE is certified in the appropriate category at the time of the submittal of the subcontract, or the issuance of a purchase order or service agreement. Subcontracts, purchase orders, and service agreements shall be consistent with the written DBE commitment.
- (1) The Commercially Useful Function performed by a DBE certified in a supply category will be evaluated by the Engineer to determine whether the DBE performed as either a broker, regular dealer, or manufacturer of the product provided to this project.
  - (2) The following factors will be used in determining whether a DBE trucking company is performing a Commercially Useful Function:
    - (a) The DBE must be responsible for the management and supervision of the entire trucking operation for which it is performing on a particular contract, and there cannot be a contrived arrangement for the purpose of meeting DBE goals.
    - (b) The DBE must itself own and operate at least one fully licensed, insured, and operational truck used on the contract.
    - (c) The DBE receives credit for the total value of the transportation services it provides on the contract using trucks it owns, insures, and operates using drivers it employs.
  - (3) The Contractor will receive credit for the Commercially Useful Function 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 Commercial Useful Function and potential DBE credit.
  - (4) The DBE may perform work in categories for which it is not certified, but only work performed in the DBE's certified category meeting the Commercially Useful Function criteria may be credited toward the DBE Utilization Goal.
  - (5) DBE work shall conform to the following requirements to be a Commercially Useful Function:
    - (a) It will be necessary and useful work required for the execution of the Contract.
    - (b) The scope of work will be distinct and identifiable with specific contract items of work, bonding, or insurance requirements.
    - (c) It will be performed, controlled, managed, and supervised by employees normally employed by and under the control of the certified DBE. The work will be performed with the DBE's own equipment. Either the DBE owner or DBE on-Site Representative will be at the work site and responsible for the work. Leased equipment may also be used, provided the DBE has exclusive use of the equipment and it is operated by a driver the DBE employs. In remote locations or rare situations, a DBE may use equipment and/or personnel from the Contractor or its affiliates. Should this situation arise, a prior arrangement must be in place. The duration of the arrangement must be short term and prior written approval from the Engineer must be obtained.
    - (d) The manner in which the work is sublet or performed will conform to standard industry practice within Alaska, as determined by the Department. The work or provision of goods or services will have a market outside of the DBE program (and must also be performed by non-DBE firms within the Alaskan construction industry). Otherwise, the work or service

will be deemed an unnecessary step in the contracting or purchasing process and no DBE credit will be allowed.

There will be no DBE credit for lower-tier non-DBE subcontract work.

- (e) The cost of the goods and services will be reasonable and competitive with the cost of goods and services outside the DBE program within Alaska. Materials or supplies needed as a regular course of the Contractor's operations such as fuel, maintenance, office facilities, portable bathrooms, etc. are not creditable.

The cost of materials actually incorporated into the project by a DBE subcontractor is creditable toward the DBE goal only if the DBE is responsible for ordering and scheduling their delivery and fully responsible for ensuring that they meet specifications. The cost of materials purchased from the contractor or its affiliates is not creditable.

- (f) Subcontract work, with the exception of truck hauling, shall be sublet by the same unit of measure as is contained in the Bid Schedule unless approved in advance by the Engineer.
- (g) The DBE will control all business administration, accounting, billing and payment transactions. The Contractor cannot perform these functions for the DBE.

In accordance with AS 36.30.420(b), the Engineer may inspect the offices of the DBE and audit their records to assure compliance.

- c. **Rebuttal of Finding of No Commercially Useful Function.** Consistent with the provisions of 49 CFR Part 26.55(c)(4)&(5), before the Engineer makes a final finding that no Commercially Useful Function has been performed by a DBE, the Engineer will coordinate transmittal of the presumptive finding to the Contractor, who will in-turn, notify the DBE. The Contractor will provide the DBE the opportunity to provide rebuttal information. The Contractor shall present the information to the Engineer.

The Engineer will make a final determination on whether the DBE is performing a Commercially Useful Function. Under no circumstances will the Contractor take any action with respect to the DBE until the final determination is made. The Engineer's decisions on Commercially Useful Function matters are subject to review by the Department, but are not administratively appealable to the U.S. DOT.

- d. **Monthly Required Reporting.** On a monthly basis, the Contractor shall submit the Monthly Summary of Disadvantaged Business Enterprise Participation, Form 25A-336, to the Engineer. Reports are due by the 15th of the following month. Also attach copies of canceled checks or bank statements that identify payer, payee, and amount of transfer to verify payment information shown on the form.

**120-4.1 DETERMINING DBE CREDIT.** The Contractor is entitled to count toward the DBE Utilization Goal those monies actually paid to certified DBEs for Commercially Useful Function 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 Commercially Useful Function of a DBE prime contractor is 100 percent of the monies actually paid to the DBE under the contract for creditable work and materials in accordance with 49 CFR Part 26.55.
- b. Credit for the Commercially Useful Function of a subcontractor is 100 percent of the monies actually paid to the DBE under the subcontract for creditable work and materials.
- c. Credit for the Commercially Useful Function of a subcontractor performing hauling/transportation is 100 percent of the monies actually paid to the DBE under the subcontract for creditable work for those firms certified in the 100 percent credit category. Credit for the Commercially Useful Function of a subcontractor performing hauling/transportation is 5 percent of the monies actually paid to the DBE under the subcontract for creditable work for those firms certified in the 5 percent credit category.



- d. Credit for the Commercially Useful Function of a manufacturer is 100 percent of the monies paid to the DBE for the creditable materials manufactured.
- e. Credit for the Commercially Useful Function of a regular dealer of a creditable material, product, or supply is 60 percent of its value. The value is the actual cost paid to the DBE not to exceed the bid price for such item.
- f. Credit for the Commercially Useful Function of a broker performed by a DBE certified in a supply category for providing a creditable material, product, or supply is limited to a reasonable brokerage fee. The brokerage fee will not exceed 5 percent of the cost of the procurement contract for the creditable item.
- g. Credit for the Commercially Useful Function of a broker performed by a DBE certified in a bonding or insurance category is limited to a reasonable brokerage fee, not to exceed 5 percent of the premium cost.
- h. Credit for the Commercially Useful Function of a joint venture (JV) either as the prime contractor or as a subcontractor may not exceed the percent of the DBE's participation in the JV agreement, as certified by the CRO. The DBE joint venture partner will be responsible for performing all of the work as delineated in the certified JV agreement.

**120-5.1 ACHIEVEMENT OF DBE GOALS.** Work under this item is subsidiary to other contract items and no payment will be made for meeting or exceeding the DBE Utilization Goal.

If the Contractor fails to utilize the DBEs listed on Form 25A-325C as scheduled or fails to submit proof of payment, requested documentation, or otherwise cooperate with a DBE review or investigation, the Department will consider this to be unsatisfactory work. If the Contractor fails to utilize GFE to replace or substitute a DBE, regardless of fault (except for Subsection 120-3.3(d)(2)(c)), the Department will also consider this unsatisfactory work. Unsatisfactory work may result in disqualification of the Contractor from future bidding under Subsection GCP 20-13 and withholding of progress payments consistent with Subsection GCP 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. 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 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 facsimile machine/dial-up Internet connection. Provide Internet connection with send and receive data capability supporting 56 kilobytes per second or higher data transfer rate.

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.

**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 re-locate the facility as directed.
- b. **Main Lab.** Provide a weatherproof structure suitable to field test construction materials, with the following minimum functional requirements:
  - (1) Floor space of 300 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 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.

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 calculate the MAVW for each vehicle and list all vehicles and their MAVW(s) in the scale house. The MAVW is either the maximum allowable legal weight determined by the Engineer when 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 (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 12-inch 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.

**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.

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-131 ENGINEERING TRANSPORTATION

### DESCRIPTION

**131-1.1** Furnish and maintain vehicles for the exclusive use of the Engineer and their staff throughout the duration of the project.

### REQUIREMENT

**131-2.1** Provide the specified number of the following vehicle types:

- a. Truck.** Full-size four wheel drive pickup or sport utility vehicle. Less than 3 model years old, in good condition and with less than 36,000 miles on the odometer. Equip vehicles with mud/snow tires, strobe beacons (Whelen 360 or equivalent) and two-way radios set on the airport 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.

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 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. 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.

**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 books. Field books become the property of the Department upon completion of the work.
- b. Label the books and number the pages. Make a heading in the appropriate book (date, weather, names and duties of crew members) at the beginning of each day's work.
- c. Update the index of the appropriate book at the end of each day's work.
- d. Reduce, check, and adjust level notes.
- e. The notekeeper shall compute the cross-section level notes and slope stake catches and a different crew member shall check the computation on a continual basis in the field.
- f. Enter the grade data, shoulder width and/or ditch distance, stationing, slope, etc., in the slope stake books.
- g. Maintain the position and identifying marks of slope stakes and reference points until used for their intended purpose.
- h. Correct errors by drawing a line through them and writing the correct entry directly above. Erasures will not be allowed.
- i. Return field books and copies of the field books to the Project office at the end of each work day or as directed.
- j. Provide copies of grade sheets and temporary bench mark elevations to the Engineer 48 hours before beginning work on unclassified excavation or embankment.
- k. The Contractor's survey crews shall comply with approved traffic control plans. Coordinate crew activities with the Worksite Traffic Supervisor.
- l. Keep a survey Party Chief diary, and give a copy of the diary to the Engineer each day. The diary shall contain the following information:
  - (1) Date.
  - (2) Weather.
  - (3) Crew members' names and duties.
  - (4) Type and location of work performed.
  - (5) Hours worked.

- (6) Type of equipment used (brand) and date equipment was double centered or “peg” test was performed.
- (7) Signature of person in responsible charge.

m. Submit the survey field notes, for the specific area, relating to monument referencing, before beginning clearing, grubbing or excavation.

**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 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.

### **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 Item G-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 – Contingent Sum



## **ITEM G-150 EQUIPMENT RENTAL**

### **DESCRIPTION**

**150-1.1** This item consists of furnishing construction equipment, operated, fueled and maintained, on a rental basis for use in construction of the proposed improvements and in performing work incidental to construction at the direction of the Engineer as such work is generally defined in these Plans and Specifications. Construction equipment is defined as that equipment actually used for performing the items of work specified and shall not include support equipment such as, but not limited to, hand tools, power tools, electric power generators, welders, small air compressors and other shop equipment needed for maintenance of the construction equipment.

### **REQUIREMENTS**

**150-2.1 EQUIPMENT FURNISHED.** The construction equipment to be provided under this contract shall be that shown in the Special Provisions 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 - per hour

## 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 ACRONYMS 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 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.

**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 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 inside and outside the project limits, 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 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 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 project limits 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 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 waive the permit requirements of regulation 17 AAC 25 regarding oversize and overweight vehicle within the project limits when the contractor submits and follows an acceptable 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 traffic control plan for hauling operations from the material site(s) to the project. Include all the traffic control devices required for these operations in the 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 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 flaggers as specified by the 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 flaggers will be in addition to flaggers required by FAA Advisory Circular 150/5370-2E, 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, 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.

#### **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 RATE SCHEDULE

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

- 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 per hour for this contract. The Engineer does not require a change order/directive for this pay item.
- 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.
- 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/](http://www.faa.gov/airports_airtraffic/airports/construction/)

### ITEM FAA AC 150/

- |   |         |
|---|---------|
| <b>(1) Constant Current Regulator, L-828,</b> class, style, and size as indicated on Plans, 60 Hz input, with brightness control for remote operation.  | 5345-10 |
| <b>(2) Runway Edge Light, Bi-directional High-Intensity, L-862,</b> 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 |
| <b>(3) Runway Edge Light, Medium Intensity, L-861,</b> and Threshold Light, L-861E, with incandescent 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 |
| <b>(4) Taxiway Edge Light, Medium Intensity, L861T,</b> with incandescent 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 |
| <b>(5) Airport Signs, L-858,</b> internally lighted.  | 5345-44 |
| <b>(6) Airport Signs, L-858,</b> unlighted.   | 5345-44 |
| <b>(7) Airport Light Base, L-867,</b> 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**, 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. 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) **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
- (15) **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
- (16) **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
- (17) **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
- (18) **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

**(19) Handhole, L-867, Size B, 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-87, 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/ft<sup>3</sup>, 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 ANSI 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.

## 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 insulating 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.** 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 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. As-built plans shall include complete wiring diagrams, (both power and control), identifying terminals, cables, and connections. As-built plans shall be kept current as the work progresses.

**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.

#### **100-4.1 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, conduit, and ground rods is paid for under Items L-108, and L-110.

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

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

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

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

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-100o, Power or Communications Pedestal: Includes anchor stake and conduits as shown.

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

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

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-100l	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

## **MATERIAL REQUIREMENTS**

AC 150/5345-10	<i>Constant Current Regulators and Regulator Monitors</i>
AC 150/5345-42	<i>Airport Light Bases, Transformer Houses, Junction Boxes and Accessories</i>
AC 150/5345-44	<i>Taxiway and Runway Signs</i>
AC 150/5345-46	<i>Runway and Taxiway Light Fixtures</i>
AC 150/5345-47	<i>Isolation Transformers for Airport Lighting Systems</i>
AC 150/5345-49	<i>L-854, Radio Control Equipment</i>
AC 150/5345-53	<i>Airport Lighting Equipment Certification Program</i>
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/](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 ready-mixed 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 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 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 ready-mixed paint for body coats.
- b. Finish coats (for both wood and steel surfaces) - the ready-mixed paint shall be used as it comes from the container for finish coats.

**101-3.14 TESTING.** The installation shall be fully tested in operation as a completed unit prior to acceptance. These tests shall include operation of the lamp-changer and 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.

#### **BASIS OF PAYMENT**

**101-5.1** Payment will be made at the contract unit price for each completed and accepted job.

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	<i>L-824 Underground Cable for Airport Lighting Circuits</i>
AC 150/5345-12	<i>Airport and Heliport Beacons</i>
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-103 BEACON TOWER

### DESCRIPTION

**103-1.1** This item shall consist of furnishing and installing an airport beacon tower according to these specifications. This work shall include the clearing of the site, erection of the tower, installation of lightning protection, painting, and all incidentals necessary to place it in operating condition as a completed unit to the satisfaction of the Engineer.

### EQUIPMENT AND MATERIALS

**103-2.1 GENERAL.** All equipment and materials covered by referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

**103-2.2 TOWER.** The beacon tower shall conform to the requirements of AC 150/5340-30, *Design and Installation Details for Airport Visual Aids*, Chapter 6. The tower and foundation shall be designed according to the International Building Code, for a basic wind speed of 120 mph (3 second gust), exposure category C or D (use D if next to large bodies of open water or a coastal area), importance factor III. Verify the structure is capable of withstanding snow and earthquake loads. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and submit them to the Department for review.

The beacon tower shall be either of the following:

- a. **Fixed Tubular Steel Tower.** The tubular steel tower shall be formed of 60,000 psi (Grade 60) ASTM A 572 steel, with galvanized prime and painted finish.
- b. **Hinged Pole Tower.** The beacon tower shall be a galvanized hinged steel pole with painted finish. Provide a pole formed of high strength 50,000 psi (Grade 50) ASTM A 572 steel. The pole shall be self-supporting without the use of guide wires, of the height specified in the bid schedule, and have a winch with an automatic brake and a removable hand crank or other approved mechanism to lower the top of the beacon pole to ground level. Provide a counterweighted top section with a tall, sturdy mounting platform for the rotating beacon. Ensure that the beacon pole tower components and assemblies, are designed and rated to meet design loads.

**103-2.3 LIGHTNING ROD.** The lightning rod shall consist of a galvanized steel, copper, or copper-clad rod with the upper end drawn to a point and of sufficient length to extend from the point of fastening to not less than 6 inches above the top of the beacon.

**103-2.4 DOWN CONDUCTOR.** The down conductor cable for lightning protection shall consist of No. 8 AWG or larger bare stranded copper wire.

**103-2.5 GROUND ROD.** The ground rod shall be  $\frac{3}{4}$  inch diameter by 10-foot long, made of copper or copper clad metal.

**103-2.6 GROUND CLAMP.** Ground clamp shall be similar and equal to the Type GR as manufactured by FCI.

### 103-2.7 PAINT.

- a. Priming paint for galvanized steel towers 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.
- b. Priming paint for ungalvanized steel towers shall be a high solids alkyd primer conforming to Fed. Spec. TT-P-664D.

- c. Orange paint for the body and finished coats on metal and wood surfaces shall consist of a ready-mixed nonfading paint meeting the requirements of Fed. Spec. TT-E-489. The color shall be according to Federal Standard 595, Aviation Gloss Orange, Number 12197.
- d. White paint for steel tower shall be ready-mixed paint conforming to Commercial Item Description A-A-3067.

**103-2.8 FOUNDATION.** Design the foundation based on the soil bearing capacity of the soils located at the pole site (using a factor of safety of 3 or more) and design loads on the beacon tower. Provide a foundation that is adjustable by tightening or loosening bolts with a wrench and adjusts within a minimum 5-degree tolerance without compromising the wind rating. Design the foundation as necessary to resist pole lateral, uplift, and overturning forces. A professional engineer registered in the State of Alaska shall stamp the design and calculations, and shall demonstrate the foundation design is adequate to support the specified loads and resist forces. Submit the design and calculations to the Department for review.

## **CONSTRUCTION METHODS**

**103-3.1 CLEARING AND GRADING.** The site on which the beacon tower is to be erected shall be cleared and leveled. All trees and brush shall be removed from the area within a distance of 25 feet from the tower or as called for in the Plans. Stumps shall be removed to a depth of 1-1/2 feet below finished grade and the excavation filled with earth and tamped. If a transformer vault or other structure is included as part of the installation, the area shall be cleared to a distance of 25 feet from these structures. The ground near the tower shall be leveled to permit the operation of mowing machines. The leveling shall extend at least 2 feet outside the tower legs. All debris removed from the tower site shall be disposed of by the Contractor to the satisfaction of the Engineer and according to Federal, state, or local regulations.

**103-3.2 EXCAVATION AND FILL.** Excavation for the tower footings or base shall be carried to a minimum of 4 inches below the footing depth. The excess excavation below the footing depth shall then be backfilled with gravel or crushed stone meeting the requirements of either P-154, P-208, or P-209 and compacted to the required level. The footing plates shall be installed, and a thickness of not less than 18 inches of the same gravel or crushed stone shall be placed immediately above the footing plates in layers of not over 6 inches. Each layer above the footing plates shall be thoroughly tamped in place. The remainder of the backfill may be of excavated earth placed in layers not to exceed 6 inches. Each layer shall be thoroughly compacted by tamping.

Where solid rock is encountered, which prevents the carrying of the foundation legs to the required depth but which is of sufficient strength to use holddown bolts, the tower anchor posts shall be cut off at the required length and the holddown bolts shall be installed as indicated in the Plans with the approval of the Engineer. Each tower leg shall be anchored to the rock by means of two 7/8 inch diameter by 3 foot long expansion or split bolts and shall be grouted with neat portland cement into holes drilled into the natural rock. Except as required for rock foundations, the footing members shall not be cut off or shortened. If excavated material is of such character that it will not readily compact when backfilled, the Engineer may order the excavation backfilled with concrete or other suitable material.

The concrete footing for fixed towers shall be installed according to the manufacturer's recommendations. Portions of the footing in the topsoil layer shall not be included in the footing height.

Concrete foundation for hinged pole shall be as shown on the Plans. Concrete shall meet the requirements of P-610, Structural Portland Cement Concrete. Do not grout between the base plate and the foundation, allow air to circulate through the pole to prevent moisture accumulation.

**103-3.3 ERECTION.** Detail erection drawings furnished by the manufacturer shall be strictly followed during construction.

Fixed towers shall be erected in sections from the ground up unless otherwise specified. In final assembly, all bolts and fastenings shall be installed, and the structure shall be plumb, true, square, and level. Nuts shall be taken up to a firm bearing after which the bolts shall, if necessary, be cut to proper length to protrude three full threads. Approved locknuts shall be placed on each bolt over the regular nut. Ladder bolts shall be inserted with the head to the outer face of the tower. Diagonal, leg, and handrail bolts shall be installed with nuts on the outer face of the tower, unless otherwise specified. Bent parts shall be straightened before erection without damage to the protective coating. Surfaces abraded or bared of protective coating shall be painted with the proper priming paint as specified in these specifications.

The Contractor shall install the ladder on the side of the tower adjacent to the driveway or most accessible approach to the tower. Tubular beacon towers shall be erected according to the manufacturer's recommendations. The safety cable shall be located on the side of the tower adjacent to the driveway or most accessible approach to the tower.

**103-3.4 LIGHTNING PROTECTION.** The Contractor shall furnish and install a lightning rod, down conductor, and at least one ground plate or rod for each beacon tower. The lightning rod shall be installed at the top of the tower with the tip of the rod extending not less than 6 inches above the top of the beacon.

Down-conductor cables shall be securely fastened to the surface of the tower leg at 5-foot intervals with suitable bronze fasteners having bronze or noncorrosive metal bolts. Sharp turns or bends in the down conductor will not be permitted.

All connections of cable to cable, cable to lightning rods, and cable to ground plates or rods shall be made with approved type solderless connectors or noncorrosive metal and shall be of substantial construction.

The down-conductor cable shall be securely attached to ground rods or plates placed at least 2 feet away from the tower foundations. The ground rod shall be driven into the ground so that the top is at least 0.5 foot below grade. The down-conductor shall be firmly attached to the ground plate or rod by means of a ground connector or clamp. Plates shall be embedded in the area of permanent moisture.

The complete lightning protection installation shall be accomplished to the satisfaction of the Engineer. The resistance to ground of any part of the lightning protection system shall not exceed 25 ohms.

**103-3.5 PAINTING.** The Contractor shall furnish all materials and labor for painting the beacon tower. The color scheme for the steel tower shall be five equal spaces of alternating orange and white paint.

- a. **Parts to be Painted.** Tower parts (except those parts to be exposed to earth) shall not be treated or primed before erection. All tower parts placed below ground level or within 12 inches above ground level shall be given two coats of approved bituminous paint.

The paint shall be applied uniformly in the proper consistency by skilled painters. The finished paint shall be free from sags, holidays, and smears. Division lines between colors shall be sharply defined. Each coat of paint shall be given ample time to dry and harden before the next coat is applied. A minimum of 4 days shall be allowed for drying on metal surfaces. Painting shall not be done in cold, damp, foggy, dusty, or frosty atmospheres, or when air temperature is below 40 °F, nor started when the weather forecast indicates such conditions for the day.

All surfaces shall be cleaned before painting. The surfaces shall be dry and free from scale, grease, rust, dust, and dirt when paint is applied.

The number of coats of paint applied shall be according to the following instructions:

- b. **Steel Towers, Galvanized.** One priming coat of zinc dust-zinc oxide primer after erection and one body and one finish of white or orange paint (as required by the color scheme) applied after erection.

- c. **Steel Towers, Not Galvanized.** One priming coat of corrosion-inhibiting primer and one body and one finish coat of white or orange paint (as required by the color scheme) applied after erection.

The above specified orange and white ready-mixed paints shall be thinned for the body coats according to the manufacturer's recommendations. In the absence of such recommendations, the following shall apply:

- d. **Body Coats.** Add not more than 1/2 pint of turpentine to each gallon of ready-mixed paint.
- e. **Finish Coats.** The ready-mixed paint shall be used as it comes from the container.

#### METHOD OF MEASUREMENT

**103-4.1** The quantity to be paid for under this item will be the number of airport beacon towers installed as completed units, in place and accepted.

#### BASIS OF PAYMENT

**103-5.1** Payment will be made at the contract unit price for each completed and accepted job.

Payment will be made under:

Item L-103a	[Height] Hinged Pole Beacon Tower - per each
Item L-103b	[Height] Fixed Tubular Steel Beacon Tower - per each

#### MATERIAL REQUIREMENTS

AC 150/5340-30	<i>Design and Installation Details for Airport Visual Aids</i>
ASTM A 572	High-Strength Low-Alloy Columbium-Vanadium Structural Steel
Commercial Item Description A-A-3067	Paint, Alkyd, Exterior, Low VOC
Fed. Spec. TT-E-489	Enamel, Alkyd, Gloss, Low VOC Content
Fed. Spec. TT-P-664D	Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant
Fed. Std. 595	Colors
MIL-P-24441/19B	Paint, Epoxy-Polyamide, Zinc Primer, Formula 159, Type III

## 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 [http://www.faa.gov/airports\\_airtraffic/airports/construction/](http://www.faa.gov/airports_airtraffic/airports/construction/).
- b. All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

**107-2.2 WIND CONES.** The 8-foot and 12-foot wind cones and assemblies shall conform to the requirements of AC 150/5345-27, Specification for Wind Cone Assemblies. The pole shall be a steel pole hinged in the middle.

- a. Type L-807, Style I, Size 1, externally lighted wind cone.
- b. Type L-807, Style I, Size 2, externally lighted wind cone.
- c. Type L-807, Style II, Size 1, unlighted wind cone.
- d. 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.** 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 Plans.

- 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 four 200-W, 115-V general lighting service lamps in the reflectors for the 12-foot 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.

**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.

#### **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	8-foot Lighted Wind Cone, in place - per each
Item 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/](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, 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. 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. 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-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 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. 8 AWG minimum size, shall be installed for lightning protection of the underground cables. The bare counterpoise wire shall be installed in the same trench for the entire length of the insulated cables it is designed to protect, and shall be placed at a distance of approximately 4 inches from the insulated cable. The counterpoise wire shall be securely attached to each light fixture base, or mounting stake. The counterpoise wire shall also be securely attached to copper or copper-clad ground rods installed not more than 1,000 feet apart around the entire circuit. The 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 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.** 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 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 megohms. Where additions 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 the insulation resistance to ground of all nongrounded conductors of multiple circuits is not less than 50 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.

**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 [Gauge] 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	[Gauge] Bare Copper Ground Conductor - per linear foot*
Item L-108d	[Gauge] Bare Copper Ground Conductor - per lump sum
Item L-108e	Underground Cable, [Gauge] AWG 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*

Item L-108i	Underground cable #14 AWG, 2 Conductor, copper, 600V, Type "SOOW-A/SOOW", - per lump sum
Item 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	<i>L-824 Underground Electrical Cable for Airport Lighting Circuits</i>
AC 150/5345-26	<i>L-823 Plug and Receptacle Cable Connectors</i>
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/](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 a high solids alkyd primer conforming to TT-P-644D
- 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.
- 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. 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, 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, 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/ft<sup>3</sup>. 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 core-to-facing bond to be equal or greater than the cohesive strength of the core.

**b. Insulation core.**

- (1) Factory foamed-in-place polyurethane between facings. Insulating value of the composite roof system shall be equal to or greater than R-38, and the wall system equal to or greater than R-19. No voids are allowed in the core.

- (2) Polyurethane shall have a minimum 2 lbs/ft<sup>3</sup> 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.

- 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-in-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, 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, QOM2100VH main breaker and 4-jaw kWh meter. The service entrance enclosure shall be raintight NEMA 3R rated with a conduit entry hub fitting on top.

The service entrance disconnect switch shall be mounted on the Snow Removal Equipment Building as shown on the Plans. Disconnect switch shall be 100 A, 240 V, 3-wire (third blade not used), S/N, with NEMA 3R enclosure, non-fused, with field installation kit.

**109-2.35 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** The quantity of electrical enclosures to be paid for under this item shall consist of the number of enclosures constructed in place and accepted as a complete unit.

**109-4.4** The quantity of electrical equipment installed in an existing structure (vault, prefabricated metal housing electrical enclosure or building) to be paid for under this item shall consist of all equipment installed, connected, and accepted as a complete unit ready for operation.

#### **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
Item L-109b	Prefabricated Metal Housing and Foundation in Place - per each
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	<i>Prefabricated Metal Housing for Electrical Equipment</i>
AC 150/5345-3	<i>L-821 Panels for Remote Control of Airport Lighting</i>
AC 150/5345-5	<i>Circuit Selector Switch</i>
AC 150/5345-7	<i>L-824 Underground Electrical Cable for Airport Lighting Circuits</i>
AC 150/5345-10	<i>Constant Current Regulators and Regulator Monitors</i>
AC 150/5345-13A	<i>L-841 Auxiliary Relay Cabinet Assembly for Pilot Control of Airport Lighting Circuits</i>
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	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)

## 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. 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. 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.

**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 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.

A layer of sand, at least 4 inches thick (loose measurement) shall be placed in the bottom of the trench as bedding for the duct. The bedding material shall consist of sand, and it shall contain no particles that would be retained on a 1/4-inch sieve. The bedding material shall be tamped until firm.

Unless otherwise shown in Plans, ducts for direct burial shall be installed so that the tops of all ducts are at least 1.5 feet below the finished grade.



When two or more ducts are installed in the same trench without concrete encasement, they shall be spaced not less than 2 inches apart (measured from outside wall to outside wall) in a horizontal direction and not less than 6 inches apart in a vertical direction.

Trenches shall be opened the complete length before duct is installed so that if any obstructions are encountered, proper provisions can be made to avoid them.

**110-3.4 PVC CONDUIT.** Install PVC conduit where indicated on the Plans.

Fabricate the conduit runs as recommended by the conduit manufacturer. Make all joints square, tight, and leakproof. Do not allow bends or breaks in the joints. Use only solvents and cements, which are specifically recommended by the conduit manufacturer. Join together the complete run between each light base alongside the trench. Place in the trench and connect to the base assembly after the minimum cure time of the joint cement has elapsed and after inspection and approval is granted by the Engineer.

Make field cuts of the conduit true and square with a tool or lathe designed for the purpose. Debur and ream the conduit as required.

Bend PVC conduit at the job site only with a "Hot Box" or as recommended by the conduit manufacturer. Heat the conduit uniformly to obtain smooth bends without overheating. Conduit with a brown appearance shall not be used. Conduit with extremely sharp bends, kinks in the bends or which exhibits a significant visual defect shall not be used.

Install expansion fittings in each run of conduit between light base assemblies, at spacing not exceeding 60 feet. The expansion fitting shall be of the same manufacturer as the conduit and shall be installed according to the manufacturer's instruction. Expansion joints shall be installed a maximum of 10 feet from the edge light bases or hand holes and shall be installed with joints 1/4 inch expanded, resulting in a minimum requirement of four expansion joints per 190-foot run of conduit.

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 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. Sand shall be placed to provide a minimum of 2 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 inch Rigid Steel Conduit - per linear foot
Item L-110b	2-1/8 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 PE Conduit - per linear foot
Item L-110h	2-inch PE 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

#### **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 L-119 OBSTRUCTION LIGHTS

### DESCRIPTION

**119-1.1** This item shall consist of furnishing and installing obstruction lights according to these specifications. Included in this item shall be the furnishing and installing of wood poles, steel or iron pipes, or other supports as required in the Plans or specifications.

This item shall also include all wire and cable connections, the furnishing and installing of all necessary conduits and fittings, insulators, pole steps, pole crossarms, and the painting of poles and pipes. In addition, it includes the furnishing and installing of all lamps and, if required, the furnishing and installing of insulating transformers, the servicing and testing of the installation and all incidentals necessary to place the lights in operation as completed units to the satisfaction of the Engineer.

### EQUIPMENT AND MATERIALS

#### 119-2.1 GENERAL.

- a. Airport lighting equipment and materials covered by FAA specifications shall be certified and listed according to 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/](http://www.faa.gov/airports_airtraffic/airports/construction/).
- b. All other equipment and materials covered by other reference specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the Engineer.

**119-2.2 OBSTRUCTION LIGHTS.** The obstruction lights shall conform to the requirements of AC 150/5345-43, Specification for Obstruction Lighting Equipment.

**119-2.3 INSULATING TRANSFORMERS.** Where required for series circuits, the insulating transformers shall conform to the requirements of AC 150/5345-47, Isolation Transformers for Airport Lighting Systems.

**119-2.4 TRANSFORMER HOUSING.** Transformer housings, if specified, shall conform to AC 150/5345-42, Specification for Airport Light Base and Transformer Housings, Junction Boxes, and Accessories.

**119-2.5 CONDUIT.** Steel conduit and fittings shall be according to UL Standard 6, 514, and 1242.

**119-2.6 WIRES.** Wires in conduit rated up to 5,000 volts 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 volts, 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. Overhead line wire from pole to pole, where specified, shall conform to ANSI/ICEA S-70-547.

**119-2.7 MISCELLANEOUS.** Paint, poles, pole steps, insulators, and all other miscellaneous materials necessary for the completion of this item shall be new and first-grade commercial products. These products shall be as specified in the Plans or specifications.

### CONSTRUCTION METHODS

**119-3.1 PLACING THE OBSTRUCTION LIGHTS.** The Contractor shall furnish and install single- or double-obstruction lights as specified and shown in the Plans. The obstruction lights shall be mounted on poles,

buildings, or towers approximately at the location shown in the Plans. The exact location shall be as directed by the Engineer.

**119-3.2 INSTALLATION ON POLES.** Where obstruction lights are to be mounted on poles, each obstruction light shall be installed with its hub at least as high as the top of the pole. All wiring shall be run in not less than 1 inch galvanized rigid steel conduit. If specified, pole steps shall be furnished and installed, the lowest step being 5 feet above ground level. Steps shall be installed alternately on diametrically opposite sides of the pole to give a rise of 18 inches for each step. Conduit shall be fastened to the pole with galvanized steel pipe straps and shall be secured by galvanized lag screws. Poles shall be painted as shown in the Plans and specifications.

When obstruction lights are installed on existing telephone or power poles, a large fiber insulating sleeve of adequate diameter and not less than 4 feet long, shall be installed to extend 6 inches above the conductors on the upper crossarm. In addition, the sleeve shall be at least 18 inches below the conductors on the lower crossarm. The details of this installation shall be according to the Plans.

**119-3.3 INSTALLATION ON BEACON TOWER.** Where obstruction lights are installed on a beacon tower, two obstruction lights shall be mounted on top of the beacon tower using 1-inch conduit. The conduit shall screw directly into the obstruction light fixtures and shall support them at a height of not less than 4 inches above the top of the rotating beacon. If obstruction lights are specified at lower levels, the Contractor shall install not less than 1/2-inch galvanized rigid steel conduit with standard conduit fittings for mounting the fixtures. The fixtures shall be mounted in an upright position in all cases. The conduit shall be fastened to the tower members with "wraplock" straps, clamps, or approved fasteners spaced approximately 5 feet apart. Three coats of aviation-orange paint shall be applied (one prime, one body, and one finish coat) to all exposed material installed.

**119-3.4 INSTALLATION ON BUILDINGS, TOWERS, SMOKESTACKS, ETC.** Where obstruction lights are to be installed on buildings or similar structures, the installation shall be made according to details shown in the Plans. The hub of the obstruction light shall be not less than 12 inches above the highest point of the obstruction except in the case of smokestacks where the uppermost units shall be mounted not less than 5 feet, nor more than 10 feet below the top of the stack. Conduit supporting the obstruction light units shall be fastened to wooden structures with galvanized steel pipe straps and shall be secured by 1-1/2-inch No. 10 galvanized wood screws. Conduit shall be fastened to masonry structures by the use of expansion shields, screw anchors, or toggle bolts using No. 10, or larger, galvanized wood or machine screws. Conduit fastened to structural steel shall have the straps held with not less than No. 10 roundhead machine screws in drilled and tapped holes. Fastenings shall be approximately 5 feet apart. Three coats of aviation-orange paint shall be applied (one prime, one body, and one finish coat) to all exposed material installed.

**119-3.5 SERIES INSULATING TRANSFORMERS.** The L-810 series obstruction light does not include a film cutout; therefore, an insulating transformer is required with each series lamp. Double series units of this type require two series insulating transformers. The transformer shall be housed in a base or buried directly in the earth according to the details shown in the Plans.

**119-3.6 WIRING.** The Contractor shall furnish all necessary labor and materials and shall make complete electrical connections from the underground cable or other source of power according to the wiring diagram furnished with the project plans. If underground cable is required for the power feed and if duct is required under paved areas, the cable and duct shall be installed according to (and paid for) under Item L-108, Underground Cable, and Item L-110, Underground Electrical Duct.

**119-3.7 LAMPS.** The Contractor shall furnish and install in each unit one or two lamps, as required, conforming to the following requirements:

- a. Series lamp: 6.6 ampere, 1020-lumen, a-21 clear bulb, medium prefocus base.
- b. Multiple lamp: 100, 107, or 116 watts; 115, 120, or 125 volts; a-21 clear bulb, medium screw base.

**119-3.8 TESTS.** The installation shall be fully tested by continuous operation for not less than 1/2 hour as a completed unit prior to acceptance. These tests shall include the functioning of each control not less than 10 times.

**119-3.9 GUARANTEE.** Furnish a written guarantee that any materials or workmanship found defective within one year of final acceptance shall be replaced at no additional cost to the Department, promptly upon notifications and to the satisfaction of the Engineer.

#### **METHOD OF MEASUREMENT**

**119-4.1** The quantity of lights to be paid for under this item will be the number of single- or double-type obstruction lights installed and accepted as completed units, in place, ready for operation.

#### **BASIS OF PAYMENT**

**119-5.1** Payment will be made at the contract unit price for each completed obstruction light installed, in place by the Contractor, and accepted by the Engineer.

Payment will be made under:

Item L-119a      Obstruction Light - per each

#### **MATERIAL REQUIREMENTS**

AC 150/5345-7	L-824 Underground Electrical Cable for Airport Lighting Circuits
AC 150/5345-42	Airport Light Base and Transformer Housings, Junction Boxes, and Accessories
AC 150/5345-43	Obstruction Lighting Equipment
AC 150/5345-47	Isolation Transformers for Airport Lighting Systems
ANSI/ICEA S-70-547	Weather-Resistant Polyolefin-Covered Wire and Cable
Fed.Spec.J-C-30	Cable and Wire, Electrical (Power, Fixed Installation)

## ITEM P-151 CLEARING AND GRUBBING

### DESCRIPTION

**151-1.1** This item shall consist of clearing or clearing and grubbing, including the disposal of materials, for all areas within the limits designated on the Plans or as required by the Engineer.

Clearing shall consist of the cutting and removal of all trees, stumps, brush, logs, hedges, the removal of fences and other loose or projecting material from the designated areas. The grubbing of stumps and roots will not be required.

Clearing and grubbing shall consist of clearing the surface of the ground of the designated areas of all trees, stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or weeds, fences, structures, debris, and rubbish of any nature, natural obstructions or such material which in the opinion of the Engineer is unsuitable for the foundation of strips, pavements, or other required structures, including the grubbing of stumps, roots, matted roots, foundations, and the disposal from the project of all spoil materials resulting from clearing and grubbing by burning or otherwise.

### CONSTRUCTION METHODS

**151-2.1 GENERAL.** The areas denoted on the Plans to be cleared or cleared and grubbed shall be staked or otherwise marked on the ground at the direction of the Engineer. The clearing and grubbing shall be done far enough ahead of the earthwork operation to permit cross-sectioning prior to excavation or embankment. Mechanical brush cutting equipment may be used for clearing. Dozers or other mechanical equipment not specifically designed for brush cutting may not be used.

Debris from mechanical brush cutting equipment less than 4 feet long by 4 inches in diameter may remain in place outside of Runway and Taxiway Safety Area surfaces except as specified in areas to be embanked. All other spoil materials generated by clearing or by clearing and grubbing shall be disposed of by burning, when permitted by local laws, or by removal to approved disposal areas. When burning of material is permitted, it shall be burned under the constant care of competent watchmen so that the surrounding vegetation and other adjacent property will not be jeopardized. Burning shall be done according to all applicable laws, ordinances, and regulations. Before starting any burning operations, the Contractor shall notify the agency having jurisdiction.

As far as practicable, waste concrete and masonry shall be placed on slopes of embankments or channels. When embankments are constructed of such material, this material shall be placed according to requirements for formation of embankments. Any broken concrete or masonry which cannot be used in construction, and all other materials not considered suitable for use elsewhere, shall be disposed of by the Contractor. In no case shall any discarded materials be left in windrows or piles adjacent to or within the airport limits. The manner and location of disposal of materials shall be subject to the approval of the Engineer and shall not create an unsightly or objectionable view. When the Contractor is required to locate a disposal area outside the airport property limits at their own expense, the Contractor shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

If the Plans or the Specifications require the saving of merchantable timber, the Contractor shall trim the limbs and tops from designated trees, saw them into suitable lengths, and make the material available for removal by others.

Any blasting necessary shall be done at the Contractor's responsibility, and the utmost care shall be taken not to endanger life or property.

The Contractor shall remove existing structure and utilities that are identified to be removed or demolished, except when another entity is identified in the Contract to accomplish the work.

**151-2.2 CLEARING.** The Contractor shall clear the staked or indicated area of all objectionable materials. Trees unavoidably falling outside the specified limits must be cut up, removed, and disposed of in a satisfactory manner. In order to minimize damage to trees that are to be left standing, trees shall be felled toward the center of area being cleared. The Contractor shall preserve and protect from injury all trees not to be removed. The trees, stumps, and brush shall be cut to a height of not more than 12 inches above the ground. The grubbing of stumps and roots will not be required.

Fences shall be removed and disposed of when directed by the Engineer. Fence wire shall be neatly rolled and the wire and posts stored on the airport if they are to be used again, or stored at a designated location if the fence is to remain the property of a local owner.

**151-2.3 CLEARING AND GRUBBING.** In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 4.0 feet in depth are to be made outside of paved areas. In cases where such depth of embankments is to be made, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off within 6 inches above the ground and allowed to remain. Tap roots and other projections over 1.5 inches in diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or slope elevation.

Any buildings and miscellaneous structures that are shown on the Plans to be removed shall be demolished or removed, and all materials therefrom shall be disposed of either by burning or otherwise removed from the site. The remaining or existing foundations, wells, cesspools, and all like structures shall be destroyed by breaking down the materials of which the foundations, wells, cesspools, etc., are built to a depth at least 2 feet below the existing surrounding ground. Any broken concrete, blocks, or other objectionable material which cannot be used in backfill shall be removed and disposed of. The holes or openings shall be backfilled with acceptable material and properly compacted.

All holes remaining after the grubbing operation in embankment areas shall have the sides broken down to flatten out the slopes, and shall be filled with suitable material, moistened and properly compacted in layers to the density required in Item P-152. The same construction procedure shall be applied to all holes remaining after grubbing in excavation areas where the depth of holes exceeds the depth of the proposed excavation.

## **METHOD OF MEASUREMENT**

**151-3.1** Measure according to Section GCP-90 and the following:

- a. Acre.** The area acceptably cleared, or cleared and grubbed, measured on the ground surface. Only areas shown on the Plans, or areas cleared at the Engineer's direction will be measured. Islands of existing cleared areas, such as lakes, ponds, existing stream beds, and roads and trails within the clearing limits of more than 60 square yards will not be included as pay areas.
- b. Each.** The number of designated trees acceptably removed, regardless of size.

## **BASIS OF PAYMENT**

**151-4.1** The accepted quantities of clearing or clearing and grubbing will be paid for at the contract unit price, per unit of measurement, for each of the pay items listed below that are shown in the bid schedule.

Payment will be made under:

Item P-151a	Clearing - per acre
Item P-151b	Clearing - lump sum
Item P-151c	Clearing & Grubbing - per acre
Item P-151d	Clearing & Grubbing - lump sum
Item P-151e	Selective Tree Removal – per each



## ITEM P-152 EXCAVATION AND EMBANKMENT

### DESCRIPTION

**152-1.1** This item consists of excavation, hauling, embankment (or waste disposal), placement, grading and compaction of all materials required to construct runway safety areas, taxiway safety areas, runways, taxiways, aprons, drainage, buildings, roadways, parking, and other work. Construct according to the specifications, and conform to the dimensions and typical sections shown on the Plans.

### 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.

**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.

*(note: this Subsection can be changed by the regions to fit the project, with FAA approval)*

## **CONSTRUCTION METHODS**

**152-3.1 GENERAL.** Perform all necessary clearing and grubbing, and construction surveying including staking of lines and grades, prior to beginning excavation, grading, and embankment operations in any area.

The suitability of material to be placed in embankments shall be subject to approval by the Engineer. Material with organics, when approved by the Engineer as suitable to support vegetation, may be used on top of the embankment slope.

Unsuitable material shall be disposed of in waste areas shown on the Plans or in locations acceptable to the Engineer. Material contaminated by hazardous substances shall require special handling and disposal, performed according to 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.

- 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.

**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 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 turbing 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) 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.

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 7400.2E *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 shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross section, unless otherwise approved by the Engineer.

The grading and compaction operations shall be conducted, and the various soil strata shall be placed, to produce an embankment as shown on the typical cross section or as directed by the Engineer. Materials such as brush, hedge, roots, stumps, grass and other unsuitable material, shall not be incorporated or buried in the embankment.

- a. **Suspension of Operations.** Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, moisture content or other unsatisfactory conditions of the field. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.
- b. **Soft Foundations.** When embankments are to be constructed across wet or swampy ground, which will not support the weight of heavy hauling and spreading equipment, the Contractor shall use methods of embankment construction, and use hauling and spreading equipment, that will least disturb the soft foundation (defined as having a California Bearing Ratio less than 3). When soft foundations are encountered, and when approved by the Engineer, the lower part of the fill may be constructed by dumping and spreading successive vehicle loads in a uniformly distributed layer of a thickness not greater than that necessary to support the vehicle while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified. The Contractor shall not be required to compact the soft foundation, and at the Engineer's option, may not be required to clear and grub.
- c. **Moisture.** The material in the layer being placed shall be within  $\pm 2\%$  of optimum moisture content before rolling to obtain the prescribed compaction. In order to achieve a uniform moisture content throughout the layer, wetting or drying of the material and manipulation shall be performed when necessary. Should the material be too wet to permit proper compaction or rolling, all work on all of the affected portions of the embankment shall be delayed until the material has dried to the required moisture content. Watering of dry material to obtain the proper moisture content shall be done with approved equipment that will sufficiently distribute the water. Sufficient equipment to furnish the required water shall be available at all times.

- d. **Compaction.** Rolling operations shall be continued until the embankment is compacted to not less than 95% of maximum density as determined by 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 100% 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.

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, diskings, 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. 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.

### **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, diskings, watering, mixing, sloping, grading, and other necessary operations for construction of embankments, or waste disposal, are subsidiary and shall be included in the contract unit prices.

**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.

Payment will be made under:

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

#### **TESTING REQUIREMENTS**

ATM 212	Standard Density of Coarse Granular Materials using the Vibratory Compactor
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.

**TABLE 1. AGGREGATE GRADATION REQUIREMENTS**

Sieve designation (Square opening)	Percentage by weight passing sieves
3 inch	100
No. 8	30-70
No. 50	0-30
No. 200	0-6

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 fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so that the course will not deform under the traffic of the construction equipment. The addition of the binding medium to the subbase material shall not increase the soil constants of that material above the limits specified.

**154-3.2 PREPARING UNDERLYING COURSE.** Before any subbase material is placed, the underlying course shall be prepared and conditioned as specified. The course shall be checked and accepted by the Engineer before placing and spreading operations are started.

To protect the subgrade and to ensure proper drainage, the spreading of the subbase shall begin along the centerline of the pavement on a crowned section or on the high side of pavements with a one-way slope.

**154-3.3 MATERIALS ACCEPTANCE IN EXISTING CONDITION.** When the entire subbase material is secured in a uniform and satisfactory condition, such approved material may be moved directly to the spreading equipment for placing. The material may be obtained from gravel pits, stockpiles, or may be produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The moisture content of the material shall be approximately that required to obtain maximum density. The final operation shall be blading or dragging, if necessary, to obtain a smooth uniform surface true to line and grade.

**154-3.4 GENERAL METHODS FOR PLACING.** When materials from several sources are to be blended and mixed, the subbase material, together with any blended material, shall be thoroughly mixed prior to placing on grade.

The subbase course shall be constructed in layers. Any layer shall be not less than 3 inches nor more than 8 inches of compacted thickness. The material, as spread, shall be of uniform gradation with no pockets of fine or coarse materials. No material shall be placed in snow or on a soft, muddy, or frozen course.

When more than one layer is required, the construction procedure described herein shall apply similarly to each layer.

During the placing and spreading, sufficient caution shall be exercised to prevent the incorporation of subgrade, shoulder, or foreign material in the subbase course mixture.

**154-3.5 FINISHING AND COMPACTING.** After spreading or mixing, the subbase material shall be thoroughly compacted. Sufficient compactors shall be furnished to adequately handle the rate of placing and spreading of the subbase course. The moisture content of the material shall be approximately that required to obtain maximum density.

The field density of the compacted material shall be not less than 100% 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.

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, recompact, 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 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 Item P-157.

**Active Treatment System Operator.** The Contractor's qualified representative who is responsible for maintaining and operating an active treatment system (as defined in the CGP) for storm water runoff.

**Alaska Certified Erosion and Sediment Control Lead (AK-CESCL).** A person who has completed training, testing, and other requirements of, and is currently certified as, an AK-CESCL from an AK-CESCL Training Program (a program developed under a Memorandum of Understanding between the Department and others). The Department recognizes AK-CESCLs as "qualified personnel" required by the CGP. An AK-CESCL must be recertified every three years.

**Alaska Department of Environmental Conservation (DEC).** 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 DEC 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 establishment of construction materials or equipment storage or maintenance areas (e.g. material piles, borrow area, concrete truck chute washdown, fueling); and industrial activities that may discharge storm water and are directly related to the construction process (e.g. concrete or asphalt batch plants).

**Construction General Permit (CGP).** The permit authorizing storm water discharges from Construction Activities, issued and enforced by DEC. It authorizes stormwater discharges provided permit conditions and water quality standards are met.

**Corps of Engineers Permit (COE Permit).** A U.S. Army Corps of Engineers Permit for construction in waters of the US. Such permit may be issued under Section 10 of the Rivers and Harbors Act of 1899, or Section 404 of the Clean Water Act.

**Electronic Notice of Intent (eNOI).** The electronic Notice of Intent submitted to DEC, to obtain coverage under the CGP.

**Electronic Notice of Termination (eNOT).** The electronic Notice of Termination submitted to DEC, 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.

**Municipal Separate Storm Sewer System (MS4) Permit.** An DEC storm water discharge permit issued to certain local governments and other public bodies for operation of storm water conveyances and drainage systems. See CGP for further definition.

**Multi-Sector General Permit (MSGP).** The 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 storm water associated with construction activity, means any party associated with a construction project that meets either of the following two criteria:

- a. The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or
- b. The party has day to day operational control of those activities at a project which are necessary to ensure compliance with a SWPPP for the site or other permit conditions (e.g. they are authorized to direct workers at a site to carry out activities required by the SWPPP or comply with other permit conditions).

**Pollutant.** Any substance or item meeting the definition of pollutant contained in 40 CFR 122.2. A partial listing from this definition includes: dredged spoil, solid waste, 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.

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.

**Spill Prevention, Control and Countermeasure Plan (SPCC Plan).** The Contractor's detailed plan for petroleum spill prevention and control measures, that meet the requirements of 40 CFR 112.

**Spill Response Field Representative.** The Contractor's representative with authority and responsibility for managing, implementing, and executing the HMCP and SPCC Plan.

**Storm Event.** A rainfall event that produces more than 0.5 inch of precipitation in 24 hours and that is separated from the previous storm event by at least 3 days of dry weather.

**Storm Water Pollution Prevention Plan (SWPPP).** The Contractor's detailed project specific plan to minimize erosion and contain sediment within the Project Zone, and to prevent discharge of pollutants that exceed applicable water quality standards. The SWPPP includes, but is not limited to, amendments, records of activities, inspection schedules and reports, qualifications of key personnel, and all other documentation, required by the CGP and this specification, and other applicable local, state, and federal laws and regulations.

**Storm Water Pollution Prevention Plan Two (SWPPP2).** The Contractor's detailed project specific plan to comply with CGP or MSGP requirements, for Contractor construction-related activities outside the Project Zone.

**Subcontractor Spill Response Coordinator.** The subcontractor's representative with authority and responsibility for coordinating the subcontractor's activities in compliance with the HMCP and SPCC Plan.

**Subcontractor SWPPP Coordinator.** The subcontractor's representative with authority to direct the subcontractor's work, and who is responsible for coordination with the Superintendent and SWPPP Manager, and for the subcontractor's compliance with the SWPPP.

**Superintendent.** The Contractor's duly authorized representative in responsible charge of the work. The Superintendent has responsibility and authority for the overall operation of the Project and for Contractor furnished sites and facilities directly related to the Project.

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

**SWPPP Manager.** The Contractor's qualified representative who conducts Inspections, updates SWPPP records, and has authority to suspend work and to implement corrective actions required for CGP compliance.

**SWPPP Preparer.** The Contractor's qualified representative who is responsible for developing the initial SWPPP.

**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.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.

- a. **Storm Water Pollution Prevention Plan.** Submit an electronic copy and three hard copies of the SWPPP to the Engineer for approval. Deliver these documents to the Engineer at least 21 days before beginning Construction Activity. Organize and bind the SWPPP and related documents for submittal according to the requirements of Subsection 157-2.1.b.

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. See Item d for further SWPPP submittal requirements.

- b. **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.
- c. **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.
- d. **CGP Coverage.** The Contractor is responsible for permitting of Contractor and subcontractor Construction Activities related to the Project. Do not use the SWPPP for Construction Activities outside the Project Zone where the Department is not an operator. Use a SWPPP2 for Construction Activities outside the Project Zone.

After Department approval of the SWPPP and prior to beginning Construction Activity, submit an eNOI with the required fee to DEC for coverage under the Construction General Permit (CGP). Submit a copy of the signed eNOI and DEC’s written acknowledgement (by letter or other document) to the Engineer as soon as practicable and no later than three days after filing eNOI or receiving a written response.

Do not begin Construction Activity until the conditions listed in Subsection 157-3.1.a are completed.

The Department will submit an eNOI to DEC for Construction Activities inside the Project Zone. The Engineer will provide the Contractor with a copy of the Department’s eNOI and DEC’s written acknowledgement (by letter or other document), for inclusion in the SWPPP.

Before Construction Activities occur transmit to the Engineer an electronic copy of the approved and certified SWPPP, with signed Delegations of Signature Authorities, SWPPP Certifications, both permittee’s signed eNOIs and DEC’s written acknowledgement.

- e. **Ending CGP Coverage.** Submit an eNOT to DEC within 30 days after the Engineer has determined the conditions listed in Subsection 157-3.1.f have been met. Submit a copy of the signed eNOT and DEC’s acknowledgement letter to the Department within three days of filing the eNOT or receiving a written response.
- f. **DEC SWPPP Review.** When CGP, Part 2.1.3 requires DEC SWPPP review:
  - (1) Transmit a copy of the Department-approved SWPPP to DEC using delivery receipt confirmation;
  - (2) Transmit a copy of the delivery receipt confirmation to the Engineer within seven days of receiving the confirmation; and
  - (3) Retain a copy of delivery receipt confirmation in the SWPPP.
- g. **Local Government SWPPP Review.** When local government or the CGP, Part 2.1.4 requires local government review:

- (1) Transmit a copy of the Department-approved SWPPP and other information as required to local government, with the required fee. Use delivery receipt confirmation;
- (2) Transmit a copy of the delivery receipt confirmation to the Engineer within seven days of receiving the confirmation;
- (3) Transmit a copy of any comments by the local government to the Engineer within seven days of receipt;
- (4) Amend the SWPPP as necessary to address local government comments and transmit SWPPP Amendments to the Engineer within seven days of receipt of the comments;
- (5) Include a copy of local government SWPPP review letter in the SWPPP; and
- (6) File a notification with local government that the project is ending.

**h. Modifying Contractor's eNOI.** When required by the CGP Part 2.7, modify your eNOI to update or correct information. Reasons for modification include a change in start or end dates, small changes in number of acres to be disturbed, change in decision to use or not use treatment chemicals, or change in location of SWPPP Records.

The Contractor must submit an eNOT and then submit a new eNOI instead of an eNOI modification when: the operator has changed, 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%.

#### **157-1.4 PERSONNEL QUALIFICATIONS.**

Provide documentation in the SWPPP that the individuals serving in these positions meet the personnel qualifications.

The SWPPP Preparer must meet at least one of the following qualifications:

- Current certification as a Certified Professional in Erosion and Sediment Control (CPESC);
- 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
- 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 SWPPP Preparation course.

The Superintendent must meet all the following qualifications:

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

The SWPPP Manager must have current certification as AK-CESCL and must meet the CGP experience, training, and authority requirements identified for the Storm Water Lead and Storm Water Inspector positions as defined in the CGP, Appendix C, Qualified Person.

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 project-specific ATS. The ATS operator must have at least three months field experience with ATS, or completion of an ATS manufacturer's training course, or completion of system operator's certification 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:

- CPESC, Certified Professional in Erosion and Sediment Control; or
- CISEC, Certified Inspector in Sediment and Erosion Control



### **157-1.5 SIGNATURE/CERTIFICATION REQUIREMENTS AND DELEGATIONS.**

- a. eNOI and eNOT.** The eNOI and eNOT must be signed and certified by a responsible corporate officer according to CGP Appendix A, Part 1.12.2. Signature and certification authority for the eNOI and eNOT cannot be delegated.
- b. Delegation of Signature Authority for Other SWPPP Documents and Reports.**  
Use Form 25D-108 to delegate signature authority and certification authority to the Superintendent position, according to CGP Appendix A, Part 1.12.3, for the SWPPP, Inspection Reports and other reports required by the CGP. The Superintendent position is responsible for signing and certifying the SWPPP, Inspection Reports, and other reports required by the CGP, except the eNOI and eNOT.
- c. Subcontractor Certification.** Subcontractors must certify that they have read and will abide by the CGP and the conditions of the project SWPPP.
- d. Signatures and Initials.** Handwrite signatures or initials on CGP documents and SWPPP forms, wherever a signature or initial is required.

### **157-1.6 RESPONSIBILITY FOR STORM WATER PERMIT COVERAGE.**

- a.** The Department and the Contractor are jointly responsible for permitting and permit compliance within the Project Zone.
- b.** The Contractor is responsible for permitting and permit compliance outside the Project Zone. The Contractor has sole responsibility for compliance with DEC 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.
- c.** An entity that owns or operates, a commercial plant (as defined in Subsection GCP-80-01.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.
- d.** The Department is not responsible for permitting or permit compliance, and is not liable for fines resulting from noncompliance with permit conditions:
  - (1) For areas outside the Project Zone;
  - (2) For Construction Activity and Support Activities outside the Project Zone; and
  - (3) For commercial plants, commercial material sources, and commercial disposal sites.

### **157-1.7 UTILITY. (Reserved for Regions)**

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

#### **a. SWPPP Preparer and Pre-Construction Site Visit.**

Use a SWPPP Preparer to develop the SWPPP and associated documents, according to the requirements of the CGP and COE permit. The SWPPP Preparer must put their name, qualifications (including the expiration date of any certifications), title and company name in the SWPPP.

The SWPPP Preparer must conduct a pre-construction inspection at the Project site before construction activity begins. If the SWPPP Preparer is not a Contractor employee, the SWPPP Preparer must visit the site

accompanied by the Contractor. Give the Department at least seven days notice of the site visit, so that the Department may participate.

During the pre-construction inspection, the SWPPP Preparer must identify, or if a draft of the SWPPP has already been prepared verify that the SWPPP fully addresses and describes:

- (1) Opportunities to phase construction activities;
- (2) Appropriate BMPs and their sequencing; and
- (3) Sediment controls that must be installed prior to beginning Construction Activities.

Document the SWPPP Preparer's pre-construction inspection in the SWPPP on Form 25D-106, SWPPP Pre-Construction Site Visit, including the names of attendees and the date.

#### **b. Developing the SWPPP.**

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

Develop the SWPPP with sections and appendices, according to the current DOT&PF SWPPP template. Include information required by the Contract and the CGP.

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 Template and Forms are available online at:

[http://www.dot.state.ak.us/stwddes/dcsconst/pop\\_constforms.shtml](http://www.dot.state.ak.us/stwddes/dcsconst/pop_constforms.shtml)

Compile the SWPPP in three ring binders with tabbed and labeled dividers for each section and appendix.

#### **c. SWPPP Considerations and Contents.**

The SWPPP must provide erosion and sediment control measures for all Construction Activity within the Project Zone. Construction activity outside the Project Zone must have permit coverage, using a separate SWPPP2, and separate Contractor Inspections.

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:

- (1) Over which each operator has operational control; and
- (2) 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:

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

Develop the SWPPP according to the requirements of the CGP and this specification. Account for the Contractor's construction methods and phasing. Identify the amount of mean annual precipitation. Comply with the CGP Part 1.4.2 Allowable Non-Storm Water Discharges. List locations where authorized non-storm water will be used, including the types of water that will be used on-site.

Include the Department's Anti-degradation Analysis in the SWPPP, if storm water from the Project Zone discharges into receiving water that is considered a high quality water and that constitutes an outstanding national resource, according to CGP Part 2.1.5.

There are special requirements in the CGP Part 3.2, for storm water discharges into an impaired water body, and they may include monitoring of storm water discharges. For Projects meeting the permit criteria, the Department will initiate a monitoring program for the storm water within the Project Zone, and will provide the required information and reports for inclusion in the SWPPP. The Contractor is responsible for monitoring and reporting outside the Project Zone.

Preserve natural topsoil unless infeasible. Delineate the site according to CGP Part 4.1. Use stakes, flags, or silt fence, etc. to identify areas where land disturbing activities will occur and areas that will be left undisturbed. Minimize the amount of soil exposed during Construction activity according to CGP Part 4.1.2.

Comply with CGP Part 4.3, requirements for dewatering for trenches and excavations.

The SWPPP must identify specific areas where potential erosion, sedimentation, or pollution may occur. The potential for wind erosion must be addressed. The potential for erosion at drainage structures must be addressed.

Describe methods and time limits, to initiate temporary or permanent soil stabilization. For areas with mean annual precipitation of:

- a. 40 inches or less, initiate stabilization as soon as practicable and within 14 days; or
- b. Greater than 40 inches, initiate stabilization as soon as practicable and within seven days.

Within seven days of initiating final stabilization, either complete final stabilization or continue maintenance of work until final stabilization is complete.

Include in the "Stabilize Soils" section of the SWPPP, a description of how you will minimize the amount of disturbed and unstabilized ground in the fall season. Identify anticipated dates of fall freeze-up and spring thaw. Describe how you will stabilize areas when it is close to or past the seasonal time of snow cover or frozen conditions, and before the first seasonal thaw. Include a plan for final stabilization.

Plans for Active Treatment Systems must be submitted to DEC for review at least 14 days prior to their use and the Operator of the ATS identified in the SWPPP. Any use of treatment chemicals must be identified on the NOI.

The SWPPP must provide designated areas for equipment and wheel washing, equipment fueling and maintenance, chemical storage, staging or material storage, waste or disposal sites, concrete washouts, paint and stucco washouts, and sanitary toilets. These activities must be done in designated areas that are located, to the extent practicable, away from drain inlets, conveyance channels, and waters of the US. No discharges are allowed from concrete washout, paint and stucco washout; or from release oils, curing

compounds, fuels, oils, soaps, and solvents. Equipment and wheel washing water that doesn't contain detergent may be discharged on-site if it is treated before discharge.

Design temporary BMPs for a 2 year 24 hour precipitation amount. Describe BMPs in the SWPPP and in SWPPP Amendments, including source controls, sediment controls, discharge points, and temporary and permanent stabilization measures. Describe the design, placement, installation, and maintenance of each BMP, using words and drawings as appropriate. Describe the design capacity of sediment basins (including sediment ponds and traps). Provide a citation to the BMP Manual or publication used as a source for the BMP, including the 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 the inspection frequency in the SWPPP:

For projects where the mean annual precipitation is less than 40 inches, either:

- a. Inspect at least once every seven (7) calendar days; or
- b. Inspect at least once every fourteen (14) calendar days and within twenty-four hours of the end of a storm event that resulted in a discharge from the site.

For projects where the mean annual precipitation is forty (40) inches or greater:

- a. Inspect once every seven (7) calendar days.
- b. For periods of relatively continuous precipitation or sequential storm events inspect at least twice every seven (7) calendar days.

Linear Project Inspections, described in CGP Part 6.5. are applicable to this project.

The SWPPP must cite and incorporate applicable requirements of the Project permits, environmental commitments, COE permit, and commitments related to historic preservation. Make additional consultations or obtain permits as necessary for Contractor specific activities 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.

#### **d. Recording Personnel and Contact Information in the SWPPP.**

Identify the SWPPP Manager as the Storm Water Lead and Storm Water Inspector positions in the SWPPP. Document the SWPPP Manager's responsibilities in Section 2.0 Storm Water Contacts, of the SWPPP template and:

- (1) Identify that the SWPPP Manager does not have authority to sign inspection reports (unless the SWPPP Manager is also the designated project Superintendent).
- (2) Identify that the SWPPP Manager cannot prepare the SWPPP unless the SWPPP Manager meets the Contract requirements for the SWPPP Preparer.

Include in the SWPPP, Records of the AK-CESCL cards or certificates for the Superintendent and SWPPP Manager, and for any acting Superintendent and acting SWPPP Managers. If the Superintendent or SWPPP Manager is replaced permanently or temporarily, by an acting Superintendent or acting SWPPP Manager;

record in the SWPPP (use Form 25D-127) the names of the replacement personnel, the date of the replacement. For temporary personnel record their beginning and ending dates.

Provide 24 hour contact information for the Superintendent and SWPPP Manager. The Superintendent and SWPPP Manager must have 24 hour contact information for all Subcontractor SWPPP Coordinators and Utility SWPPP Coordinators.

Include in the SWPPP, Records of the AK-CESCL cards or certificates of ATS operators. Record names of ATS operators and their beginning and ending dates, on Form 25D-127.

The Department will provide Records of AK-CESCL cards or certificates for the Project Engineer, Stormwater Inspectors, and Monitoring Person (if applicable), and names and dates they are acting in that position. Include the Department's Records in the SWPPP Appendix. Include the department's Storm Water Inspector and Storm Water Monitoring Person (if applicable) in section 2.0 of 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, under equipment during maintenance or repairs, and under leaky equipment.

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 spills or contaminated surfaces immediately.

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
- b. Total above ground storage capacity for oil and any petroleum products is greater than 1,320 gallons (not including onboard tanks for fuel or hydraulic fluid used primarily to power the movement of a motor vehicle or ancillary onboard oil-filled operational equipment, and not including containers with a storage capacity of less than 55 gallons)

Reference the SPCC Plan in the HMCP and SWPPP.

### **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, 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.a, Inspection Reports, and other reports required by the CGP.

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

- a. Ensuring Contractor's and subcontractor's compliance with the SWPPP and CGP;
- b. Ensuring the control of erosion, sedimentation, or discharge of pollutants;
- c. Directing and overseeing installation, maintenance, and removal of BMPs;
- d. Performing Inspections; and
- e. Updating the SWPPP including adding amendments and forms.

When Bid Item P-157(g) is part of the Contract, the SWPPP Manager must be available at all times to administer SWPPP requirements, and be physically present within the Project Zone or the project office, for at least eight hours per day when construction activities are occurring

The Superintendent and SWPPP Manager shall be knowledgeable in the requirements of this Item P-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 specified by special provision, or use annual rye grass if no temporary seed mix is specified.

Use soil stabilization material as specified in Item P-682 and T-908.

Use silt fences as specified in Item 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 and Consent Decree because Contractor's employees will be conducting duties that relate to compliance with the CGP and the Consent Decree. A copy of the Consent Decree is available on the Department's Statewide Environmental Office web page.

### **157-3.1 CONSTRUCTION REQUIREMENTS.**

Comply with the SWPPP and the requirements of the CGP.

#### **a. Before Construction Activity may Begin.**

The following actions must be completed before Construction Activity begins:

- (1) The SWPPP Preparer must visit the Project, the visit must be documented in the SWPPP, 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 DEC website
- (5) The Department approved SWPPP must be submitted to DEC and Local Government (when required); and
- (6) The Contractor has transmitted to the Engineer an electronic copy of the approved SWPPP.

You may begin Winter Construction activity according to CGP Part 4.10.3, provided actions (1) through (3) above are completed before winter construction activity begins.

Post notices containing the following information:

- Copy of all eNOIs related to this project
- Name and 24 hour phone number of SWPPP Manager
- 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.

Install an outdoor rain gauge in per manufacturer's guidance in a readily accessible location on the Project.

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.

#### **b. During Construction.**

Before subcontractors or utility companies begin soil disturbing activities, provide to them copies of applicable portions of the SWPPP, and require them to sign a SWPPP Subcontractor Certification, Form 25D-105. Include SWPPP Subcontractor Certifications as an appendix to the SWPPP. Ensure

subcontractors and utility companies understand and comply with the SWPPP and the CGP. Inform subcontractors and utility companies of SWPPP amendments that affect them in a timely manner. Coordinate with subcontractors and utility companies doing work in the Project Zone so BMPs, including temporary and 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, and no less frequently than once a month during construction activity. Document on the SWPPP Training Log, Form 25D-125, the dates and attendees to these trainings. Include the SWPPP Training Log as an appendix to the SWPPP.

Notify the Engineer immediately if the actions of any utility company or subcontractor do not comply with the SWPPP and the CGP.

Comply with Subsection GCP-70-11 Protection and Restoration of Property and Landscape. Concrete washout must be fully contained.

Fuel in designated areas. Place absorbent pads or other suitable containment under fill ports while fueling, under equipment during maintenance or repairs, and under leaky equipment.

Comply with requirements of the HMCP and SPCC Plan, and all local, state and federal regulations that pertain to the handling, storage, containment, cleanup, and disposal of petroleum products or other hazardous materials.

Keep the SWPPP and HMCP current (refer to Subsection 157-2.1.c, SWPPP Considerations and Contents)

#### **c. 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 DEC according to the CGP, Appendix A, Part 3.0. Notify the Engineer immediately and to the extent possible coordinate reports to DEC 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
- The corrective action taken or planned to reduce, eliminate and prevent reoccurrence

If there has been an incident of non-compliance with COE Permits, then notify the Engineer immediately of the non-compliance.

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.

#### **d. Corrective Action and Maintenance of BMPs.**

Implement maintenance as required by the CGP, SWPPP, and manufacturer's specifications, whichever is more restrictive.

Implement corrective action:

- If an incident of non-compliance with the SWPPP, or CGP is identified;
- If an Inspection or the Engineer identifies the SWPPP or any part of the SWPPP is ineffective in preventing erosion, sedimentation or the discharge of pollutants;
- If a required BMP was not installed according to the SWPPP schedule or phasing or was installed incorrectly, or was not installed according to the CGP Part 4.0.



- If a BMP is not operating as intended, has not been maintained in an effective operation condition, or is unable to effectively perform the intended function.
- If a prohibited discharge of pollutants, as specified in CGP Part 4.6 is occurring or will occur, or
- If there is accumulation of sediment or other pollutants, that is in or near any storm water conveyance channels, or that may enter a discharge point or storm sewer system. If there is accumulation of sediment or other pollutants that is being tracked outside the project zone.

Implement corrective actions so that they comply with the following time requirements:

- For conditions that are easily remedied (i.e. removal of tracked sediment, maintenance of control measure, or spill clean-up), initiate corrective action within 24 hours and complete as soon as possible.
- For all other conditions meet both requirements:
  - (a) Corrective action is completed in time to protect water quality; and
  - (b) Corrective action is completed no later than the Complete-by-Date that was entered in an Inspection Report (see Subsection 157-3.3.b for more information).

If a corrective action is not implemented within the time requirements of this section, document the situation in the SWPPP, notify the Engineer and implement corrective action as soon as possible.

If a corrective action could affect a subcontractor, notify the subcontractor within three days of taking the corrective action. Require in your written subcontract, that subcontractors must notify the Contractor within 24 hours of becoming aware of a condition that requires a corrective action.

#### **e. 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:

- As soon as practicable
- As soon as necessary to avoid erosion, sedimentation, or the discharge of pollutants
- 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.

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 a 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 Items T-901 and T-908, 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.

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:

- At the culvert or drainage structure inlet and outlet; and
- 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:

- (1) At the inlet and outlet of the culvert, drainage structure, or bridge;
- (2) 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
- (3) Under the bridge.

Within seven days of initiating final stabilization, either complete final stabilization or continue maintenance of work until final stabilization is complete.

**f. 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:

- Land disturbing activities have ceased
- Final Stabilization has been achieved (including at Department furnished material sources, disposal sites, staging areas, equipment areas, etc.); and
- Temporary BMPs have been removed.

After the Engineer has determined the conditions for ending CGP coverage have been met, the Department will:

- Send written notice to the Contractor with the date that the conditions were met;
- Submit an eNOT to DEC; and
- Provide a copy of the eNOT and DEC's acknowledgement letter to the Contractor.

The Contractor is responsible for ending permit coverage within the Project Zone, by submitting an eNOT to DEC within 30 days of meeting the conditions for ending CGP coverage. The Contractor is responsible for BMP maintenance and SWPPP updates until permit coverage is ended.

If the Contractor's CGP eNOI acreage includes Support Activities and any other areas where the Department is not an Operator, the Contractor may not be able to file an eNOT at the same time as the Department. In this case, the Contractor must amend the SWPPP and separate SWPPP2(s), to indicate the Department's CGP coverage has ended, and the Department is no longer an Operator within the Project Zone.

The Contractor must indicate in the SWPPP the areas that have reached Final Stabilization, and the dates land disturbing activities ended and Final Stabilization was achieved. The Contractor must submit an eNOT to DEC, and insert copies of the Department's and the Contractor's eNOTs with DEC's acknowledgement letters in the appendix of the SWPPP.

The Contractor must submit a copy of each signed eNOT and DEC's acknowledgement letter to the Department within three days of filing the eNOT or receiving a written response.

The Contractor is responsible for coordinating local government inspections of work and ending permit coverage with local government. See Subsection 157-1.3.e for more information.

**g. 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. Update on-site postings if records are relocated during winter shutdown. Provide the Department with copies of all Records.

Retain Records and a copy of the SWPPP, for at least three years after the date of eNOT. If EPA or DEC 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 DEC has determined all issues related to the investigation are settled.

The SWPPP and related documents must be made available for review and copy, to the Department and other regulatory agencies that request them. See CGP Parts 5.10, 6.6 and 9.4.

### **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.

#### **a. Inspection during Construction.**

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

Inspections required by the CGP and SWPPP must be performed by the Contractor's SWPPP Manager and the Department's storm water inspector jointly, unless 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.

#### **b. Inspection Reports.**

Use only the DOT&PF SWPPP Construction Site Inspection Report, Form 25D-100 to record Inspections. Changes or revisions to Form 25D-100 are not permitted; except for adding or deleting data fields that list: Location of Discharge Points, and Site Specific BMPs. Complete all fields included on the Inspection Report form; do not leave any field blank.

Unless otherwise directed by the Engineer, insert a Complete-by-Date for each corrective action listed that complies with:

- (1) Section 157-3.1(d)
- (2) The CGP, and

(3) The Consent Decree.

Provide a copy of the completed, unsigned Inspection Report to the Engineer by noon on the day following the inspection.

The Superintendent must review, correct errors, and sign and certify the Inspection Report, within three days of the date of Inspection. The Engineer may coordinate with the Superintendent to review and correct any errors or omissions before the Superintendent signs the report. Corrections are limited to adding missing information or correcting entries to match field notes and conditions present at the time the Inspection was performed. Deliver the signed and certified Inspection Report to the Engineer on the same day the Superintendent signs it.

The Engineer will sign and certify the Inspection Report and will return the original to the Contractor within three working days.

The Engineer may make corrections after the Superintendent has signed and certified the Inspection Report. The Engineer will initial and date each correction. If the Engineer makes corrections, the Superintendent must recertify the Inspection Report by entering a new signature and date in the white space below the original signature and date lines. Send a copy of the recertified Inspection Report to the Engineer on the day it is recertified.

If subsequent corrections to the certified Inspection Report are needed, document the corrections in an 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.

**c. Inspection before Seasonal Suspension of Work.**

Conduct an Inspection before seasonal suspension of work to confirm BMPs are installed and functioning according to the requirements of the SWPPP and CGP.

**d. Reduced Inspection Frequencies.**

Conduct Inspections according to the inspection schedule indicated in the approved SWPPP. Any change in inspection frequency must be approved by the Engineer, and beginning and ending dates documented as an amendment to the SWPPP.

Inspection frequency may be reduced to at least one Inspection every 30 days, if approved by the Engineer and the entire site is temporarily stabilized;

When work is suspended due to freezing conditions, the Engineer may suspend inspection requirements after fourteen days of freezing conditions if:

- (1) Soil disturbing activities are suspended; and
- (2) Soil stabilizing activities are suspended.

Inspections must resume according to the normal inspection schedule identified in the SWPPP, at least 21 days before anticipated spring thaw.

The Engineer may waive requirements for updating the Grading and Stabilization Activities Log and Daily Record of Rainfall during seasonal suspension of work. If so, resume collecting and recording weather data on the Daily Record of Rainfall form one month before thawing conditions are expected to result in runoff. Resume recording land disturbance and stabilization activities on the Grading and Stabilization Activities Log when Construction Activity resumes.

**e. Stabilization before 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.

**f. Inspection before Project Completion.**

Conduct Inspection to ensure Final Stabilization is complete throughout the Project, and temporary BMPs that are required to be removed are removed. Temporary BMPs that are biodegradable and are specifically designed and installed with the intent of remaining in place until they degrade, may remain in place after project completion.

**g. Items and Areas to Inspect.**

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

**h. SWPPP Amendments and SWPPP Amendment Log.**

The Superintendent and the SWPPP Manager are the only persons authorized to amend the SWPPP and update the SWPPP Amendment Log, Form 25D-114. The Superintendent or the SWPPP Manager must sign and date amendments to the SWPPP and updates to the SWPPP Amendment Log.

SWPPP Amendments must be approved by the Engineer.

Amendments must occur:

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

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.c.

Keep the SWPPP Amendment Log current. Prior to performing each scheduled Inspection, submit to the Engineer a copy of the pages of the Amendment Log that contain new entries since the last submittal. Include copies of any documents amending the SWPPP.

Keep the SWPPP Amendment Log as an appendix to the SWPPP.

**i. Site Maps.**

Document installation, routine maintenance, and removal of BMPs by making notes on the SWPPP Site Maps or in a table included with the site maps. Include the date and the recording person's initials by these notes. Identify areas where Construction Activities begin, areas where Construction Activities temporarily or permanently cease, and areas that are temporarily or permanently stabilized.

**j. Corrective Action Log.**

The Superintendent and SWPPP Manager are the only persons authorized to make entries on the SWPPP Corrective Action Log, Form 25D-112. Document the need for corrective action within 24 hours of either:

- (1) Identification during an inspection; or
- (2) Discovery by the Department's or Contractor's staff, a subcontractor, or a regulatory agency inspector.

Modification or replacement of a BMP, installation of a new BMP not shown in the original SWPPP, or overdue maintenance (after sediment accumulated in sediment basins (including sediment traps and ponds) exceeds 50% of design capacity; or after sediment accumulates to more than half the above ground height on silt fences, check dams, or berms) is a corrective action and must be documented on the Corrective Action Log.

Within 24 hours of discovery, update the Corrective Action Log with the date of discovery and proposed corrective action. If discovered during an inspection, update log with inspection date and proposed corrective actions noted on the Inspection Report.

After the corrective action has been accomplished, note in the Corrective Action Log the action taken and if a SWPPP amendment was needed. Date and initial the entry.

Keep the Corrective Action Log current and submit a copy to the Engineer prior to performing each scheduled SWPPP Inspection.

Keep the Corrective Action Log as an appendix to the SWPPP.

#### **k. Grading and Stabilization Activities Log.**

The Superintendent and SWPPP Manager are the only persons authorized to date and initial entries on the SWPPP Grading and Stabilization Activities Log, Form 25D-110. Use the SWPPP Grading and Stabilization Activities Log, to record land disturbance and stabilization activities.

Keep the Grading and Stabilization Activities Log current and submit a copy to the Engineer prior to performing each scheduled SWPPP Inspection. Keep the Grading and Stabilization Activities Log organized and completed to demonstrate compliance with the CGP Part 4.4.

Keep the Grading and Stabilization Activities Log as an appendix to the SWPPP.

#### **l. Daily Record of Rainfall.**

Use SWPPP Daily Record of Rainfall, Form 25D-115, to record weather conditions at the Project. Update the form daily and include the initials of the person recording each day's entry. Submit a copy to the Engineer prior to performing each scheduled Inspection. Keep the Daily Record of Rainfall as an appendix to the SWPPP.

### **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 or for failure to perform work related to this Section 641. 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.

In other circumstances, the Engineer will give the Contractor written notice 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 the corrective actions.

If the Contractor fails to take the corrective action within the specified time, the Engineer may:

- a. Suspend the work until corrective action is completed;
- b. Withhold monies due the Contractor until corrective action is completed;
- c. Assess damages or equitable adjustments against the Contract Amount; and
- d. Employ others to perform the corrective action and deduct the cost from the Contract amount.

Reasons for the Engineer to take action under this section include, but are not limited to, the Contractor's failure to:

- Obtain appropriate permits before Construction Activities occur;
- Perform SWPPP Administration;
- Perform timely Inspections;
- Update the SWPPP;
- Transmit updated SWPPP, Inspection Reports, and other updated SWPPP forms to the Engineer;
- Maintain effective BMPs to control erosion, sedimentation, and pollution in accordance with the SWPPP, the CGP, and applicable local, state, and federal requirements;
- Perform duties according to the requirements of this Section P-157; or
- 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.

### **157-3.5 ACCESS TO WORK.**

The Project, including any related off-site areas or support activities, must be made available for inspection, or sampling and monitoring, by the Department and other regulatory agencies. See CGP Part 6.6.

### **157-4.1 METHOD OF MEASUREMENT.** Section 90 and as follows:

Item P-680 is per lineal foot and Item P-682 is per square yard

Items P-157a, P-157c and P-157g, are lump sum.

Items P-157b, P-157d and P-157e, will be measured on a contingent sum basis as specified in the Directive authorizing the work.

Item P-157f will be measured on a contingent sum basis with withholding determined by the Department.

### **TABLE 157-1 BMP VALUES - RESERVED**

Liquidated Damages assessed according to Table 157-2 are not an adjustment to the Contract amount. These damages charges are related to Contract performance but are billed by the Department independent of the Contract amount. An amount equal to the Liquidated Damages may be withheld for unsatisfactory performance, from payment due under the Contract, until the Contractor remits payment for billed Liquidated Damages.

**TABLE 157-2 Version B  
EROSION, SEDIMENT AND POLLUTION CONTROL – LIQUIDATED DAMAGES**

<b>Code</b>	<b>Specification Subsection Number and Description</b>	<b>Deductable Amount in Dollars</b>	<b>Cumulative Deductable Amounts in Dollars</b>
<b>a</b>	157-1.4 Failure to have a qualified (AK-CESCL or equivalent) Superintendent or	Calculated in Code B or F	

	SWPPP Manager		
<b>b</b>	<p>Failure to meet SWPPP requirements of:</p> <p>(1) 157-2.1.a Name of SWPPP Preparer and Date of Pre-Construction Inspection</p> <p>(2) Not Applicable</p> <p>(3) 157-3.3.h Sign and Date SWPPP amendments with qualified person.</p> <p>157-2.1.d SWPPP Include approving person's name and AK-CESCL expiration date.</p> <p>(4) 157-3.2 Records maintained at project and made available for review</p>	\$750 per omission	
<b>c</b>	157-2.1.c and 157-3.3.h Failure to either reference a BMP manual or publication, or state that no BMP manual or publication was used	\$250 per omission	
<b>d</b>	157-3.3.e Failure to stabilize a Project prior to Seasonal Thaw	\$5,000 per Project per year	
<b>e</b>	157-2.1.a Failure to conduct pre-construction inspections before Construction Activities	\$2,000 per Project	
<b>f</b>	<p>157-3.3 Failure to conduct and record CGP Inspections</p> <p>157-3.3.a Personnel conducting Inspections and Frequency</p> <p>157-3.3.b Inspection Reports, use Form 25D-100, completed with all required information according to the Consent Decree paragraph 7.c, parts (1) through (11)</p>	\$750 per Inspection	
<b>g</b>	157-3.1.d Failure to timely accomplish BMP maintenance and/or repairs, In effect until BMP maintenance and/or repairs is completed.	\$500 per Project per day	Not to exceed \$250,000 per year for all projects
<b>h</b>	157-3.1.c Failure to provide to the Engineer and DEC a timely oral endangerment report of violations or for a deficient oral endangerment report	\$750 for the first day the report is late or deficient	Additional \$750 for every 14 day period without the required information
<b>i</b>	157-3.1.c Failure to provide to the Engineer and DEC a timely written endangerment report of violations or for a deficient written endangerment report	\$750 for the first day the report is late or deficient	Additional \$750 for every 14 day period without the required information

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



**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 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.

**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 Withholding.** The Engineer may withhold an amount equal to Liquidated Damages, assessed according to Item P-157, from payment due the Contractor. Liquidated Damages for violations of the Contract, CWA, CGP, or Consent Decree are determined by the Engineer according to Table 157-2. The Engineer may withhold payment due the Contractors until the Contractor pays the Liquidated Damages to the Department.

The Department will not release performance bonds until Liquidated Damages assessed according to Item P-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 physically present 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 157. This work includes but is not limited to:

- Dewatering
- Shoring
- Bailing
- Permanent seeding

- Installation and removal of temporary work pads
- Temporary accesses
- Temporary drainage pipes and structures
- Diversion channels
- Settling impoundment
- Filtration

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:

<b>PAY ITEM</b>		<b>PAY UNIT</b>
P-157a	Erosion, Sediment and Pollution Control Administration	Lump Sum
P-157b	Temporary Erosion, Sediment and Pollution Control	Contingent Sum
P-157c	Temporary Erosion, Sediment and Pollution Control	Lump Sum
P-157d	Temporary Erosion, Sediment and Pollution Control Additives	Contingent Sum
P-157e	Temporary Erosion Sediment and Pollution Control by Directive	Contingent Sum
P-157f	Withholding	Contingent Sum
P-157g	SWPPP Manager	Lump 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.

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.

**TABLE 1. AGGREGATE GRADATION REQUIREMENTS**

Sieve Designation(Square Openings)	Percentage by weight passing sieves For E-1
1.0 in.	100
3/4 in.	70-100
3/8 in.	50-85
No. 4	35-65
No. 8	20-50
No. 50	15-30
No. 200	8-15

The specified gradations represent the limits of suitability of aggregate for use from the sources of supply. The final gradations decided on, within the specified limits, shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieves, or vice versa.

The portion of the material passing the No. 40 sieve shall have a liquid limit not more than 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  $\pm 2\%$  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 according to 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 Surface Course - per cubic yard
Item P-208b	Uncrushed Aggregate Surface Course - per cubic yard
Item P-208c	Crushed Aggregate Surface Course - per ton
Item P-208d	Uncrushed Aggregate Surface Course - per ton

#### **TESTING REQUIREMENTS**

AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
ATM 212	The Standard Density of Coarse Granular Materials Using the Vibratory Compactor
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	Percentage of Fracture in Coarse Aggregate

## ITEM P-209 CRUSHED AGGREGATE BASE COURSE

### DESCRIPTION

**209-1.1** This item consists of a base course composed of crushed aggregates constructed on a prepared course according to these Specifications and to the dimensions and typical cross section shown on the Plans.

### MATERIALS

**209-2.1 AGGREGATE.** Aggregates shall consist of clean, sound, durable particles of crushed stone or crushed gravel and shall be free from vegetable matter, excess coatings of clay, silt, and other objectionable materials and shall contain no clay balls.

Fine aggregate passing the No. 4 sieve shall consist of fines from the operation of crushing the coarse aggregate. If necessary, fine aggregate may be added to produce the correct gradation. The fine aggregate shall be produced by crushing stone and gravel that meet the requirements for wear and soundness specified for coarse aggregate.

The crushed aggregate portion which is retained on the No. 4 sieve shall have at least 75% by weight with 2 fractured faces as determined by WAQTC FOP for AASHTO TP 61.

The percentage of wear shall not be greater than 45% when tested according to AASHTO T 96. The sodium sulfate soundness loss shall not exceed 12%, after 5 cycles, when tested according to AASHTO T 104. Aggregates shall have a minimum degradation value of 45 when tested according to ATM 313.

The fraction passing the No. 40 sieve shall have a liquid limit no greater than 25 and a plasticity index of not more than 4 when tested according to WAQTC FOP for AASHTO T 89 and T 90. The fine aggregate shall have a minimum sand equivalent value of 35 when tested according to WAQTC FOP for AASHTO T 176.

- a. **Sampling and Testing.** The Engineer will sample aggregates for quality testing before the start of production. The Engineer, at no expense to the Contractor, will make all tests necessary to determine whether aggregate quality is in compliance with the specifications.

The Engineer will sample aggregates for acceptance according to WAQTC FOP for AASHTO T 2, and test aggregates for acceptance according to WAQTC FOP for AASHTO T 27/T 11.

- b. **Gradation Requirements.** The gradation of the final mixture shall fall within the range indicated in Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11. The final gradation shall be continuously well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on an adjacent sieve or vice versa.

**TABLE 1. REQUIREMENTS FOR GRADATION OF AGGREGATE**

<b>Sieve Designation (Square Openings)</b>	<b>Percentage by weight passing sieves</b>	
	<b>C-1</b>	<b>D-1</b>
1-1/2 in	100	--
1.00 in	70-100	100
3/4 in	60-90	70-100
3/8 in	45-75	50-80
No. 4	30-60	35-65
No. 8	22-52	20-50
No. 50	8-30	8-30
No. 200	0-6	0-6

Note: Unless otherwise specified, Gradation D-1 shall be used.

### **CONSTRUCTION METHODS**

**209-3.1 PREPARING UNDERLYING COURSE.** Placing and spreading operations shall not commence until the underlying course has been accepted, in writing, by the Engineer. Any ruts or soft areas shall be corrected and compacted to the required density before placing the base course. Crushed aggregate base course shall not be placed on frozen material.

**209-3.2 MIXING.** The aggregate shall be uniformly blended during crushing operations or mixed in a plant. The plant shall blend and mix the materials to meet the Specifications.

**209-3.3 PLACING.** The crushed aggregate base material shall be placed on the approved subgrade in uniform, equal-depth layers, each not exceeding 6 inches of compacted depth.

The previously constructed layer shall be cleaned of loose and foreign material prior to placing the next layer. The surface of the compacted material shall be kept moist until covered with the next layer.

**209-3.4 COMPACTION.** Immediately upon completion of the spreading operations, the aggregate shall be thoroughly compacted to the required density. The moisture content of the material shall be approximately that required to obtain maximum density.

**209-3.5 ACCEPTANCE SAMPLING AND TESTING FOR DENSITY.** Base course will be accepted for density when the field density is not less than 100% of the maximum density, as determined according to WAQTC FOP for AASHTO T 99/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.

**209-3.6 FINISHING.** The surface of the aggregate base 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 base 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.

**209-3.7 SURFACE TEST.** After the course has been completely compacted, the surface will be tested by the Engineer for smoothness and accuracy of grade and crown. The finished 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.



**209-3.8 THICKNESS CONTROL.** The thickness of the finished base course will be determined by the Engineer by taking before and after elevation measurements, or by depth tests, at random locations. The completed thickness of the base course shall be within 1/2 inch of the design thickness. Where the thickness is deficient by more than 1/2 inch, it shall be corrected to within the specified tolerances.

**209-3.9 MAINTENANCE.** The base course shall be maintained in a condition that will meet all specification requirements until the work is accepted. Equipment used in the construction of an adjoining section may be routed over completed portions of the base course, provided no damage results and provided that the equipment is routed over the full width of the base course to avoid rutting or uneven compaction.

#### **METHOD OF MEASUREMENT**

**209-4.1** Crushed Aggregate Base 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**

**209-5.1** Crushed Aggregate Base Course will be paid for at the contract price, per unit of measurement, accepted in place.

Payment will be made under:

Item P-209a	Crushed Aggregate Base Course - per cubic yard
Item P-209b	Crushed Aggregate Base Course - per ton

#### **TESTING REQUIREMENTS**

ATM 212	Determining the Standard Density of Coarse Granular Materials Using the Vibratory Compactor
ATM 313	Degradation Value of Aggregates
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
WAQTC FOP for AASHTO T 2	Sampling 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 176	Sand Equivalent
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	Percentage of Fracture in Coarse Aggregate

## ITEM P-401 PLANT HOT MIX ASPHALT PAVEMENT

*(This Section may be replaced with Special A 16 by designer)*

### DESCRIPTION

**401-1.1** This item shall consist of a surface course composed of mineral aggregate and asphalt cement mixed in a central mixing plant and placed on a prepared course according to these Specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the Plans. Each course shall be constructed to the depth, typical section, or elevation required by the Plans and shall be rolled, finished, and approved before the placement of the next course.

### MATERIALS

**401-2.1 AGGREGATE.** Aggregates shall consist of crushed stone or crushed gravel with or without sand or other inert finely divided mineral aggregate. The portion of materials retained on the No. 4 sieve is coarse aggregate. The portion passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate, and the portion passing the No. 200 sieve is mineral filler.

- a. **Coarse Aggregate.** Coarse aggregate shall consist of sound, tough, durable particles, free from adherent films of matter that would prevent thorough coating and bonding with the bituminous material and be free from organic matter and other deleterious substances. The percentage of wear shall not be greater than 40% when tested according to AASHTO T 96. The sodium sulfate soundness loss shall not exceed 10%, or the magnesium sulfate soundness loss shall not exceed 13%, after 5 cycles, when tested according to AASHTO T 104. The aggregate shall have a minimum degradation value of 30 when tested according to ATM 313.

The crushed aggregate portion which is retained on the No. 4 sieve shall have at least 90% by weight 2 fractured faces as determined by FOP for AASHTO TP 61.

The aggregate shall not contain more than 8%, by weight, of flat or elongated pieces, when tested according to ATM 306. The ratio of the calipers shall be set to 1:5.

- b. **Fine Aggregate.** Fine aggregate shall consist of clean, sound, durable, angular shaped particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for coarse aggregate. The aggregate particles shall be free from coatings of clay, silt, or other objectionable matter and shall contain no clay balls. The fine aggregate, including any blended material for the fine aggregate, shall have a plasticity index of not more than 6 and a liquid limit of not more than 25 when tested according to WAQTC FOPs for AASTHTO T 89 and AASHTO T 90.

Natural (nonmanufactured) sand may be used to obtain the gradation of the aggregate blend or to improve the workability of the mix. The amount of sand to be added will be adjusted to produce mixtures conforming to requirements of this specification. The fine aggregate shall not contain more than 20% natural sand by weight of total aggregates.

The aggregate shall have sand equivalent values of 35 or greater when tested according to WAQTC FOP for AASHTO T 176.

- c. **Sampling.** WAQTC FOP for AASHTO T 2 shall be used in sampling coarse and fine aggregate, and AASHTO T 127 shall be used in sampling mineral filler.

**401-2.2 MINERAL FILLER.** If filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of AASHTO M 17.

**401-2.3 ASPHALT CEMENT.** Asphalt cement shall conform to the following property requirements:

<b>Performance Grade AASHTO M 320</b>	<b>Softening Point AASHTO T 53</b>	<b>Toughness ASTM D 5801</b>	<b>Tenacity ASTM D 5801</b>
PG 52-28	N/A	N/A	N/A
PG 58-28	120° F, min.	110 in lbs, min.	75 in lbs, min.
PG 64-28	125° F, min.	110 in lbs, min.	75 in lbs, min.

The Contractor shall furnish vendor's certified test reports for each lot of asphalt cement shipped to the project. The vendor's certified test report for the asphalt cement can be used for acceptance or tested independently by the Engineer.

All excess asphalt cement shall remain the property of the Contractor. Removal of excess asphalt cement from the project area shall be incidental to the contract and no separate payment will be made.

**401-2.4 PRELIMINARY MATERIAL ACCEPTANCE.** Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

**a. Coarse Aggregate.**

- (1) Percent of wear.
- (2) Soundness.

**b. Fine Aggregate.**

- (1) Liquid limit.
- (2) Plastic index.
- (3) Sand equivalent.

**c. Mineral Filler.**

- d. Asphalt Cement.** The certification(s) shall show the appropriate test(s) for each material, the test results, and a statement that the material meets the specification requirement.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

## **COMPOSITION**

**401-3.1 COMPOSITION OF MIXTURE.** The plant mix shall be composed of a mixture of well-graded aggregate, filler if required, and asphalt cement. The several aggregate fractions shall be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF).

**401-3.2 JOB MIX FORMULA.** No hot mix asphalt for payment shall be produced until a JMF has been approved by the Engineer. The hot mix asphalt shall be designed using procedures contained in ATM 417, "Chapter 5, Marshall Method of Mix Design, of the Asphalt Institute's Manual Series No. 2 (MS-2), Mix Design Methods for Asphalt Concrete", and shall meet the requirements of Tables 1 and 2.

If material variability exceeds the standard deviations indicated, the JMF and subsequent production targets should be based on a stability greater than shown in Table 1, and the flow and air voids should be targeted close to the mid-range of the criteria in order meet the acceptance requirements.

If the Tensile Strength Ratio (TSR) of the composite mixture, as determined by ATM 414, is less than 75, the aggregates shall be rejected or the asphalt treated with an approved anti-stripping agent. The amount of anti-

stripping agent added to the asphalt shall be sufficient to produce a TSR of not less than 75. If an antistrip agent is required, it will be provided by the Contractor at no additional cost.

The JMF shall be submitted in writing by the Contractor to the Engineer at least 15 calendar days prior to the start of paving operations and shall include as a minimum:

- a. Percent passing each sieve size.
- b. Percent of asphalt cement.
- c. Asphalt viscosity or penetration grade.
- d. Number of blows of hammer compaction per side of molded specimen.
- e. Mixing temperature.
- f. Compaction temperature.
- g. Temperature of mix when discharged from the mixer.
- h. Temperature-viscosity relationship of the asphalt cement.
- i. Plot of the combined gradation on the Federal Highway Administration (FHWA) 45 power gradation curve.
- j. Graphical plots of stability, flow, air voids, voids in the mineral aggregate, and unit weight verses asphalt content.
- k. Percent natural sand.
- l. Percent fractured faces.
- m. Percent elongated particles.
- n. Tensile Strength Ratio (TSR).
- o. Antistrip agent (if required).

The Engineer has authority to review submitted JMDs and to reject JMDs that do not meet specifications. The Contractor shall submit samples to the Engineer, upon request, for JMD verification testing.

The JMF may be designed by the Department. The Contractor shall submit material samples to the Engineer, upon request, for JMF design. The Department will furnish one JMD, that meets specifications, for each Type and Class of HMA specified. If additional JMDs are required, the Engineer will assess a fee of \$2,500.00 under Contract Item P-401b, Hot Mix Asphalt Price Adjustment, for each additional JMD furnished.

The JMF for each mixture shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new JMF must be approved by the Engineer before the new material is used.

**TABLE 1. MIX DESIGN REQUIREMENTS**

<b>Test Property</b>	<b>Pavements Designed for Aircraft Gross Weights of 60,000 Lbs. or More or Tire Pressures of 100 Psi or More</b>	<b>Pavements Designed for Aircraft Gross Weight Less Than 60,000 Lbs. or Tire Pressure Less Than 100 Psi</b>
Number of blows	75	50
Stability, pounds	2150	1350
Flow, 0.01 inch	10-14	10-18
Air voids %	2.8-4.2	2.8-4.2
Voids in mineral aggregate, %, min.	See Table 2	See Table 2

**TABLE 2. MINIMUM PERCENT VOIDS IN MINERAL AGGREGATE**

Maximum Particle Size inch	Voids in Mineral Aggregate, %, Minimum
1/2	14.0
3/4	13.0
1	12.0
1-1/4	11.0

The mineral aggregate shall be of such size that the percentage composition by weight, as determined by laboratory screens, will conform to the gradation or gradations specified in Table 3 when tested according to WAQTC FOP for AASHTO T 27 and T 11

The gradations in Table 3 represent the limits which shall determine the suitability of aggregate for use from the sources of supply. The aggregate, as selected (and used in the JMF), shall have a gradation within the limits designated in Table 3 and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve, or vice versa, but shall be well graded from coarse to fine when tested according to WAQTC FOP for AASHTO T 27 and T 11.

For acceptance testing, deviations from the final approved mix design for bitumen content and gradation of aggregates shall be within the tolerance limits for individual measurements as specified in Table 5. The limits still will apply if they fall outside the master grading band in Table 3. Limits do not apply to the largest sieve specified.

The maximum size aggregate used shall not be more than one-half of the thickness of the course being constructed.

**TABLE 3. AGGREGATE – HOT MIX ASPHALT PAVEMENTS**

Sieve Size	Percentage by Weight Passing Sieves			
	1-1/4 in.max	1.00 in. max	3/4 in. max	1/2 in. max
1-1/4 in.	100	--	--	--
1 in.	86-98	100	--	--
3/4 in.	68-93	76-98	100	--
1/2 in.	57-81	66-86	75-90	100
3/8 in.	49-69	57-77	60-84	80-90
No. 4	34-54	40-60	33-70	4-81
No.8	22-42	26-46	19-56	26-70
No.16	13-33	17-37	10-44	16-59
No.30	8-24	11-27	7-34	9-49
No.50	6-18	7-19	5-24	6-36
No.100	4-12	6-16	4-16	4-22
No.200	3-6	3-6	3-7	3-7
Asphalt %	4.5-7.0	4.5-7.0	5.0-7.5	5.5-8.0

The aggregate gradations shown are based on aggregates of uniform specific gravity. The percentages passing the various sieves shall be corrected when aggregates of varying specific gravities are used, as indicated in the Asphalt Institute Manual Series No. 2 (MS-2), Appendix A.

**401-3.3 RECYCLED ASPHALT CONCRETE.** Recycled asphalt concrete shall consist of reclaimed asphalt pavement (RAP), coarse aggregate, fine aggregate, mineral filler, asphalt cement, and recycling agent, if necessary. Reclaimed asphalt pavement may be used for all courses.

The RAP shall be of a consistent gradation and asphalt content. The Contractor may obtain the RAP from the job site or an existing source.

All new aggregates used in the recycled mix shall meet the requirements of Subsection 401-2.1. New bituminous material shall meet the requirements of Subsection 401-2.3. Recycling agents shall meet the requirements of AASHTO R 14.

The recycled asphalt concrete mix shall be designed using procedures contained in the Asphalt Institute's Manual Series Number 20 (MS-20), Asphalt Hot-Mix Recycling, in conjunction with MS-2 and ATM 417. The job mix shall meet the requirements of Subsection 401-3.2. In addition to the requirements of Subsection 401-3.2, the JMF shall indicate the percent of RAP, the percent and viscosity grade of new asphalt, the percent and grade of hot-mix recycling agent (if used), and the properties (including viscosity and penetration) of the asphalt blend.

The Contractor shall submit documentation to the Engineer, indicating that the mixing equipment proposed for use is adequate to mix the percent of RAP shown in the JMF and meet all local and national environmental regulations.

**401-3.4 TEST SECTION.** Prior to full production, the Contractor shall prepare and place a quantity of hot mix asphalt according to the JMF. The amount of mixture should be sufficient to construct a test section 300 feet long and at least 20 to 30 feet wide placed in two lanes, with a longitudinal cold joint, and shall be of the same depth specified for the construction of the course which it represents. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.

Three random 6 inch diameter core samples, randomly selected according to ASTM D 3665, shall be cut from the finished pavement mat by the Contractor. The samples will be tested for density from the bulk specific gravity (BSG) according to WAQTC FOP for AASHTO T 166/T 275 and evaluated according to Section 401-5.2. The Target Value for density will be 94% of the theoretical maximum specific gravity (MSG), as determined by WAQTC FOP for AASHTO T 209. The sample used to determine the theoretical MSG will be randomly selected from the material in the test section. The relative density in percent equals the BSG times 100 divided by the maximum specific gravity for the lot and rounded to the nearest whole percent.

Three random samples of the mixture will be taken according to 401-5.1a(1) and (2) and tested for aggregate gradation and asphalt cement content according to Section 401-5.1 and evaluated according to Section 401-5.2. Joint density will be evaluated according to Subsection 401-5.2f(3). The Target Value for joint density shall be 92% of the theoretical MSG as determined by WAQTC FOP for AASHTO T 209.

If the initial test section should prove to be unacceptable, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the Specifications. Any additional sections that are not acceptable shall be removed at the Contractor's expense. Full production shall not begin until an acceptable section has been constructed and accepted by the Engineer. The initial test section, whether acceptable or unacceptable, and any subsequent section that meets specification requirements will be paid for according to Subsection 401-8.1.

Job mix control testing shall be performed by the Contractor at the start of plant production and in conjunction with the calibration of the plant for the JMF. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the same manner as for the original design tests.

**401-3.5 TESTING LABORATORY.** The laboratory used to develop the JMF shall meet the requirements of ASTM D 3666. A certification signed by the manager of the laboratory stating that it meets these requirements shall be submitted to the Engineer prior to the start of construction. The certification shall contain as a minimum:

- a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
- b. A listing of equipment to be used in developing the job mix.
- c. A copy of the laboratory's quality control system.
- d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program

## **CONSTRUCTION METHODS**

**401-4.1 WEATHER LIMITATIONS.** The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 4. The temperature requirements may be waived by the Engineer, if requested; however, all other requirements including compaction shall be met.

**TABLE 4. BASE TEMPERATURE LIMITATIONS**

<b>Mat Thickness</b>	<b>Base Temperature (Minimum)</b>
3 inches or greater	40 °F
Greater than 1 inch but less than 3 inches	42 °F
1 inch or less	50 °F

**401-4.2 ASPHALT MIXING PLANT.** Plants may not be placed on Airport property. Plants used for the preparation of hot mix asphalt shall conform to the requirements of AASHTO M 156 with the following changes:

**a. Requirements for All Plants.**

- (1) **Truck Scales.** The hot mix asphalt shall be weighed on approved scales furnished by the Contractor, or on certified public scales at the Contractor's expense. Scales shall be inspected and sealed as often as the Engineer deems necessary to assure their accuracy. Scales shall conform to the requirements of Item G-130-2.5.
- (2) **Testing Facilities.** The Contractor shall provide laboratory facilities at the plant or job site for the Contractor's quality control testing, according to Subsection 401-6.2.
- (3) **Inspection of Plant.** The Engineer, or Engineer's authorized representative, shall have access, at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant: verifying weights, proportions, and material properties; and checking the temperatures maintained in the preparation of the mixtures.
- (4) **Storage Bins and Surge Bins.** Paragraph 4.9 of ASTM D 995 is deleted. Instead, the following applies. Use of surge bins or storage bins for temporary storage of hot mix asphalt will be permitted as follows:
  - (a) The hot mix asphalt may be stored in surge bins for not longer than 3 hours.
  - (b) The hot mix asphalt may be stored in insulated storage bins for not longer than 24 hours.

The bins shall be such that mix drawn from them meets the same requirements as mix loaded directly into trucks.

If the Engineer determines that there is an excessive amount of heat loss, segregation or oxidation of the mixture due to temporary storage, no overnight storage will be allowed.

**401-4.3 HAULING EQUIPMENT.** Trucks used for hauling hot mix asphalt shall have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, the truck beds shall be lightly coated with a minimum amount of paraffin oil, lime solution, or other approved material. Each truck shall have a suitable cover to protect the mixture from adverse weather. When necessary, to ensure that the mixture will be delivered to the site at the specified temperature, truck beds shall be insulated or heated and covers shall be securely fastened.

**401-4.4 HOT MIX ASPHALT PAVERS.** Hot mix asphalt pavers shall be self-propelled, with an activated screed, heated as necessary, and shall be capable spreading and finishing courses of bituminous plant mix material which will meet the specified thickness, smoothness, and grade. The paver shall have sufficient power to propel itself and the hauling equipment without adversely affecting the finished surface.

The paver shall have a receiving hopper of sufficient capacity to permit a uniform spreading operation. The hopper shall be equipped with a distribution system to place the mixture uniformly in front of the screed without segregation. The screed shall effectively produce a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

If an automatic grade control device is used, the paver shall be equipped with a control system capable of automatically maintaining the specified screed elevation. The control system shall be automatically actuated from either a reference line and/or through a system of mechanical sensors or sensor-directed mechanisms or devices which will maintain the paver screed at a predetermined transverse slope and at the proper elevation to obtain the required surface. The transverse slope controller shall be capable of maintaining the screed at the desired slope within plus or minus 0.1%.

The controls shall be capable of working in conjunction with any of the following attachments:

- a. Ski-type device of not less than 30 feet in length.
- b. Taut stringline (wire) set to grade.
- c. Short ski or shoe.
- d. Laser control.

**401-4.5 ROLLERS.** Rollers of the vibratory, steel wheel, and pneumatic-tired type shall be used. They shall be in good condition, capable of operating at slow speeds to avoid displacement of the hot mix asphalt. The number, type, and weight of rollers shall be sufficient to compact the mixture to the required density while it is still in a workable condition.

The use of equipment which causes excessive crushing of the aggregate will not be permitted.

**401-4.6 PREPARATION OF ASPHALT CEMENT.** The asphalt cement shall be heated in a manner that will avoid local overheating and provide a continuous supply of the asphalt cement to the mixer at a uniform temperature. The temperature of the asphalt cement delivered to the mixer shall be sufficient to provide a suitable viscosity for adequate coating of the aggregate particles, but shall not exceed 325 °F.

**401-4.7 PREPARATION OF MINERAL AGGREGATE.** The aggregate for the mixture shall be heated and dried prior to introduction into the mixer. The maximum temperature and rate of heating shall be such that no damage occurs to the aggregates. The temperature of the aggregate and mineral filler shall not exceed 350 °F when the asphalt is added. Particular care shall be taken that aggregates high in calcium or magnesium content are not damaged by overheating. The temperature shall not be lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

**401-4.8 PREPARATION OF HOT MIX ASPHALT.** The aggregates and the asphalt cement shall be weighed or metered and introduced into the mixer in the amount specified by the JMF.



The combined materials shall be mixed until the aggregate obtains a uniform coating of bitumen and is thoroughly distributed throughout the mixture. Wet mixing time shall be the shortest time that will produce a satisfactory mixture, but not less than 25 seconds for batch plants. The wet mixing time for all plants shall be established by the Contractor, based on the procedure for determining the percentage of coated particles described in AASHTO T 195, for each individual plant and for each type of aggregate used. The wet mixing time will be set to achieve 95% of coated particles. For continuous mix plants, the minimum mixing time shall be determined by dividing the weight of its contents at operating level by the weight of the mixture delivered per second by the mixer. The moisture content of all bituminous mix upon discharge shall not exceed 0.5% of the total weight of mix, as determined by WAQTC FOP for AASHTO T 329.

**401-4.9 PREPARATION OF THE UNDERLYING SURFACE.** Immediately before placing the hot mix asphalt, the underlying course shall be cleaned of all dust and debris. A prime coat or tack coat shall be applied according to Item P-602 or P-603, if required by the contract Specifications.

**401-4.10 TRANSPORTING, PLACING, AND FINISHING.** The hot mix asphalt shall be transported from the mixing plant to the site in vehicles conforming to the requirements of Subsection 401-4.3. Deliveries shall be scheduled so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Adequate artificial lighting shall be provided for night placements. Hauling over freshly placed material shall not be permitted until the material has been compacted, as specified, and allowed to cool to atmospheric temperature.

The Contractor may elect to use a material transfer vehicle to deliver mix to the paver.

The mix shall be placed and compacted at a temperature not less than 235 °F.

Upon arrival, the mixture shall be placed to the full width by a bituminous paver. It shall be struck off in a uniform layer of such depth that, when the work is completed, it shall have the required thickness and conform to the grade and contour indicated. The speed of the paver shall be regulated to eliminate pulling and tearing of the bituminous mat. Unless otherwise permitted, placement of the mixture shall begin along the centerline of a crowned section or on the high side of areas with a one-way slope. The mixture shall be placed in consecutive adjacent strips having a minimum width of 20 feet except where edge lanes require less width to complete the area. The longitudinal joint in one course shall offset the longitudinal joint in the course immediately below by at least 12 inches; however, the joint in the surface top course shall be at the centerline of the pavement. Transverse joints in one course shall be offset by at least 10 feet from transverse joints in the previous course.

Transverse joints in adjacent lanes shall be offset a minimum of 10 feet.

On areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture may be spread and compacted by hand tools.

**401-4.11 COMPACTION OF MIXTURE.** After placing, the mixture shall be thoroughly and uniformly compacted by rolling. The surface shall be compacted as soon as possible when the mixture has attained sufficient stability so that the rolling does not cause undue displacement, cracking or shoving. The sequence of rolling operations and the type of rollers used shall be at the discretion of the Contractor. The speed of the roller shall, at all times, be sufficiently slow to avoid displacement of the hot mixture and be effective in compaction. Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected at once.

Sufficient rollers shall be furnished to handle the output of the plant. Rolling shall continue until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained.

To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened (and scrapers used), but excessive water will not be permitted.

In areas not accessible to the roller, the mixture shall be thoroughly compacted with hand tampers.

Any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or in any way defective shall be removed and replaced with fresh hot mixture and immediately compacted to conform to the surrounding area. This work shall be done at the Contractor's expense. Skin patching shall not be allowed.

**401-4.12 JOINTS.** The formation of all joints shall be made in such a manner as to ensure a continuous bond between the courses and obtain the required density. All joints shall have the same texture as other sections of the course and meet the requirements for smoothness and grade.

The roller shall not pass over the unprotected end of the freshly laid mixture except when necessary to form a transverse joint. When necessary to form a transverse joint, it shall be made by means of placing a bulkhead or by tapering the course. The tapered edge shall be cut back to its full depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. In both methods, all contact surfaces shall be given a tack coat of joint adhesive before placing any fresh mixture against the joint.

All longitudinal joints that have become cold (less than 150 °F) or damaged shall be cut back with a cutter mounted on the outside of a power roller as approved by the engineer. After being cut back, the joint will be brushed with a power broom as directed by the engineer to remove all loose asphalt concrete. To ensure a continuous bond between the longitudinal pavement joints in the top lift, a tack coat of Crafcro Pavement Joint Adhesive No. 34524, or approved equal, shall be applied to the joint prior to the laydown of the asphalt concrete.

All costs associated with joint preparation, applying joint sealant, and applying joint adhesive are subsidiary to the hot mix asphalt pay item.

## **MATERIAL ACCEPTANCE**

**401-5.1 ACCEPTANCE SAMPLING AND TESTING.** All acceptance sampling and testing necessary to determine conformance with the requirements specified in this section will be performed by the Engineer at no cost to the Contractor. Testing organizations performing these tests will meet the requirements of ASTM D 3666.

Asphalt Lots. The quantity of each type of asphalt concrete mixture produced and placed will be divided into lots and the lots evaluated individually for acceptance. The Department has the exclusive right and responsibility for determining the acceptability of all materials incorporated into the project. The results of the acceptance testing performed by the Engineer will be made available to the Contractor.

5,000 ton lot size. A lot will normally be 5,000 tons. The lot will be divided into 10 equal sublots of 500 tons, each randomly sampled and tested for asphalt cement content, density and gradation according to this subsection. If the project has more than 1 lot and if less than 8 sublots have been sampled at the time a lot is terminated, the material in the shortened lot will be included as part of the prior lot and the price adjustment computed for the prior lot will include the samples from the shortened lot.

1,500 to 4,999 ton lot size. If the total project quantity is between 1,500 tons and 4,999 tons, the total project quantity will be considered one lot. The lot will be divided into sublots of 500 tons and randomly sampled for asphalt cement content, density and gradation according to this subsection except a determination for outliers will not be performed. The lot will be evaluated for price adjustment according to Subsection 401-5.2 except as noted.

Under 1,500 ton lot size. If the total project quantity is less than 1,500 tons, asphalt concrete pavement will be accepted for payment based on the Engineer's approval of a Job Mix Formula and the placement and compaction of the asphalt concrete pavement to the specified depth and finished surface requirements and tolerances, and material testing. The Engineer reserves the right to perform any testing required in order to determine acceptance.

Any area of finished surfacing that is segregated, fails to meet surface tolerance requirements, cools to below 170 °F prior to completing compaction, or is any other way defective shall be removed and replaced with new asphalt concrete pavement. Removal and replacement of defective pavement shall be at no additional cost to the Department.

Joint lot size. The lot size for longitudinal joint density in the final lift of asphalt concrete pavement will be the total length of longitudinal joints constructed by a lot of material for the mat completing the joint.

**a. Sampling.**

- (1) Cement Content.** Samples taken for the determination of asphalt cement content will be taken from behind the screed prior to initial compaction, at the auger, or from the windrow, according to WAQTC FOP for AASHTO T 168. Two separate samples will be taken, one for acceptance testing and one held in reserve for retesting if applicable.
- (2) Gradation.** Samples taken for the determination of aggregate gradation will be either of the following as directed by the Engineer, randomly according to the procedures contained in WAQTC FOP for AASHTO T 168. Two separate samples will be taken, one for acceptance testing and one held in reserve for retesting if applicable. The samples will be taken from one of the following locations:

**(a)** The same as specified for the determination of asphalt cement content.

**(b)** From the combined aggregate cold feed conveyor via a diversion chute or from the stopped conveyor belt.

On drum mix plants a diverter device for obtaining aggregate samples shall be located on the conveyor system delivering combined aggregates into the drum. The diverter device shall divert aggregate from the full width of the conveyor system and shall be maintained to provide a representative sample of aggregate incorporated in the mix. The plant shall be equipped with a safe and suitable location for obtaining aggregate samples from the diverter device.

**(c)** Dry batched aggregates.

- (3) Density.** The Contractor shall cut full depth core samples with a diameter of 6 inches from each subplot, within 24 hours of final rolling for density acceptance testing. The samples shall be neatly cut by a core drill at the randomly selected location designated by the Engineer according to the procedures contained in ASTM D 3665. All voids left by sampling shall be backfilled with new asphalt concrete material and compacted within 24 hours of sampling.

Cores for mat density shall not be taken closer than 1 foot from a transverse or longitudinal joint.

Cores for joint density shall be taken directly on the joint, at locations adjacent to cores taken from the mat completing the joint.

**b. Testing.**

- (1) Cement Content.** Asphalt cement content will be determined by ATM 405 or WAQTC FOP for AASHTO T 308, by total weight of mix.
- (2) Gradation.** Cold feed or dry batched aggregate gradations will be tested according to WAQTC FOP for AASHTO T 27/T 11 and evaluated for acceptance according to Subsection 401-5.2. Asphalt concrete mix and core sample gradations will be determined according to WAQTC FOP for AASHTO T 30 from extracted aggregate, or aggregate remaining after the ignition oven (WAQTC FOP for AASHTO T 308) has burned off the asphalt cement.

- (3) **Density.** The Target Value for mat density shall be 94% of the theoretical MSG as determined by WAQTC FOP for AASHTO T 209. For the first lot of asphalt concrete pavement, the MSG will be determined by the Job Mix Formula. For additional lots, the MSG will be determined from the randomly selected sample from the first subplot. For joint density lots, the MSG will be MSG of the adjacent mat lot completing the joint. The Target Value for longitudinal joint density in the final lift shall be 92% of the theoretical MSG as determined by WAQTC FOP for AASHTO T 209.

Core samples will be tested according to WAQTC FOP for AASHTO T 166/T 275, and evaluated for acceptance according to Subsection 401-5.2.

#### **401-5.2 ACCEPTANCE CRITERIA.**

- a. **General.** Acceptance will be based on the following characteristics of the hot mix asphalt and completed pavement as well as the implementation of the Contractor's Quality Control plan and test results:

- (1) Aggregate gradation
- (2) Asphalt content
- (3) Mat density
- (4) Joint density
- (5) Thickness
- (6) Smoothness
- (7) Grade

Aggregate gradation, asphalt content, mat density, and joint density will be evaluated for acceptance on a lot basis using the method of estimating percentage of material within specification limits (PWL). Acceptance using PWL considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results to calculate the percentage of material that is above the lower specification tolerance limit (L) or below the upper specification tolerance limit (U).

Thickness will be evaluated by the Engineer for compliance according to Subsection 401-5.2.f(4). Acceptance for smoothness will be based on the criteria contained in Subsection 401-5.2f(5). Acceptance for grade will be based on the criteria contained in Subsection 401-5.2f(6).

The Engineer may at any time, notwithstanding previous plant acceptance, reject and require the Contractor to dispose of any batch of hot mix asphalt which is rendered unfit for use due to contamination, segregation, incomplete coating of aggregate, or improper mix temperature. Such rejection may be based on only visual inspection or temperature measurements. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and, if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

- b. **Aggregate Gradation, Asphalt Content.** Evaluation for acceptance of each lot of plant-produced material for aggregate gradation and asphalt content will be based on PWL.
- c. **Mat Density.** Evaluation for acceptance of each lot of in-place pavement for mat density will be based on PWL.
- d. **Joint Density.** Evaluation for acceptance of each lot of in-place pavement for joint density will be based on PWL.
- e. **Percentage of Material Within Specification Limits (PWL).** The PWL will be determined according to procedures specified in Section 110 of the General Provisions. The sample average (X) is

rounded to the nearest tenth for density and all sieves except the No. 200, and to the nearest hundredth for asphalt cement content and the No. 200 sieve. The sample standard deviation (Sn) is rounded to the nearest hundredth for density and all sieve sizes except the No. 200 sieve. The sample standard deviation (Sn) is rounded to the nearest .001 for asphalt content and the No. 200 sieve. The specification tolerance limits (L) and (U) are contained in Table 5.

**f. Acceptance Criteria.**

**(1) Mat Density, Aggregate Gradation, and Asphalt Content.** Acceptance and payment for the lot will be determined according to Subsection 401-8.1.

**(2)** (Intentionally left blank)

**(3) Longitudinal Joint Density.** For the final lift of asphalt concrete pavement, if the PWL of the lot equals or exceeds 90%, the lot will be acceptable. If the PWL is less than 90%, the Contractor shall seal the longitudinal joint with Asphalt Systems GSB-78, or approved equal, and shall evaluate the method of compacting joints. If the PWL is below 80%, the Contractor shall stop production until the reason for poor compaction can be determined.

**(4) Thickness.** Thickness will be evaluated for compliance by the Engineer to the requirements shown on the Plans. Measurements of thickness will be made by the Engineer using the cores extracted from the mat for each subplot for density measurement.

**(5) Smoothness.** The finished surfaces of the pavement shall not vary more than 1/4 inch for the surface course. Each lot will be evaluated with a 12-foot straightedge. The lot size will be 2000 yd<sup>2</sup>. Measurements will be made perpendicular and parallel to the centerline at distances not to exceed 50 feet. When more than 15% of all measurements within a lot exceed the specified tolerance, the Contractor shall remove the deficient area and replace with new material. Sufficient material shall be removed to allow at least 1 inch of asphalt concrete to be placed. Skin patching will not be permitted. High points may be ground off.

**(6) Grade.** The finished surface of the pavement shall not vary from the gradeline elevations and cross sections shown on the Plans by more than 0.05 foot. The finished grade of each lot will be determined by running levels at intervals of 50 feet or less longitudinally and transversely to determine the elevation of the completed pavement. The lot size will be 2000 yd<sup>2</sup>. When more than 15% of all the measurements within a lot are outside the specified tolerance, the Contractor shall remove the deficient area and replace with new material. Sufficient material shall be removed to allow at least 1 inch of asphalt concrete to be placed. Skin patching for correcting low areas will not be permitted. High points may be ground off.

**g. Outliers.** All individual tests for asphalt content, aggregate gradation, and mat and joint density will be checked for outliers (test criterion) according to ATM SP-7, except as noted in Subsection 401-5.1. Outliers will be discarded, and the PWL will be determined using the remaining test values.

If any sieve size on a gradation test or the asphalt cement content is an outlier, then the gradation test results and the asphalt cement content results for that sample will not be included in the price adjustment. The density test result for that sample will be included in the price adjustment provided it is not an outlier also.

If the density test result is an outlier, the density test result will not be included in the price adjustment, however, the gradation and asphalt cement content results for that sample will be included provided neither is an outlier.

**TABLE 5. LOWER SPECIFICATION TOLERANCE LIMIT (L)  
AND UPPER SPECIFICATION TOLERANCE LIMIT (U)**

<b>Measured Characteristics</b>	<b>L</b>	<b>U</b>
3/4 in.	TV -6.0	TV +6.0
1/2 in.	TV -6.0	TV +6.0
3/8 in.	TV -6.0	TV +6.0
No. 4	TV -6.0	TV +6.0
No. 8	TV -6.0	TV +6.0
No. 16	TV -5.0	TV +5.0
No. 30	TV -4.0	TV +4.0
No. 50	TV -4.0	TV +4.0
No. 100	TV -3.0	TV +3.0
No. 200	TV -2.0	TV +2.0
Asphalt %	TV-0.4	TV+0.4
Mat Density	92%	98%
Joint Density	90%	98%

TV (Target Value) = Job Mix Formula value for gradation and asphalt cement content

#### **401-5.3 RETESTS.**

- a. General.** Retesting of a sample of pavement, which is outside the limits specified in Table 5, will be allowed if requested by the Contractor, in writing, within 7 days after receiving the written test results from the Engineer. Only one retest per lot will be permitted. The Engineer will select the sample location for the retest. The original test result will be discarded and the retest result will be used in the price adjustment calculation regardless of whether the retest result gives a higher or lower pay factor.

**(1)** A redefined PWL will be calculated for the lot.

**(2)** The cost for resampling shall be borne by the Contractor.

- b. Payment for Resampled Lots.** The redefined PWL for a lot will be used to calculate the payment for that lot according to Table 6.

**401-5.4 LEVELING COURSE.** Any course used for truing and leveling shall meet the requirements of Subsection 401-3.2 and 5.2b, but will not be subject to the density requirements of Subsection 401-5.2c and d. The leveling course shall be compacted with the same effort used to achieve density of the test section. The truing and leveling course shall not exceed a nominal thickness of 1-1/2 inches.

#### **CONTRACTOR QUALITY CONTROL**

**401-6.1 GENERAL.** The Contractor shall develop a Quality Control Program according to Section 100 of the General Provisions. The program shall address all elements which affect the quality of the pavement including, but not limited to:

a. Mix Design	f. Mixing and Transportation
b. Aggregate Grading	g. Placing and Finishing

c. Quality of Materials	h. Joints
d. Stockpile Management	i. Compaction
e. Proportioning	j. Surface smoothness

**401-6.2 TESTING LABORATORY.** The Contractor shall provide a fully equipped asphalt laboratory located at the plant or job site.

The effective working area of the laboratory shall be a minimum of 150 ft<sup>2</sup> with a ceiling height of not less than 7.5 feet. Lighting shall be adequate to illuminate all working areas. It shall be equipped with heating units to maintain a temperature of 70 °F ± 5 °F.

Laboratory facilities shall be kept clean and all equipment shall be maintained in proper working condition. The Engineer shall be permitted unrestricted access to inspect the Contractor's laboratory facility and witness quality control activities. The Engineer will advise the Contractor in writing of any noted deficiencies concerning the laboratory facility, equipment, supplies, or testing personnel and procedures. When the deficiencies are serious enough to be adversely affecting test results, the incorporation of the materials into the work will be suspended immediately and will not be permitted to resume until the deficiencies are satisfactorily corrected.

**401-6.3 QUALITY CONTROL TESTING.** The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to these Specifications and as set forth in the Quality Control Program. The testing program shall include, but not necessarily limited to, tests for the control of asphalt content, aggregate gradation, temperatures, aggregate moisture, field compaction, and surface smoothness. A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

- a. **Asphalt Content.** A minimum of 2 asphalt cement content tests shall be performed per lot according to Subsection 401-5.1b(1).
- b. **Gradation.** Aggregate gradations shall be determined a minimum of twice per lot from mechanical analysis of aggregate according to WAQTC FOP for AASHTO T 30 and WAQTC FOP for AASHTO T 27/T 11. When asphalt content is determined by the nuclear method, aggregate gradation shall be determined from hot bin samples on batch plants, or from the cold feed on drum mix or continuous mix plants, and tested according to WAQTC FOP for AASHTO T 27/T 11 using actual batch weights to determine the combined aggregate gradation of the mixture.
- c. **Moisture Content of Aggregate.** The moisture content of aggregate used for production shall be determined a minimum of once per lot according to WAQTC FOP for AASHTO T 255/T 265.
- d. **Moisture Content of Mixture.** The moisture content of the mixture shall be determined once per lot according to WAQTC FOP for AASHTO T 329.
- e. **Temperatures.** Temperatures shall be checked, at least 4 times per lot, at necessary locations to determine the temperatures of the dryer, the bitumen in the storage tank, the mixture at the plant, and the mixture at the job site.
- f. **In-Place Density Monitoring.** The Contractor shall conduct any necessary testing to ensure that the specified density is being achieved. A nuclear gauge may be used to monitor the pavement density according to WAQTC TM 8.
- g. **Additional Testing.** Any additional testing that the Contractor deems necessary to control the process may be performed at the Contractor's option.
- h. **Monitoring.** The Engineer reserves the right to monitor any or all of the above testing.

**401-6.4 SAMPLING.** When directed by the Engineer, the Contractor shall sample and test any material which appears inconsistent with similar material being sampled, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling shall be according to standard procedures specified.

**401-6.5 CONTROL CHARTS.** The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for aggregate gradation and asphalt content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept current. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a problem and the Contractor is not taking satisfactory corrective action, the Engineer may suspend production or acceptance of the material.

- a. Individual Measurements.** Control charts for individual measurements shall be established to maintain process control within tolerance for aggregate gradation and asphalt content. The control charts shall use the JMF Target values as indicators of central tendency for the following test parameters with associated Action and Suspension Limits:

**CONTROL CHART LIMITS FOR INDIVIDUAL MEASUREMENTS**

Sieve	Action Limit	Suspension Limit
3/4 in.	0%	0%
1/2 in.	+/-6%	+/-9%
3/8 in.	+/-6%	+/-9%
No. 4	+/-6%	+/-9%
No. 16	+/-5%	+/-7.5%
No. 50	+/-3%	+/-4.5%
No. 200	+/-2%	+/-3%
Asphalt Content	+/-0.45%	+/-0.70%

- b. Range.** Control charts for range shall be established to control process variability for the test parameters and Suspension Limits listed below. The range shall be computed for each lot as the difference between the two test results for each control parameter. The Suspension Limits specified below are based on a sample size of  $n = 2$ . Should the Contractor elect to perform more than 2 tests per lot, the Suspension Limits shall be adjusted by multiplying the Suspension Limit by 1.18 for  $n = 3$  and by 1.27 for  $n = 4$ .

**CONTROL CHART LIMITS BASED ON RANGE  
(Based on  $n = 4$ )**

Sieve	Suspension Limit
1/2 in.	14%
3/8 in.	14%
No. 4	14%
No. 16	11%
No. 50	8%
No. 200	4.5%
Asphalt Content	1%



- c. **Corrective Action.** The Quality Control Plan shall indicate that appropriate action shall be taken when the process is believed to be out of tolerance. The Plan shall contain sets of rules to gauge when a process is out of control and detail what action will be taken to bring the process into control. As a minimum, a process shall be deemed out of control and production stopped and corrective action taken, if:

- (1) One point falls outside the Suspension Limit line for individual measurements or range; or
- (2) Two points in a row fall outside the Action Limit line for individual measurements.

## **METHOD OF MEASUREMENT**

**401-7.1 MEASUREMENT.** Hot mix asphalt will be measured by the number of tons used in the accepted work, based on recorded truck scale weights. No deduction will be made for the weight of asphalt cement in the mixture.

Asphalt cement will be measured by the number of tons of asphalt cement used in the accepted pavement determined as follows:

The method of measurement to be used will be based on one of the following procedures. The Engineer will select in writing the procedure to be used.

- a. Supplier's invoices minus waste, diversion and excess left over. This method may be used on projects where deliveries are made in sealed tankers and the plant is producing material for one project only. Method b. will be used to compute left over. Waste and diversion will be computed in a manner to be determined by the Engineer.
- b. Volume measure (tank stickings) of actual daily uses. It is the Contractor's responsibility to notify the Engineer whenever material is to be added to the calibrated volume measure or whenever material from the volume measure is to be used for work other than that specified in this contract.
- c. Percent of asphalt cement for each subplot as determined by ATM 405 or WAQTC FOP for AASHTO T 308 multiplied by the weight represented by that subplot.

Method c. will be used for determining asphalt cement quantity unless otherwise directed in writing by the engineer. Whichever method is used must be used for the duration of the project. Another method may be used and computed as a check, but only one method will be used for payment computation.

## **BASIS OF PAYMENT**

**401-8.1 PAYMENT.** Payment for an accepted lot of hot mix asphalt will be made at the contract unit price per ton for hot mix asphalt and asphalt cement adjusted according to Subsection 401-8.1a.

The price shall be compensation for furnishing all materials, for all preparation, mixing, and placing of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

- a. **Basis of Adjusted Payment.** The Asphalt Price Adjustment will be the sum of the price adjustments for each lot. The lot Pay Factors for density, gradation and asphalt cement content are determined from Table 6 using Percent Within Limits (PWL) calculated from Section 110 of the General Provisions. The maximum pay factor for the largest sieve size for gradation will be 1.00. The price adjustment will be based on the Composite Pay Factor (CPF) for asphalt content and aggregate

gradation or the Density Pay Factor (DPF) whichever is the lowest value. CPF and DPF is rounded to the nearest hundredth. Table 7 is used to determine the weight factor (f) for each sieve size and asphalt content.

The hot mix asphalt Composite Pay Factor (CPF) is computed for asphalt cement content and all sieves using the following formula:

$$CPF = \frac{[f_{3/4in}(PF_{3/4in}) + f_{1/2in}(PF_{1/2in}) + \dots + f_{ac}(PF_{ac})]}{\Sigma f}$$

**TABLE 6. PRICE ADJUSTMENT SCHEDULE**

Percentage of Material Within the Specification Limit (PWL)	Pay Factor (PF)
96-100	1.05
90-95	0.01 PWL + 0.10
75-89	0.005 PWL + 0.55
55-74	0.014 PWL - 0.12
Below 55	0*

\* If the Composite Pay Factor or the Density Pay Factor falls below 0.65, the lot shall be removed and replaced. However, the Engineer may decide to allow the deficient lot to remain in place. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, the Pay Factor for the lot shall be 0.50.

**TABLE 7. WEIGHT FACTORS**

Sieve Size	Factor " f "
3/4 in.	4
1/2 in.	5
3/8 in.	5
No. 4	4
No. 8	4
No. 16	4
No. 30	5
No. 50	5
No. 100	4
No. 200	20
Asphalt %	40

The price adjustment for each individual lot will be calculated as follows:

Price Adjustment = [(CPF or DPF)\*-1] x (tons in lot) x (PAB)

PAB = Price Adjustment Base per ton (for mix including asphalt cement)

PAB for Hot Mix Asphalt with PG 52-28 = \$45.00

PAB for Hot Mix Asphalt with PG 58-28 = \$55.00

PAB for Hot Mix Asphalt with PG 64-28 = \$60.00

\* Composite Pay Factor (CPF) or Density Pay Factor (DPF) whichever is lower value.

**b. Payment.** Payment will be made under:

Item P-401a Hot mix asphalt Type \_\_\_, Class \_\_\_ - per ton

Item P-401b Hot Mix Asphalt Price Adjustment - contingent sum

Item P-401c Asphalt cement [ Performance Grade ] - per ton  
 Item P-401d Asphalt Cement Treated Base - per ton

### TESTING REQUIREMENTS

WAQTC FOP for AASHTO T 2	Sampling Aggregates
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregate and Soils
WAQTC FOP for AASHTO T 30	Mechanical Analysis of Extracted Aggregate
WAQTC FOP for AASHTO T 40	Sampling Bituminous Materials
WAQTC FOP for AASHTO TP 61	Percentage of Fracture in Coarse Aggregate
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 166/T 275	Bulk Specific Gravity and Percent Compaction of Bituminous Mixes
WAQTC FOP for AASHTO T 168	Sampling Bituminous Mixes
WAQTC FOP for AASHTO T 176	Sand Equivalent
WAQTC FOP for AASHTO T 209	Maximum Specific Gravity of Bituminous Mixes
WAQTC FOP for AASHTO T 255/T 265	Moisture Content of Aggregate and Soils
WAQTC FOP for AASHTO T 308	Asphalt Binder Content of Bituminous Mixes by Ignition Method
WAQTC FOP for AASHTO T 329	Moisture Content of Hot-Mix Asphalt (HMA) by Oven Method
WAQTC TM 8	In-Place Density of Bituminous Mixes using the Nuclear Moisture-Density Gauge.
ATM 306	Flat and Elongated
ATM 313	Degradation Value of Aggregate
ATM 405	Asphalt Cement Content of Asphalt Concrete Mixtures by the Nuclear Method
ATM 414	Anti-Strip Requirements of Hot Mix Asphalt
ATM 417	Hot Mix Asphalt Design by the Marshall Method
ATM SP-7	Determination of Outlier Test Results
AASHTO T 53	Softening Point of Bitumen (Ring-and-Ball Apparatus)
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

AASHTO T 127	Sampling and Amount of Testing of Hydraulic Cement
AASHTO M 156	Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T 195	Determining Degree of Particle Coating of Bituminous-Aggregate Mixtures
AASHTO M 320	Performance-Graded Asphalt Binder
ASTM D 5801	Test Method for Toughness and Tenacity of Bituminous Materials
The Asphalt Institute	Mix Design Methods for Asphalt Concrete Manual No. 2 (MS-2)
The Asphalt Institute	Hot-Mix Recycling Manual No. 20 (MS-20)

#### **MATERIAL REQUIREMENTS**

AASHTO R 14	Classifying Hot-Mix Recycling Agents
AASHTO M 17	Mineral Filler for Bituminous Paving Mixtures

## ITEM P-501 PORTLAND CEMENT CONCRETE PAVEMENT

### DESCRIPTION

**501-1.1** This work shall consist of pavement composed of portland cement concrete, without reinforcement, constructed on a prepared underlying surface according to these specifications and shall conform to the lines, grades, thickness, and typical cross sections shown on the Plans.

### MATERIALS

#### 501-2.1 AGGREGATES.

- a. **Fine Aggregate.** Fine aggregate shall conform to the requirements of AASHTO M 6, Class A, except part a in Table 2 is deleted. Gradation shall meet the requirements of Table 1 when tested according to WAQTC FOP for AASHTO T 27/T 11, except as may otherwise be qualified under Section 5.
- b. **Coarse Aggregate.** Coarse aggregate shall conform to the requirements of AASHTO M 80, Class B. Gradations shall meet the requirements of AASHTO M 43, Number 57 or 67, when tested according to WAQTC FOP for AASHTO T 27/T 11.

Aggregates delivered to the mixer shall consist of crushed stone, crushed or uncrushed gravel, crushed recycled concrete pavement, or a combination thereof. The aggregate shall be composed of clean, hard, uncoated particles and shall meet the requirements for deleterious substances contained in AASHTO M 80, Class A. Dust and other coating shall be removed from the aggregates by washing, if necessary. The aggregate in any size group shall not contain more than 8% by weight of flat and elongated pieces when tested according to ATM 306. The percentage of wear shall be no more than 40 when tested according to AASHTO T 96.

**501-2.2 CEMENT.** Cement shall conform to the requirements of AASHTO M 85 including the low-alkali requirement.

If for any reason, cement becomes partially set or contains lumps of caked cement, it shall be rejected. Cement salvaged from discarded or used bags shall not be used.

**501-2.3 CEMENTITIOUS MATERIALS.** Fly ash shall meet the requirements of AASHTO M 295, Class C or Class F, except that the moisture content shall be 1% maximum and the amount retained on the No. 325 sieve when wet-sieved is 30% maximum. The supplementary optional chemical and physical properties shall apply.

**501-2.4 PREMOLDED JOINT FILLER.** Premolded joint filler for expansion joints shall conform to the requirements of AASHTO M 213 and shall be punched to admit the dowels where called for on the Plans. The filler for each joint shall be furnished in a single piece for the full depth and width required for the joint, unless otherwise specified by the Engineer. When the use of more than one piece is required for a joint, the abutting ends shall be fastened securely and held accurately to shape by stapling or other positive fastening means satisfactory to the Engineer.

**501-2.5 JOINT SEALER.** The joint sealer for the joints in the concrete pavement shall meet the requirements of Item P-605 and shall be of the type(s) specified in the Plans.

**501-2.6 STEEL REINFORCEMENT.** Reinforcing shall consist of Welded Steel Wire Fabric conforming to the requirements of AASHTO M 55.. Welded wire fabric shall be furnished in flat sheets only.

**501-2.7 DOWEL AND TIE BARS.** Tie bars shall be deformed steel bars and conform to the requirements of AASHTO M 31 or AASHTO M 322.

Dowel bars shall be plain steel bars conforming to AASHTO M 31 or AASHTO M322, and shall be free from burring or other deformation restricting slippage in the concrete. High strength dowel bars shall conform to AASHTO M 31, Bare Finish. Before delivery to the construction site each dowel bar shall be painted on all surfaces with one coat of paint meeting Federal Specification TT-P-664. If plastic or epoxy-coated steel dowels are used no paint coating is required, except when specified for a particular situation on the contract Plans. Coated dowels shall conform to the requirements of AASHTO M 254.

The sleeves for dowel bars used in expansion joints shall be metal or other type of an approved design to cover 2 to 3 inches of the dowel, with a closed end and with a suitable stop to hold the end of the bar at least 1 inch from the closed end of the sleeve. Sleeves shall be of such design that they will not collapse during construction.

**501-2.8 WATER.** Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable, or other substances injurious to the finished product. Water will be tested according to the requirements of AASHTO T 26. Water known to be of potable quality may be used without testing.

**501-2.9 COVER MATERIAL FOR CURING.** Curing materials shall conform to one of the following specifications:

- a. Liquid membrane-forming compound conforming to AASHTO M 148, Type 2, Class B.
- b. White polyethylene film conforming to AASHTO M 171.
- c. White burlap-polyethylene sheeting conforming to AASHTO M 171.
- d. Waterproof paper conforming to AASHTO M 171

**501-2.10 ADMIXTURES.** The use of any material added to the concrete mix shall be approved by the Engineer. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the Engineer may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the Engineer from the supply of material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

- a. **Air-Entraining Admixtures.** Air-entraining admixtures shall meet the requirements of AASHTO M 154 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any chemical admixtures shall be compatible.
- b. **Chemical Admixtures.** Water-reducing, set retarding, and set-accelerating admixtures shall meet the requirements of AASHTO M 194, including the flexural strength test.

**501-2.11 EPOXY-RESIN.** Epoxy-resin used to anchor dowels and tie bars in pavements shall conform to the requirements of AASHTO M 235, Type I, Grade 3, Class C. Class A or B shall be used when the surface temperature of the hardened concrete is below 60 °F.

**501-2.12 MATERIAL ACCEPTANCE.** Prior to use of materials, the Contractor shall submit certified test reports to the Engineer for those materials proposed for use during construction. The certification shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material passed or failed.

The Engineer may request samples for testing, prior to and during production, to verify the quality of the materials and to ensure conformance with the applicable specifications.

## **MIX DESIGN**

**501-3.1 PROPORTIONS.** Concrete shall be normal weight concrete designed to achieve a 28-day flexural strength of 735 psi. The mix shall be designed according to the American Concrete Institute (ACI) Pub. 301

Section 4, and ACI Pub. 214 using the absolute volume method per ACI Pub. 211.1. Acceptance of the concrete will be based on a flexural strength of 645 psi.

The Contractor shall note that to ensure that the concrete actually produced will meet or exceed the acceptance criteria for the specified strength, the mix design average strength must be higher than the specified strength. The amount of overdesign necessary to meet specification requirements depends on the producer's standard deviation of flexural test results and the accuracy which that value can be estimated from historic data for the same or similar materials.

The minimum cementitious material (cement plus fly ash) shall be 564 lbs/yd<sup>3</sup>. The ratio of water to cementitious material, including free surface moisture on the aggregates but not including moisture absorbed by the aggregates shall not be more than 0.50 by weight.

Prior to the start of paving operations and after approval of all material to be used in the concrete, the Contractor shall submit a mix design showing the proportions and flexural strength obtained from the concrete at 7 and 28 days. The mix design shall include copies of test reports, including test dates, and a complete list of materials including type, brand, source, and amount of cement, fly ash, coarse aggregate, fine aggregate, water, and admixtures. The fineness modulus of the fine aggregate and the air content shall also be shown. The mix design shall be submitted to the Engineer at least 40 days prior to the start of operations. Production shall not begin until the mix design is approved in writing by the Engineer.

Should a change in sources be made, or admixtures added or deleted from the mix, a new mix design must be submitted to the Engineer for approval.

Flexural strength test specimens shall be prepared according to WAQTC FOP for AASHTO T 23 and tested according to AASHTO T 97.

**501-3.2 CEMENTITIOUS MATERIALS.** Fly ash may be used in the mix design. When fly ash is used as a partial replacement for cement, the minimum cement content may be met by considering portland cement plus fly ash as the total cementitious material. The fly ash replacement rate shall be 1.0-1.25 for Class C and 1.25 for Class F. Fly ash substitution shall not exceed 20% by weight of the portland cement.

### **501-3.3 ADMIXTURES.**

- a. **Air-Entraining.** Air-entraining admixture shall be added in such a manner that will insure uniform distribution of the agent throughout the batch. The air content of freshly mixed air-entrained concrete shall be based upon trial mixes with the materials to be used in the work adjusted to produce concrete of the required plasticity and workability. The percentage of air in the mix shall be 5-8. Air content shall be determined by testing according to WAQTC FOP for AASHTO T 152..
- b. **Chemical.** Water-reducing, set-controlling, and other approved admixtures shall be added to the mix in the manner recommended by the manufacturer and in the amount necessary to comply with the specification requirements. Tests shall be conducted on trial mixes, with the materials to be used in the work, according to AASHTO M 194.

**501-3.4 TESTING LABORATORY.** The laboratory used to develop the mix design shall meet the requirements of ASTM C 1077. A certification that it meets these requirements shall be submitted to the Engineer prior to the start of mix design and shall contain as a minimum:

- a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.
- b. A statement that the equipment used in developing the mix design is in calibration.
- c. A statement that each test specified in developing the mix design is offered in the scope of the laboratory's services.

- d. A copy of the laboratory's quality control system.

## **CONSTRUCTION METHODS**

**501-4.1 EQUIPMENT.** The Contractor shall furnish all equipment and tools necessary for handling materials and performing all parts of the work.

- a. **Batch Plant and Equipment.** The batch plant and equipment shall conform to the requirements of AASHTO M 157.

- b. **Mixers and Transportation Equipment.**

- (1) **General.** Concrete may be mixed at a central plant, or wholly or in part in truck mixers. Each mixer shall have attached in a prominent place a manufacturer's nameplate showing the capacity of the drum in terms of volume of mixed concrete and the speed of rotation of the mixing drum or blades.

- (2) **Central Plant Mixer.** Central plant mixers shall conform to the requirements of AASHTO M 157. The mixer shall be examined daily for changes in condition due to accumulation of hard concrete or mortar or wear of blades. The pickup and throwover blades shall be replaced when they have worn down 3/4 inch or more. The Contractor shall have a copy of the manufacturer's design on hand showing dimensions and arrangement of blades in reference to original height and depth.

- (3) **Truck Mixers and Truck Agitators.** Truck mixers used for mixing and hauling concrete and truck agitators used for hauling central-mixed concrete shall conform to the requirements of AASHTO M 157.

- (4) **Nonagitator Trucks.** Nonagitator hauling equipment shall conform to the requirements of AASHTO M 157.

- c. **Finishing Equipment.** The finishing equipment shall be of sufficient weight and power for proper finishing of the concrete. The finishing machine shall be designed and operated to strike off, screed and consolidate the concrete such that laitance on the surface is less than 1/8 inch thick.

- d. **Vibrators.** Vibrator shall be either internal type with immersed tube or multiple spuds, or surface type vibrating pan or screed. For pavements 8 inches or more thick, internal vibrators shall be used. They may be attached to the spreader or the finishing machine, or they may be mounted on a separate carriage. Operating frequency for internal vibrators shall be between 8,000 and 12,000 vibrations per minute. Average amplitude for internal vibrators shall be 0.025-0.05 inches. For pavements less than 8 inches thick, vibrating surface pans or screeds shall be allowed. Operating frequencies for surface vibrators shall be between 3,000 and 6,000 vibrations per minute.

The number, spacing, and frequency shall be as necessary to provide a dense and homogeneous pavement. Adequate power to operate all vibrators shall be available on the paver. The vibrators shall be automatically controlled so that they shall be stopped as forward motion ceases.

Hand held vibrators may be used in irregular areas.

- e. **Concrete Saws.** The Contractor shall provide sawing equipment adequate in number of units and power to complete the sawing to the required dimensions. The Contractor shall provide at least one standby saw in good working order and a supply of saw blades at the site of the work at all times during sawing operations.

- f. **Side Forms.** Straight side forms shall be made of steel and shall be furnished in sections not less than 10 feet in length. Forms shall have a depth equal to the pavement thickness at the edge.



Flexible or curved forms of proper radius shall be used for curves of 100 foot radius or less. Forms shall be provided with adequate devices for secure settings so that when in place they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms with battered top surfaces and bent, twisted or broken forms shall not be used. Built-up forms shall not be used, except as approved by the Engineer. The top face of the form shall not vary from a true plane more than 1/8 inch in 10 feet, and the upstanding leg shall not vary more than 1/4 inch. The forms shall contain provisions for locking the ends of abutting sections together tightly for secure setting. Wood forms may be used under special conditions, when approved by the Engineer.

- g. Pavers.** The paver shall be fully energized, self-propelled, and designed for the specific purpose of placing, consolidating, and finishing the concrete pavement, true to grade, tolerances, and cross section. It shall be of sufficient weight and power to construct the maximum specified concrete paving lane width as shown in the Plans, at adequate forward speed, without transverse, longitudinal or vertical instability or without displacement. The paver shall be equipped with electronic or hydraulic horizontal and vertical control devices.

**501-4.2 FORM SETTING.** Forms shall be set sufficiently in advance of the concrete placement to insure continuous paving operation. After the forms have been set to correct grade, the underlying surface shall be thoroughly tamped, either mechanically or by hand, at both the inside and outside edges of the base of the forms. Forms shall be staked into place sufficiently to maintain the form in position for the method of placement.

Form sections shall be tightly locked and shall be free from play or movement in any direction. The forms shall not deviate from true line by more than 1/8 inch at any joint. Forms shall be so set that they will withstand, without visible spring or settlement, the impact and vibration of the consolidating and finishing equipment. Forms shall be cleaned and oiled prior to the placing of concrete.

The alignment and grade elevations of the forms shall be checked and corrections made by the Contractor immediately before placing the concrete.

**501-4.3 CONDITIONING OF UNDERLYING SURFACE, SLIP-FORM CONSTRUCTION.** The compacted underlying surface on which the pavement will be placed shall be widened approximately 3 feet to extend beyond the paving machine track to support the paver without any noticeable displacement. After the underlying surface has been placed and compacted to the required density, the areas which will support the paving machine and the area to be paved shall be trimmed or graded to the plan grade elevation and profile by means of a properly designed machine. The grade of the underlying surface shall be controlled by a positive grade control system using lasers, stringlines, or guide wires. If the density of the underlying surface is disturbed by the trimming operations, it shall be corrected by additional compaction and retested at the option of the Engineer before the concrete is placed except when stabilized subbases are being constructed. If damage occurs on a stabilized subbase, it shall be corrected full depth by the Contractor. If traffic is allowed to use the prepared grade, the grade shall be checked and corrected immediately before the placement of concrete. The prepared grade shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from concrete. The underlying surface shall be protected so that it will be entirely free of frost when concrete is placed.

**501-4.4 CONDITIONING OF UNDERLYING SURFACE, SIDE-FORM AND FILL-IN LANE CONSTRUCTION.** The prepared underlying surface shall be moistened with water, without saturating, immediately ahead of concrete placement to prevent rapid loss of moisture from the concrete. Damage caused by hauling or usage of other equipment shall be corrected and retested at the option of the Engineers. If damage occurs to a stabilized subbase, it shall be corrected full depth by the Contractor. A template shall be provided and operated on the forms immediately in advance of the placing of all concrete. The template shall be propelled only by hand and not attached to a tractor or other power unit. Templates shall be adjustable so that they may be set and maintained at the correct contour of the underlying surface. The adjustment and operation of the templates shall be such as will provide an accurate retest of the grade before placing the concrete thereon. All excess material shall be removed and wasted. Low areas shall be

filled and compacted to a condition similar to that of the surrounding grade. The underlying surface shall be protected so that it will be entirely free from frost when the concrete is placed. The use of chemicals to eliminate frost in the underlying surface shall not be permitted.

The template shall be maintained in accurate adjustment, at all times by the Contractor, and shall be checked daily.

**501-4.5 HANDLING, MEASURING, AND BATCHING MATERIAL.** The batch plant site, layout, equipment, and provisions for transporting material shall assure a continuous supply of material to the work. Stockpiles shall be constructed in such a manner that prevents segregation and intermixing of deleterious materials.

Aggregates that have become segregated or mixed with earth or foreign material shall not be used. All aggregates produced or handled by hydraulic methods, and washed aggregates, shall be stockpiled or binned for draining at least 12 hours before being batched. Rail shipments requiring more than 12 hours will be accepted as adequate binning only if the car bodies permit free drainage.

Batching plants shall be equipped to proportion aggregates and bulk cement, by weight, automatically using interlocked proportioning devices of an approved type. When bulk cement is used, the Contractor shall use a suitable method of handling the cement from weighing hopper to transporting container or into the batch itself for transportation to the mixer, such as a chute, boot, or other approved device, to prevent loss of cement. The device shall be arranged to provide positive assurance that the cement content specified is present in each batch.

**501-4.6 MIXING CONCRETE.** The concrete may be mixed at the work site, in a central mix plant or in truck mixers. The mixer shall be of an approved type and capacity. Mixing time shall be measured from the time all materials, except water, are emptied into the drum. All concrete shall be mixed and delivered to the site according to the requirements of AASHTO M 157. Mixed concrete from the central mixing plant shall be transported in truck mixers, truck agitators, or nonagitating trucks. The elapsed time from the addition of cementitious material to the mix until the concrete is deposited in place at the work site shall not exceed 30 minutes when the concrete is hauled in nonagitating trucks, nor 90 minutes when the concrete is hauled in truck mixers or truck agitators. Retempering concrete by adding water or by other means will not be permitted, except when concrete is delivered in transit mixers. With transit mixers additional water may be added to the batch materials and additional mixing performed to increase the slump to meet the specified requirements provided the addition of water is performed within 45 minutes after the initial mixing operations and provided the water/cementitious ratio specified in the mix design is not exceeded.

**501-4.7 LIMITATIONS ON MIXING AND PLACING.** No concrete shall be mixed, placed, or finished when the natural light is insufficient, unless an adequate and approved artificial lighting system is operated.

Unless authorized in writing by the Engineer, mixing and concreting operations shall be discontinued when a descending air temperature in the shade and away from artificial heat reaches 40 °F and shall not be resumed until an ascending air temperature in the shade and away from artificial heat reaches 35 °F.

The aggregate shall be free of ice, snow, and frozen lumps before entering the mixer. The temperature of the mixed concrete shall not be less than 50 °F at the time of placement. Concrete shall not be placed on frozen material nor shall frozen aggregates be used in the concrete.

When concreting is authorized during cold weather, water and/or the aggregates may be heated to not more than 150 °F. The apparatus used shall heat the mass uniformly and shall be arranged to preclude the possible occurrence of overheated areas which might be detrimental to the materials.

**501-4.8 PLACING CONCRETE.** The Contractor has the option of side (fixed) form or slip-form paving. At any point in concrete conveyance, the free vertical drop of the concrete from one point to another or to the underlying surface shall not exceed 3 feet.

Hauling equipment or other mechanical equipment can be permitted on adjoining previously constructed lots of pavement when the concrete strength reaches a flexural strength of 550 psi, based on the average of three specimens, with no individual specimen below 525 psi when tested according to AASHTO T 97. Subgrade and subbase planers, concrete pavers, and concrete finishing equipment may be permitted to ride upon the edges of previously constructed pavement when the concrete has attained a minimum flexural strength of 400 psi.

- a. **Side-form Method.** For the side-form method, the concrete shall be deposited on the moistened grade to require as little rehandling as possible. Unless truck mixers, truck agitators, or nonagitating hauling equipment are equipped with means for discharge of concrete without segregation of the materials, the concrete shall be placed and spread using an approved mechanical spreading device that prevents segregation of the materials. Placing shall be continuous between transverse joints without the use of intermediate bulkheads. Necessary hand spreading shall be done with shovels--not rakes. Workers shall not be allowed to walk in the freshly mixed concrete with boots or shoes coated with earth or foreign substances.

Concrete shall be deposited as near to expansion and contraction joints as possible without disturbing them but shall not be dumped from the discharge bucket or hopper onto a joint assembly unless the hopper is centered above the joint assembly.

Concrete shall be thoroughly consolidated against and along the faces of all forms and previously placed concrete and along the full length and on both sides of all joint assemblies by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, or a side form. In no case shall the vibrator be operated longer than 20 seconds in any one location, nor shall the vibrators be used to move the concrete.

- b. **Slip-form Method.** For the slip-form method, the concrete shall be placed with an approved crawler-mounted, slip-form paver designed to spread, consolidate and shape the freshly placed concrete in one complete pass of the machine so that a minimum of hand finishing will be necessary to provide a dense and homogeneous pavement in conformance with requirements of the Plans and specifications. The concrete shall be placed directly on top of the joint assemblies to prevent them from moving when the paver moves over them. Side forms and finishing screeds shall be adjustable to the extent required to produce the specified pavement edge and surface tolerance. The side forms shall be of dimensions, shape, and strength to support the concrete laterally for a sufficient length of time so that no edge slumping exceeds the requirements of Subsection 501-5.2e(5). Final finishing shall be accomplished while the concrete is still in the plastic state.

In the event that slumping or sloughing occurs behind the paver or if there are any other structural or surface defects which, in the opinion of the Engineer, cannot be corrected within permissible tolerances, paving operations shall be immediately stopped until proper adjustment of the equipment or procedures have been made. In the event that satisfactory procedures and pavement are not achieved after not more than 2,000 linear feet of single lane paving, the Contractor shall complete the balance of the work with the use of standard metal forms and the formed method of placing and curing. Any concrete not corrected to permissible tolerances shall be removed and replaced at the Contractor's expense.

**501-4.9 STRIKE-OFF OF CONCRETE AND PLACEMENT OF REINFORCEMENT.** Following the placing of the concrete, it shall be struck off to conform to the cross section shown on the Plans and to an elevation such that when the concrete is properly consolidated and finished, the surface of the pavement shall be at the elevation shown on the Plans. When reinforced concrete pavement is placed in two layers, the bottom layer shall be struck off to such length and depth that the sheet of reinforcing steel fabric or bar mat may be laid full length on the concrete in its final position without further manipulation. The reinforcement shall then be placed directly upon the concrete, after which the top layer of the concrete shall be placed, struck off, and screeded. If any portion of the bottom layer of concrete has been placed more than 30 minutes without being covered with the top layer or if initial set has taken place, it shall be removed and replaced with freshly mixed concrete at the Contractor's expense. When reinforced concrete is placed in one layer, the reinforcement

may be positioned in advance of concrete placement or it may be placed in plastic concrete by mechanical or vibratory means after spreading.

Reinforcing steel, at the time concrete is placed, shall be free of mud, oil, or other organic matter that may adversely affect or reduce bond. Reinforcing steel with rust, mill scale or a combination of both will be considered satisfactory, provided the minimum dimensions, weight, and tensile properties of a hand wire-brushed test specimen are not less than the applicable AASHTO/ASTM specification requirements.

**501-4.10 JOINTS.** Joints shall be constructed as shown on the Plans and according to these requirements. All joints shall be constructed with their faces perpendicular to the surface of the pavement and finished or edged as shown on the Plans. Joints shall not vary more than 1/2 inch from their designated position and shall be true to line with not more than 1/4 inch variation in 10 feet. The surface across the joints shall be tested with a Contractor furnished 10-foot straightedge as the joints are finished and any irregularities in excess of 1/4 inch shall be corrected before the concrete has hardened. All joints shall be so prepared, finished, or cut to provide a groove of uniform width and depth as shown on the Plans.

- a. **Construction.** Longitudinal construction joints shall be slip-formed or formed against side forms with or without keyways, as shown in the Plans.

Transverse construction joints shall be installed at the end of each day's placing operations and at any other points within a paving lane when concrete placement is interrupted for more than 30 minutes or it appears that the concrete will obtain its initial set before fresh concrete arrives. The installation of the joint shall be located at a planned contraction or expansion joint. If placing of the concrete is stopped, the Contractor shall remove the excess concrete back to the previous planned joint.

- b. **Contraction.** Contraction joints shall be installed at the locations and spacing as shown on the Plans. Contraction joints shall be installed to the dimensions required by forming a groove or cleft in the top of the slab while the concrete is still plastic or by sawing a groove into the concrete surface after the concrete has hardened. When the groove is formed in plastic concrete the sides of the grooves shall be finished even and smooth with an edging tool. If an insert material is used, the installation and edge finish shall be according to the manufacturer's instructions. The groove shall be finished or cut clean so that spalling will be avoided at intersections with other joints. Grooving or sawing shall produce a slot at least 1/8 inch wide and to the depth shown on the Plans.
- c. **Expansion.** Expansion joints shall be installed as shown on the Plans. The premolded filler of the thickness as shown on the Plans, shall extend for the full depth and width of the slab at the joint, except for space for sealant at the top of the slab. The filler shall be securely staked or fastened into position perpendicular to the proposed finished surface. A cap shall be provided to protect the top edge of the filler and to permit the concrete to be placed and finished. After the concrete has been placed and struck off, the cap shall be carefully withdrawn leaving the space over the premolded filler. The edges of the joint shall be finished and tooled while the concrete is still plastic. Any concrete bridging the joint space shall be removed for the full width and depth of the joint.
- d. **Keyways.** Keyways shall be formed in the plastic concrete by means of side forms or the use of keyway liners which are inserted during the slip-form operations. The keyway shall be formed to a tolerance of 1/4 inch in any dimension and shall be of sufficient stiffness to support the upper keyway flange without distortion or slumping of the top of the flange. The dimensions of the keyway forms shall not vary more than plus or minus 1/4 inch from the mid-depth of the pavement. Liners that remain in place permanently and become part of the keyed joint shall be made of galvanized, copper clad, or of similar rust-resistant material compatible with plastic and hardened concrete and shall not interfere with joint reservoir sawing and sealing.
- e. **Tie Bars.** Tie bars shall consist of deformed bars installed in joints as shown on the Plans. Tie bars shall be placed at right angles to the centerline of the concrete slab and shall be spaced at intervals shown on the Plans. They shall be held in position parallel to the pavement surface and in the middle

of the slab depth. When tie bars extend into an unpaved lane, they may be bent against the form at longitudinal construction joints, unless threaded bolt or other assembled tie bars are specified. These bars shall not be painted, greased, or enclosed in sleeves. When slip-form operations call for tie bars, two-piece hook bolts can be installed in the female side of the keyed joint provided the installation is made without distorting the keyed dimensions or causing edge slump. If a bent tie bar installation is used, the tie bars shall be inserted through the keyway liner only on the female side of the joint. In no case shall a bent tie bar installation for male keyways be permitted.

- f. **Dowel Bars.** Dowel bars or other load-transfer units of an approved type shall be placed across joints in the manner as shown on the Plans. They shall be of the dimensions and spacings as shown and held rigidly in the middle of the slab depth in the proper horizontal and vertical alignment by an approved assembly device to be left permanently in place. The dowel or load-transfer and joint devices shall be rigid enough to permit complete assembly as a unit ready to be lifted and placed into position. A metal, or other type, dowel expansion cap or sleeve shall be furnished for each dowel bar used with expansion joints. These caps shall be substantial enough to prevent collapse and shall be placed on the ends of the dowels as shown on the Plans. The caps or sleeves shall fit the dowel bar tightly and the closed end shall be watertight. The portion of each dowel painted with rust preventative paint, as required under Subsection 501-2.7 and shown on the Plans to receive a debonding lubricant, shall be thoroughly coated with asphalt MC-70, or an approved lubricant, to prevent the concrete from bonding to that portion of the dowel. If free-sliding plastic-coated or epoxy-coated steel dowels are used, a lubrication bond breaker shall be used except when approved pullout tests indicate it is not necessary. Where butt-type joints with dowels are designated, the exposed end of the dowel shall be oiled.

Dowel bars at contraction joints may be placed in the full thickness of pavement by a mechanical device approved by the Engineer. The device shall be capable of installing dowel bars within the maximum permissible alignment tolerances. Dowels bars at longitudinal construction joints shall be bonded in drilled holes.

- g. **Installation of Joint Devices.** All joint devices shall be approved by the Engineer.

The top of an assembled joint device shall be set at the proper distance below the pavement surface and the elevation shall be checked. Such devices shall be set to the required position and line and shall be securely held in place by stakes or other means to the maximum permissible tolerances during the placing and finishing of the concrete. Where premolded joint material is used, it shall be placed and held in a vertical position; if constructed in sections, there shall be no offsets between adjacent units.

Dowel bars and assemblies shall be checked for position and alignment. The maximum permissible tolerances on dowel bar alignment shall be according to Subsection 501-5.2. During the concrete placement operation, it is advisable to place plastic concrete directly on dowel assemblies immediately prior to passage of the paver to help maintain dowel position and alignment within maximum permissible tolerances.

When concrete is placed using slip-form pavers, dowels and tie bars shall be placed in longitudinal construction joints by bonding the dowels or tie bars into holes drilled into the hardened concrete. Holes approximately 1/8 to 1/4 inch greater in diameter than the dowel or tie bar shall be drilled with rotary-type core drills that must be held securely in place to drill perpendicularly into the vertical face of the pavement slab. Rotary-type percussion drills may be used provided that spalling of concrete does not occur. Any damage of the concrete shall be repaired by the Contractor in a method approved by the Engineer. Dowels or tie bars shall be bonded in the drilled holes using an epoxy resin material. Installation procedures shall be adequate to insure that the area around dowels is completely filled with epoxy grout. Epoxy shall be injected into the back of the hole and displaced by the insertion of the dowel bar. Bars shall be completely inserted into the hole and shall not be withdrawn and reinserted creating air pockets in the epoxy around the bar. The Contractor shall furnish a template for checking the position and alignment of the dowels. Dowel bars shall not be

less than 10 inches from a transverse joint and shall not interfere with dowels in the transverse direction.

- h. Sawing of Joints.** Joints shall be cut as shown on the Plans. Equipment shall be as described in Subsection 501-4.1. The circular cutter shall be capable of cutting a groove in a straight line and shall produce a slot at least 1/8 inch wide and to the depth shown on the Plans. The top portion of the slot shall be widened by sawing to provide adequate space for joint sealers as shown on the Plans. Sawing shall commence as soon as the concrete has hardened sufficiently to permit cutting without chipping, spalling, or tearing and before uncontrolled shrinkage cracking of the pavement occurs. Sawing shall be carried on both during the day and night as required. The joints shall be sawed at the required spacing, consecutively in sequence of the concrete placement.

#### **501-4.11 FINAL STRIKE-OFF, CONSOLIDATION, AND FINISHING.**

- a. Sequence.** The sequence of operations shall be the strike-off, floating and removal of laitance, straightedging, and final surface finish. The addition of superficial water to the surface of the concrete to assist in finishing operations will not be permitted.
- b. Finishing at Joints.** The concrete adjacent to joints shall be compacted or firmly placed without voids or segregation against the joint material; it shall be firmly placed without voids or segregation under and around all load-transfer devices, joint assembly units, and other features designed to extend into the pavement. Concrete adjacent to joints shall be mechanically vibrated as required in Subsection 501-4.8a. After the concrete has been placed and vibrated adjacent to the joints, the finishing machine shall be operated in a manner to avoid damage or misalignment of joints. If uninterrupted operations of the finishing machine, to, over, and beyond the joints, cause segregation of concrete, damage to, or misalignment of the joints, the finishing machine shall be stopped when the screed is approximately 8 inches from the joint. Segregated concrete shall be removed from the front of and off the joint; and the forward motion of the finishing machine shall be resumed. Thereafter, the finishing machine may be run over the joint without lifting the screed, provided there is no segregated concrete immediately between the joint and the screed or on top of the joint.
- c. Machine Finishing.** The concrete shall be spread as soon as it is placed, and it shall be struck off and screeded by a finishing machine. The machine shall go over each area as many times and at such intervals as necessary to give to proper consolidation and to leave a surface of uniform texture. Excessive operation over a given area shall be avoided. When side forms are used, the tops of the forms shall be kept clean by an effective device attached to the machine, and the travel of the machine on the forms shall be maintained true without lift, wobbling, or other variation tending to affect the precision finish. During the first pass of the finishing machine, a uniform ridge of concrete shall be maintained ahead of the front screed for its entire length. When in operation, the screed shall be moved forward with a combined longitudinal and transverse shearing motion, always moving in the direction in which the work is progressing, and so manipulated that neither end is raised from the side forms during the striking-off process. If necessary, this shall be repeated until the surface is of uniform texture, true to grade and cross section, and free from porous areas.
- d. Hand Finishing.** Hand finishing methods will not be permitted, except under the following conditions: in the event of breakdown of the mechanical equipment, hand methods may be used to finish the concrete already deposited on the grade; in areas of narrow widths or of irregular dimensions where operation of the mechanical equipment is impractical. Concrete, as soon as placed, shall be struck off and screeded. An approved portable screed shall be used. A second screed shall be provided for striking off the bottom layer of concrete when reinforcement is used.

The screed for the surface shall be at least 24 inches longer than the maximum width of the slab to be struck off. It shall be of approved design, sufficiently rigid to retain its shape, and shall be constructed either of metal or of other suitable material covered with metal. Consolidation shall be attained by the use of suitable vibrators.

- e. **Floating.** After the concrete has been struck off and consolidated, it shall be further smoothed and trued by means of a longitudinal float using one of the following methods:

(1) **Hand Method.** Long-handled floats shall not be less than 12 feet in length and 6 inches in width, stiffened to prevent flexibility and warping. The float shall be operated from foot bridges spanning but not touching the concrete or from the edge of the pavement. Floating shall pass gradually from one side of the pavement to the other. Forward movement along the centerline of the pavement shall be in successive advances of not more than one-half the length of the float. Any excess water or laitance in excess of 1/8 inch thick shall be removed and wasted.

(2) **Mechanical Method.** The Contractor may use a machine composed of a cutting and smoothing float(s), suspended from and guided by a rigid frame and constantly in contact with, the side forms or underlying surface. If necessary, long-handled floats having blades not less than 5 feet in length and 6 inches in width may be used to smooth and fill in open-textured areas in the pavement. When the crown of the pavement will not permit the use of the mechanical float, the surface shall be floated transversely by means of a long-handled float. Care shall be taken not to work the crown out of the pavement during the operation. After floating, any excess water and laitance in excess of 1/8 inch thick shall be removed and wasted. Successive drags shall be lapped one-half the length of the blade.

- f. **Straight-edge Testing and Surface Correction.** After the pavement has been struck off and while the concrete is still plastic, it shall be tested for trueness with a Contractor furnished 16-foot straightedge swung from handles 3 feet longer than one-half the width of the slab. The straightedge shall be held in contact with the surface in successive positions parallel to the centerline and the whole area gone over from one side of the slab to the other, as necessary. Advancing shall be in successive stages of not more than one-half the length of the straightedge. Any excess water and laitance in excess of 1/8 inch thick shall be removed from the surface of the pavement and wasted. Any depressions shall be immediately filled with freshly mixed concrete, struck off, consolidated, and refinished. High areas shall be cut down and refinished. Special attention shall be given to assure that the surface across joints meets the smoothness requirements of Subsection 501-5.2. Straightedge testing and surface corrections shall continue until the entire surface is found to be free from observable departures from the straightedge and until the slab conforms to the required grade and cross section. The use of long-handled wood floats shall be confined to a minimum; they may be used only in emergencies and in areas not accessible to finishing equipment.

**501-4.12 SURFACE TEXTURE.** The surface of the pavement shall be finished with either a broom, burlap drag, or artificial turf finish for all newly constructed concrete pavements. It is important that the texturing equipment not tear or unduly roughen the pavement surface during the operation. Any imperfections resulting from the texturing operation shall be corrected. The corrugations shall be uniform in appearance and approximately 1/16 inch in depth.

- a. **Brush or Broom Finish.** If the pavement surface texture is to be a type of brush or broom finish, it shall be applied when the water sheen has practically disappeared. The equipment shall operate transversely across the pavement surface.
- b. **Burlap Drag Finish.** If a burlap drag is used to texture the pavement surface, it shall be at least 15 oz/yd<sup>2</sup>. To obtain a textured surface, the transverse threads of the burlap shall be removed approximately 1 foot from the trailing edge. A heavy buildup of grout on the burlap threads produces the desired wide sweeping longitudinal striations on the pavement surface.
- c. **Artificial Turf Finish.** If artificial turf is used to texture the surface, it shall be applied by dragging the surface of the pavement in the direction of concrete placement with an approved full-width drag made with artificial turf. The leading transverse edge of the artificial turf drag will be securely fastened to a lightweight pole on a traveling bridge. At least 24 inches of the artificial turf shall be in contact with the concrete surface during dragging operations. A variety of different types of artificial

turf are available and approval of any one type will be done only after it has been demonstrated by the Contractor to provide a satisfactory texture. One type that has provided satisfactory texture consists of 7,200 approximately 0.85-inches-long polyethylene turf blades per square foot.

**501-4.13 CURING.** Immediately after finishing operations are completed and marring of the concrete will not occur, the entire surface of the newly placed concrete shall be cured for a 7-day cure period according to one of the methods below. Failure to provide sufficient cover material of whatever kind the Contractor may elect to use, or lack of water to adequately take care of both curing and other requirements, shall be cause for immediate suspension of concreting operations. The concrete shall not be left exposed for more than 1/2 hour during the curing period. The concrete shall be maintained at a temperature of at least 50 °F for a period of 72 hours after placing and at a temperature above freezing for the remainder of the curing time. The Contractor shall be responsible for the quality and strength of the concrete placed during cold weather, and any concrete injured by frost action shall be removed and replaced at the Contractor's expense.

- a. **Impervious Membrane Method.** The entire surface of the pavement shall be sprayed uniformly with white pigmented curing compound immediately after the finishing of the surface and before the set of the concrete has taken place. The curing compound shall not be applied during rainfall. Curing compound shall be applied by mechanical sprayers under pressure at the rate of 1 gallon to not more than 150 square feet. The spraying equipment shall be of the fully atomizing type equipped with a tank agitator. At the time of use, the compound shall be in a thoroughly mixed condition with the pigment uniformly dispersed throughout the vehicle. During application the compound shall be stirred continuously by mechanical means. Hand spraying of odd widths or shapes and concrete surfaces exposed by the removal of forms will be permitted. The curing compound shall be of such character that the film will harden within 30 minutes after application. Should the film become damaged from any cause, including sawing operations, within the required curing period, the damaged portions shall be repaired immediately with additional compound or other approved means. Upon removal of side forms, the sides of the exposed slabs shall be protected immediately to provide a curing treatment equal to that provided for the surface.
- b. **Polyethylene Films.** The top surface and sides of the pavement shall be entirely covered with polyethylene sheeting. The units shall be lapped at least 18 inches. The sheeting shall be placed and weighted to cause it to remain in contact with the surface and sides. The sheeting shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the pavement. Unless otherwise specified, the sheeting shall be maintained in place for 7 days after the concrete has been placed.
- c. **Waterproof Paper.** The top surface and sides of the pavement shall be entirely covered with waterproofed paper. The units shall be lapped at least 18 inches. The paper shall be placed and weighted to cause it to remain in contact with the surface covered. The paper shall have dimensions that will extend at least twice the thickness of the pavement beyond the edges of the slab. The surface of the pavement shall be thoroughly saturated prior to placing of the paper. Unless otherwise specified, the paper shall be maintained in place for 7 days after the concrete has been placed.
- d. **White Burlap-Polyethylene Sheets.** The surface of the pavement shall be entirely covered with the sheeting. The sheeting used shall be such length (or width) that it will extend at least twice the thickness of the pavement beyond the edges of the slab. The sheeting shall be placed so that the entire surface and both edges of the slab are completely covered. The sheeting shall be placed and weighted to remain in contact with the surface covered, and the covering shall be maintained fully saturated and in position for 7 days after the concrete has been placed.

**501-4.14 REMOVING FORMS.** Unless otherwise specified, forms shall not be removed from freshly placed concrete until it has hardened sufficiently to permit removal without chipping, spalling, or tearing but in no case, less than 24 hours. After the forms have been removed, the sides of the slab shall be cured as outlined in one of the methods indicated in Subsection 501-4.14. Major honeycombed areas shall be considered as defective work and shall be removed and replaced according to Subsection 501-5.2.



**501-4.15 SEALING JOINTS.** The joints in the pavement shall be sealed according to Section P-605.

**501-4.16 PROTECTION OF PAVEMENT.** The Contractor shall protect the pavement and its appurtenances against both public traffic and traffic caused by the Contractor's employees and agents. This shall include workers to direct traffic and the erection and maintenance of warning signs, lights, pavement bridges, crossovers, and protection of unsealed joints from intrusion of foreign material, etc. Any damage to the pavement occurring prior to final acceptance shall be repaired or the pavement replaced at the Contractor's expense. The Contractor shall have available at all times, materials for the protection of the edges and surface of the unhardened concrete. Such protective materials shall consist of rolled polyethylene sheeting at least 4 mils thick of sufficient length and width to cover the plastic concrete slab and any edges. The sheeting may be mounted on either the paver or a separate movable bridge from which it can be unrolled without dragging over the plastic concrete surface. When rain appears imminent, all paving operations shall stop and all available personnel shall begin covering the surface of the unhardened concrete with the protective covering.

**501-4.17 OPENING TO TRAFFIC.** The pavement shall not be opened to traffic until test specimens molded and cured according to WAQTC FOP for AASHTO T 23 have attained a flexural strength of 550 psi when tested according to AASHTO T 97. If such tests are not conducted, the pavement shall not be opened to traffic until 14 days after the concrete was placed. Prior to opening to traffic, the pavement shall be cleaned.

### **MATERIAL ACCEPTANCE**

**501-5.1 ACCEPTANCE SAMPLING AND TESTING.** All acceptance sampling and testing, with the exception of coring for thickness determination, necessary to determine conformance with the requirements specified in this subsection will be performed by the Engineer. Concrete will be accepted for strength and thickness on a lot basis. After initial curing, the Contractor shall deliver the beams to the Central Region Materials Laboratory (5750 Tudor Road, Anchorage, Alaska) or the Northern Region Materials Laboratory (2301 Peger Road, Fairbanks, Alaska); or the Southeast Region Materials Laboratory (6860 Glacier Highway, Juneau, Alaska); as directed by the Engineer, for final curing and/or acceptance testing. Deliver cores for measuring thickness to the Project Engineer.

Lot Size. A lot will consist of 1000 cubic yards.

#### **a. Flexural Strength.**

- (1) Sampling.** Each lot will be divided into five equal sublots. One sample shall be taken for each subplot from the plastic concrete delivered to the job site. Sampling locations will be determined by the Engineer according to random sampling procedures contained in ASTM D 3665. The concrete shall be sampled according to WAQTC TM 2. The Contractor shall make and initially cure the number of flexural beam specimens specified according to WAQTC FOP for AASHTO T 23. Each beam shall be between 20 and 30 inches in length..
- (2) Testing.** Two specimens shall be made from each sample. The flexural strength of each specimen shall be determined according to AASHTO T 97 at a loading rate that constantly increases the extreme fiber stress at the mid-point of the allowable range. Test results will be checked for outliers as described in Subsection 501-5.1.d. and outliers will be discarded. The flexural strength for each subplot will be computed by averaging the results of the remaining test specimens representing that subplot.
- (3) Curing.** The Contractor shall provide adequate facilities for the initial curing of beams according to WAQTC FOP for AASHTO T 23.
- (4) Acceptance.** Acceptance of pavement for flexural strength will be determined by the Engineer according to Subsection 501-5.2.

- b. Pavement Thickness.** Pavement placed using fixed forms shall not be cored. Sampling and testing will be accomplished by inspection and measurement of the forms prior to and after placing of concrete. Sampling and testing for pavement placed with slipform paving methods will be as follows:

- (1) Sampling.** Each lot will be divided into four equal sublots and one core shall be taken by the Contractor for each subplot. Sampling locations will be determined by the Engineer according to random sampling procedures contained in ASTM D 3665. Areas, such as thickened edges, with planned variable thickness, will be excluded from sample locations.

Cores shall be neatly cut with a core drill. The Contractor shall furnish all tools, labor, and materials for cutting samples and filling the cored hole. Core holes shall be filled by the Contractor with a non-shrink grout approved by the Engineer within one day after sampling.

- (2) Testing.** The thickness of the cores will be determined by the Engineer by the average caliper measurement according to AASHTO T 148.

- (3) Acceptance.** Acceptance of pavement for thickness will be determined by the Engineer according to Subsection 501-5.2.

- c. Partial Lots.** When sampling for flexural strength, if 150 cubic yards or less remain to complete the project quantity, it will be considered as part of the previous subplot. If more than 150 cubic yards remain, it will be considered as a complete subplot and sampled and tested as such.

If a project has more than 1 lot and less than 4 additional sublots have been sampled at the time a lot is terminated, the additional sublots will be included in the previous lot. If 4 or more additional sublots have been sampled, they will be considered as a separate lot and the acceptance criteria calculation will be based on the actual number of samples in the shortened lot.

- d. Outliers.** All individual flexural strength tests within a lot will be checked for an outlier (test criterion) according to ATM, SP-7. Outliers will be discarded, and the PWL will be determined using the remaining test values.

- e. Yield, Cement Content, and Air Content.** Acceptance of pavement for yield, cement content, and air content will be determined by the Engineer according to Subsection 501-5.2 at the testing rate of 1 test series per 200 cubic yards.

#### **501-5.2 ACCEPTANCE CRITERIA.**

- a. General.** Acceptance will be based on the following characteristics of the completed pavement:

- (1)** Flexural strength
- (2)** Thickness
- (3)** Smoothness
- (4)** Grade
- (5)** Edge slump
- (6)** Dowel bar alignment
- (7)** Yield, cement content, and air content

Flexural strength and thickness will be evaluated for acceptance on a lot basis using the method of estimating percentage of material within specification limits (PWL). Acceptance using PWL considers the variability (standard deviation) of the material and the testing procedures, as well as the average (mean) value of the test results to calculate the percentage of material that is above the lower specification tolerance limit (L).

Acceptance for flexural strength will be based on the criteria contained according to Subsection 501-5.2e(1). Acceptance for thickness will be based on the criteria contained in Subsection 501-5.2e(2).

Acceptance for smoothness will be based on the criteria contained in Subsection 501-5.2e(3). Acceptance for grade will be based on the criteria contained in Subsection 501-5.2e(4).

The Engineer may at any time reject and require the Contractor to dispose of any batch of concrete mixture which is rendered unfit for use due to contamination, segregation, or improper slump. Such rejection may be based on only visual inspection. In the event of such rejection, the Contractor may take a representative sample of the rejected material in the presence of the Engineer, and if it can be demonstrated in the laboratory, in the presence of the Engineer, that such material was erroneously rejected, payment will be made for the material at the contract unit price.

- b. **Flexural Strength.** Acceptance of each lot of in-place pavement for flexural strength will be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.
- c. **Pavement Thickness.** Acceptance of each lot of in-place pavement will be based on PWL. The Contractor shall target production quality to achieve 90 PWL or higher.
- d. **Percentage of Material Within Limits (PWL).** The PWL will be determined according to procedures specified in Section 110 of the General Provisions.

The lower specification tolerance limit (L) for flexural strength and thickness will be:

Lower Specification Tolerance Limit (L)	
Flexural Strength	0.93 x strength specified in Subsection 501-3.1
Thickness	Plan Thickness - 0.5 inch

e. **Acceptance Criteria.**

- (1) **Flexural Strength.** If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined according to Subsection 501-8.1.
- (2) **Thickness.** If the PWL of the lot equals or exceeds 90%, the lot will be acceptable. Acceptance and payment for the lot will be determined according to Subsection 501-8.1.
- (3) **Smoothness.** As soon as the concrete has hardened sufficiently, the pavement surface will be tested with a 12-foot straightedge or other specified device. Surface smoothness deviations shall not exceed 1/4 inch from the straightedge placed in any direction, including placement along and spanning any pavement joint edge.

Areas in a slab showing high spots of more than 1/4 inch but not exceeding 1/2 inch in 12 feet shall be marked and immediately ground down with an approved grinding machine to an elevation that will fall within the tolerance of 1/4 inch or less. Where the departure from correct cross section exceeds 1/2 inch, the pavement shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

- (4) **Grade.** An evaluation of the surface grade will be made by the Engineer for compliance to the tolerances contained below.
  - (a) **Lateral Deviation.** Lateral deviation from established alignment of the pavement edge shall not exceed plus or minus 0.10 foot in any lane.
  - (b) **Vertical Deviation.** Vertical deviation from established grade shall not exceed plus or minus 0.05 foot at any point.
- (5) **Edge Slump.** When slip-form paving is used, not more than 15% of the total free edge of each 500-foot segment of pavement, or fraction thereof, shall have an edge slump exceeding 1/4 inch, and none of the free edge of the pavement shall have an edge slump exceeding 3/8 inch. (The

total free edge of 500 feet of pavement will be considered the cumulative total linear measurement of pavement edge originally constructed as nonadjacent to any existing pavement; i.e., 500 feet of paving lane originally constructed as a separate lane will have 1,000 feet of free edge, 500 feet of fill-in lane will have no free edge, etc.). The area affected by the downward movement of the concrete along the pavement edge shall be limited to not more than 18 inches from the edge. When excessive edge slump cannot be corrected before the concrete has hardened, the area with excessive edge slump shall be removed and replaced at the expense of the Contractor when so directed by the Engineer.

**(6) Dowel Bar Alignment.** Dowel bars and assemblies will be checked for position and alignment. The maximum permissible tolerance on dowel bar alignment in each plane, horizontal and vertical, shall not exceed 2% (or 1/4 inch per foot) of a dowel bar.

**(7) Yield, Cement Content, and Air Content.** Yield, cement content, and air content will be determined according to WAQTC FOP for AASHTO T 121 and T 152.

**f. Removal and Replacement of Concrete.** Any area or section of concrete that is removed and replaced shall be removed and replaced back to planned joints. The Contractor shall replace damaged dowels and the requirements for doweled longitudinal construction joints in Subsection 501-4.10 shall apply to all contraction joints exposed by concrete removal.

### **CONTRACTOR QUALITY CONTROL**

**501-6.1 QUALITY CONTROL PROGRAM.** The Contractor shall develop a Quality Control Program according to Section 100 of the General Provisions. The program shall address all elements which affect the quality of the pavement including but not limited to:

- |                                |                                     |   |
|--------------------------------|-------------------------------------|---|
| <b>a.</b> Mix Design           | <b>e.</b> Proportioning             | <b>i.</b> Dowel Placement and Alignment |
| <b>b.</b> Aggregate Gradation  | <b>f.</b> Mixing and Transportation | <b>j.</b> Flexural Strength             |
| <b>c.</b> Quality of Materials | <b>g.</b> Placing and Consolidation | <b>k.</b> Finishing and Curing          |
| <b>d.</b> Stockpile Management | <b>h.</b> Joints                    | <b>l.</b> Surface Smoothness            |

**501-6.2 QUALITY CONTROL TESTING.** The Contractor shall perform all quality control tests necessary to control the production and construction processes applicable to this specification and as set forth in the Quality Control Program. The testing program shall include, but not necessarily be limited to, tests for aggregate gradation, aggregate moisture content, slump, and air content.

A Quality Control Testing Plan shall be developed as part of the Quality Control Program.

**a. Fine Aggregate.**

**(1) Gradation.** A sieve analysis shall be made at a minimum of every 100 cubic yards according to WAQTC FOP for AASHTO T 27/T 11 from randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

**(2) Moisture Content.** If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made according to WAQTC FOP for AASHTO T 255/T 265.

**b. Coarse Aggregate.**

**(1) Gradation.** A sieve analysis shall be made at a minimum of every 100 cubic yards for each size of aggregate. Tests shall be made according to WAQTC FOP for AASHTO T 27/T 11 from

randomly sampled material taken from the discharge gate of storage bins or from the conveyor belt.

**(2) Moisture Content.** If an electric moisture meter is used, at least two direct measurements of moisture content shall be made per week to check the calibration. If direct measurements are made in lieu of using an electric meter, two tests shall be made per day. Tests shall be made according to WAQTC FOP for AASHTO T 255/T 265.

**c. Slump.** Slump tests shall be performed for every 100 cubic yards of material produced. Slump tests shall be performed according to WAQTC FOP for AASHTO T 119 from material randomly sampled from material discharged from trucks at the paving site. Material samples shall be taken according to WAQTC TM 2.

**d. Air Content.** Air content tests, shall be performed for every 100 cubic yards of material produced. Air content tests shall be performed according to WAQTC FOP for AASHTO T 152, from material randomly sampled from trucks at the plant site. Material samples shall be taken according to WAQTC TM 2.

**501-6.3 CONTROL CHARTS.** The Contractor shall maintain linear control charts for fine and coarse aggregate, gradation, slump, and air content.

Control charts shall be posted in a location satisfactory to the Engineer and shall be kept up to date at all times. As a minimum, the control charts shall identify the project number, the contract item number, the test number, each test parameter, the Action and Suspension Limits, or Specification limits, applicable to each test parameter, and the Contractor's test results. The Contractor shall use the control charts as part of a process control system for identifying potential problems and assignable causes before they occur. If the Contractor's projected data during production indicates a potential problem and the Contractor is not taking satisfactory corrective action, the Engineer may halt production or acceptance of the material.

**a. Fine and Coarse Aggregate Gradation.** The Contractor shall record the running average of the last five gradation tests for each control sieve on linear control charts. Specification limits contained in Tables 1 and 2 shall be superimposed on the Control Chart for job control.

**b. Slump and Air Content.** The Contractor shall maintain linear control charts both for individual measurements and range (i.e., difference between highest and lowest measurements) for slump and air content according to the following Action and Suspension Limits.

#### CONTROL CHART LIMITS

Based on Sample Size n=4

Control Parameter	Individual Measurements		Range Suspension Limit
	Action Limit	Suspension Limit	
Slump	+/- 1 in.	+/- 1.5 inch	+/- 2.4 inch
Air Content	+/- 1.2%	+/- 1.8%	+/- 2.8%

The individual measurement control charts shall use the mix design Target Values as indicators of central tendency.

**501-6.4 CORRECTIVE ACTION.** The Quality Control Plan shall indicate that appropriate action shall be taken when the process is believed to be out of control. The Quality Control Plan shall detail what action will be taken to bring the process into control and shall contain sets of rules to gauge when a process is out of control. As a minimum, a process shall be deemed out of control and corrective action taken if any one of the following conditions exists.

**a. Fine and Coarse Aggregate Gradation.** When two consecutive averages of five tests are outside of the Tables 1 or 2 specification limits, immediate steps, including a halt to production, shall be taken to correct the grading.

- b. **Fine and Coarse Aggregate Moisture Content.** Whenever the moisture content of the fine or coarse aggregate changes by more than 0.5%, the scale settings for the aggregate batcher(s) and water batcher shall be adjusted.
- c. **Slump.** The Contractor shall halt production and make appropriate adjustments whenever:
- (1) one point falls outside the Suspension Limit line for individual measurements or range; or
  - (2) two points in a row fall outside the Action Limit line for individual measurements.
- d. **Air Content.** The Contractor shall halt production and adjust the amount of air-entraining admixture whenever:
- (1) one point falls outside the Suspension Limit line for individual measurements or range; or
  - (2) two points in a row fall outside the Action Limit line for individual measurements.

Whenever a point falls outside the Action Limits line, the air-entraining admixture dispenser shall be calibrated to ensure that it is operating correctly and with good reproducibility.

#### METHOD OF MEASUREMENT

**501-7.1** Portland cement concrete pavement will be measured by the number of cubic yards of pavement as specified in place, completed and accepted.

#### BASIS OF PAYMENT

**501-8.1 PAYMENT.** Payment for accepted concrete pavement will be made at the contract unit price per cubic yard, adjusted according to Subsection 501-8.1a.

Payment shall be full compensation for all labor, materials, tools, equipment, and incidentals required to complete the work as specified herein and on the drawings.

- a. **Basis of Adjusted Payment.** The pay factor for each individual lot will be calculated according to Table 1. A pay factor will be calculated for both flexural strength and thickness. The lot pay factor will be the lower of the two pay factors.

**TABLE 1. PRICE ADJUSTMENT SCHEDULE**

Percentage of Material Within Specification Limits (PWL)	Pay Factor
96 – 100	1.05
90 – 95	0.01 PWL + 0.10
75 - 89	0.005 PWL + 0.55
55 – 74	0.14 PWL – 0.12
Below 55	0*

\*If the PWL falls below 55, the lot shall be removed and replaced. However, the Engineer may decide to allow the rejected lot to remain. In that case, if the Engineer and Contractor agree in writing that the lot shall not be removed, the pay factor for the lot shall be 0.50.

For each lot accepted, the adjusted contract unit price shall be the product of the lot pay factor for the lot and the contract unit price.

**b. Payment.** Payment will be made under:

Item P-501a      Portland Cement Concrete Pavement - per cubic yard

### **TESTING REQUIREMENTS**

AASHTO T 26	Quality of Water to be Used in Concrete
AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 97	Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
ASTM C 1077	Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation
ASTM D 3665	Random Sampling of Construction Materials
ATM 306	Percentage of Flat and Elongated Particles in Coarse Aggregate
ATM SP-7	Determination of Outlier Test Results
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 121	Unit Weight, Cement Factor & Water/Cement Ratio of Freshly Mixed Concrete
WAQTC FOP for AASHTO T 152	Air Content of Freshly Mixed Concrete by the Pressure Method
WAQTC FOP for AASHTO T 255/T 265	Moisture Content of Aggregate and Soils
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 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 Admixtures for Concrete
AASHTO M 213	Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
AASHTO M 235	Epoxy Resin Adhesives
AASHTO M 254	Corrosion-Resistant Coated Dowel Bars
AASHTO M 295	Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
AASHTO M 322	Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement
ACI 306R	Cold Weather Concreting
Federal Specification TT-P-664	



## ITEM P-602 PRIME COAT

### DESCRIPTION

**602-1.1** This item shall consist of an application of liquid asphalt material on the prepared base course according to these Specifications and in reasonably close conformity to the lines shown on the Plans.

### MATERIALS

**602-2.1 MATERIALS.** The types, grades, controlling specifications, and application temperatures for the prime coat are given in Table 1. The Engineer shall designate the specific material to be used.

**TABLE 1. MATERIAL**

Type and Grade	Specification	Application Temperatures \\ °F	Application Rate gal/yd <sup>2</sup>
<b>Emulsified Asphalt</b>			
SS-1, SS-1h	AASHTO M 140	70-160	0.27 to 0.53
MS-2, HFMS-1	AASHTO M 140	70-160	0.27 to 0.53
CSS-1, CSS-1h	AAASHTO M 208	70-160	0.27 to 0.53
CMS-2	AASHTO M 208	70-160	0.27 to 0.53
CMS-2s	\\2\\	70-160	0.22 to 0.44
<b>Cutback Asphalt</b>			
RC-30	ASTM D 2028	80+	0.27 to 0.53
RC-70	ASTM D 2028	120+	0.27 to 0.53
RC-250	ASTM D 2028	165+	0.27 to 0.53
MC-30	ASTM D 2027	80+	0.11 to 0.33

\\1\\ The maximum temperature for cutback asphalt shall be that at which fogging occurs.

\\2\\ CMS-2s shall meet the following specifications: Viscosity, Sabolt Furol, of 50 to 450 at 122 °F when tested under AASHTO T 59. Particle charge test of Positive when tested under AASHTO T 59. Sieve test maximum of 0.10% when tested under AASHTO T 59. Oil distillate, by volume of emulsion, of 20% maximum when tested under AASHTO T 59. Residue of 65% minimum when tested under AASHTO T 59. Penetration of 100 to 250 at 77 °F, 100 g, 5 s when tested under ASTM D 5. Ductility of 40 cm minimum at 77 °F when tested under ASTM D 113. Solubility in trichloroethylene of 97.5% minimum.

### CONSTRUCTION METHODS

**602-3.1 WEATHER LIMITATIONS.** The prime coat shall be applied only when the existing surface is dry or contains sufficient moisture to get uniform distribution, when the surface temperature is above 45 °F, and when the weather is not foggy or rainy. The temperature requirements may be waived, but only when so directed by the Engineer.

**602-3.2 EQUIPMENT.** The equipment used by the Contractor shall include a self-powered pressure distributor and equipment for heating the prime coat.

The distributor shall be designed, equipped, maintained, and operated so that prime coat at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank

contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

**602-3.3 APPLICATION OF PRIME COAT.** Immediately before applying the prime coat, the full width of the surface to be primed shall be swept with a power broom to remove all loose dirt and other objectionable material.

The prime coat including solvent shall be uniformly applied with an asphalt distributor at the rate specified in Table 1, depending on the base course surface texture. The type of material and application rate shall be approved by the Engineer prior to application.

Following the application, the primed surface shall be allowed to dry not less than 48 hours without being disturbed or for such additional time as may be necessary to permit the drying out of the prime until it will not be picked up by traffic or equipment. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the surfacing has been placed. Suitable precautions shall be taken by the Contractor to protect the primed surface against damage during this interval, including supplying and spreading any sand necessary to blot up excess prime coat.

**602-3.4 CONTRACTOR'S RESPONSIBILITY.** Samples of the prime coat materials that the Contractor proposes to use, together with a statement as to their source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the materials to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials, so demonstrated by certified tests, shall be acceptable.

The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of prime coat material shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the material shall not be interpreted as basis for final acceptance. All such test reports shall be subject to verification by testing samples of materials received for use on the project.

**602-3.5 FREIGHT AND WEIGH BILLS.** Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the prime coat actually used in the construction covered by the contract. The Contractor shall not remove prime coat from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer.

Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

#### **METHOD OF MEASUREMENT**

**602-4.1** Prime coat will be measured by the ton, according to Subsection GCP-90-02.

#### **BASIS OF PAYMENT**

**602-5.1** Payment will be made at the contract unit price per ton for accepted prime coat.

Payment will be made under:

Item P-602a      Prime Coat [Grade] - per ton

### **TESTING REQUIREMENTS**

AASHTO T 59	Testing Emulsified Asphalts
ASTM D 5	Penetration of Bituminous Materials
ASTM D 113	Ductility of Bituminous Materials

### **MATERIAL REQUIREMENTS**

AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 2027	Standard Specification for Cutback Asphalt (Medium-Curing Type)
ASTM D 2028	Asphalt, Cutback (Rapid Curing Grade)

## ITEM P-603 TACK COAT

### DESCRIPTION

**603-1.1** This item shall consist of preparing and treating an asphalt or concrete surface with liquid asphalt material according to these Specifications and in reasonably close conformity to the lines shown on the Plans.

### MATERIALS

**603-2.1 MATERIALS.** Tack coat material shall be either cutback asphalt, emulsified asphalt, or tar and shall conform to the requirements of Table 1. The type, grade, controlling specification, and application temperature of tack coat to be used shall be specified by the Engineer.

**TABLE 1. MATERIAL**

Type and Grade	Specification	Application Temperature °F	Application Rate gal/yd <sup>2</sup>
<b>Emulsified Asphalt</b>			
SS-1, SS-1h	AASHTO M 140	75-130	0.05 to 0.16
CSS-1, CSS-1h	AASHTO M 208	75-130	0.05 to 0.16
STE-1	\1\	68-140	0.08 to 0.10
<b>Cutback Asphalt</b>			
RC-70	ASTM D 2028	120-160	0.05 to 0.16
<b>Tar</b>			
RTCB 5, RTCB 6	AASHTO M 52	60-120	0.05 to 0.16

\1\ STE-1 shall meet the following specifications: Viscosity, Sabolt Furol at 77 °F of 30 max., when tested under AASHTO T 59. Particle charge test of Positive when tested under AASHTO T 59 (If particle charge test is inconclusive, material having a max. pH value of 6.7 will be acceptable). Storage Stability, 1 day 1% max when tested under AASHTO T 59. Demulsibility, 35 mil 0.8% Dioctyl Sodium Sulfosuccinate Solution 25 minimum when tested under AASHTO T 59. Sieve test maximum of 0.10% when tested under AASHTO T 59. Oil distillate, by volume of emulsion, of 5% maximum when tested under AASHTO T 59. Residue of 45% minimum when tested under AASHTO T 59. Penetration at 77 °F, 100 gm, 5 sec. of 100 minimum, 200 maximum when tested under ASTM D 5. Ductility at 77 °F of 40 cm minimum when tested under ASTM D 113. Solubility in trichloroethylene of 97.5% minimum

### CONSTRUCTION METHODS

**603-3.1 WEATHER LIMITATIONS.** The tack coat shall be applied only when the existing surface is dry and the surface temperature is above 40 °F. The temperature requirements may be waived, but only when so directed by the Engineer.

**603-3.2 EQUIPMENT.** The Contractor shall provide equipment for heating and applying the tack coat.

The distributor shall be designed, equipped, maintained, and operated so that tack coat at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages,

volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.

A power broom and/or blower shall be provided for any required cleaning of the surface to be treated.

**603-3.3 APPLICATION OF TACK COAT.** Immediately before applying the tack coat, the full width of surface to be treated shall be swept with a power broom and/or airblast to remove all loose dirt and other objectionable material.

Emulsified asphalt shall be applied a sufficient time in advance of the paver to ensure that all water has evaporated before any of the overlying mixture is placed on the tacked surface.

The tack coat material including vehicle or solvent shall be uniformly applied with an asphalt distributor at the rate specified in Table 1, depending on the condition of the existing surface. The type of material and application rate shall be approved by the Engineer prior to application.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit drying out and setting of the tack coat. This period shall be determined by the Engineer. The surface shall then be maintained by the Contractor until the next course has been placed. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

**603-3.4 CONTRACTOR'S RESPONSIBILITY.** Samples of the tack coat material that the Contractor proposes to use, together with a statement as to its source and character, must be submitted and approved before use of such material begins. The Contractor shall require the manufacturer or producer of the tack coat to furnish material subject to this and all other pertinent requirements of the contract. Only satisfactory materials so demonstrated by certified tests, shall be acceptable.

The Contractor shall furnish the vendor's certified test reports for each carload, or equivalent, of tack coat shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing samples of material received for use on the project.

**603-3.5 FREIGHT AND WEIGH BILLS.** Before the final estimate is allowed, the Contractor shall file with the Engineer receipted bills when railroad shipments are made, and certified weigh bills when materials are received in any other manner, of the tack coat actually used in the construction covered by the contract. The Contractor shall not remove tack coat from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

## **METHOD OF MEASUREMENT**

**603-4.1** Tack coat will be measured by the ton according to Subsection GCP-90-02.

## **BASIS OF PAYMENT**

**603.5-1** Payment will be made at the contract unit price per ton of accepted material.

Payment will be made under:

Item P-603a      Tack Coat [Grade] - per ton

### **TESTING REQUIREMENTS**

AASHTO T 59	Testing Emulsified Asphalts
ASTM D 5	Penetration of Bituminous Materials
ASTM D 113	Ductility of Bituminous Materials

### **MATERIAL REQUIREMENTS**

AASHTO M 52	Tar for Use in Road Construction
AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 633	Volume Correction Table for Road Tar
ASTM D 2028	Liquid Asphalt (Rapid-Curing Type)

## **ITEM P-605 JOINT SEALING FILLER**

### **DESCRIPTION**

**605-1.1** This item shall consist of providing and installing a resilient and adhesive joint sealing filler capable of effectively sealing joints and cracks in pavements.

### **MATERIALS**

**605-2.1 JOINT SEALERS.** Joint sealing material shall meet the requirements of ASTM D 3581.

Each lot or batch of sealing compound shall be delivered to the jobsite in the manufacturer's original sealed container. Each container shall be marked with the manufacturer's name, batch or lot number, and the safe heating temperature and shall be accompanied by the manufacturer's certification stating that the compound meets the requirements of this specification.

### **CONSTRUCTION METHODS**

**605-3.1 TIME OF APPLICATION.** Joints shall be sealed as soon after completion of the curing period as feasible and before the pavement is opened to traffic, including construction equipment. The pavement temperature shall be above 50 °F at the time of installation of the poured joint sealing material.

**605-3.2 PREPARATION OF JOINTS.** Immediately before sealing, the joints shall be thoroughly cleaned of all laitance, curing compound, and other foreign material. Cleaning shall be accomplished by wire brushing. Upon completion of cleaning, the joints shall be blown out with compressed air. The joint faces shall be surface dry when the seal is applied.

Prior to resealing joints, the existing joint material shall be removed to the depth as shown on the Plans. If joint sealer other than that originally used is specified, all existing joint sealer shall be removed.

**605-3.3 INSTALLATION OF SEALANT.** Joints shall be inspected for proper width, depth, alignment, and preparation, and shall be approved by the Engineer before sealing is allowed.

The joint sealant shall be applied uniformly solid from bottom to top and shall be filled without formation of entrapped air or voids. A backing material shall be placed as shown on the Plans and shall be nonadhesive to the concrete or the sealant material. The heating kettle shall be an indirect heating type, constructed as a double boiler. A positive temperature control and mechanical agitation shall be provided. The sealant shall not be heated to within 20 degrees (F) below the safe heating temperature. The safe heating temperature can be obtained from the manufacturer's shipping container. A direct connecting pressure type extruding device with nozzles shaped for insertion into the joint shall be provided. Any sealant spilled on the surface of the pavement shall be removed immediately.

### **METHOD OF MEASUREMENT**

**605-4.1** Joint sealing material will be measured by the linear foot of sealant in place, complete, and accepted.

### **BASIS OF PAYMENT**

**605-5.1** Payment for joint sealing material will be made at the contract unit price per linear foot.

Payment will be made under:

Item P-605a      Joint Sealing Filler - per linear foot

### **TESTING REQUIREMENTS**

ASTM D 412	Rubber Properties in Tension
ASTM D 1644	Nonvolatile Content of Varnishes

### **MATERIAL REQUIREMENTS**

ASTM D 3581	Joint Sealant, Hot-Poured, Jet-Fuel-Resistant Type, for Portland Cement Concrete and Tar-Concrete Pavements
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## ITEM P-606 ADHESIVE COMPOUND

### DESCRIPTION

**606-1.1** This specification covers two types of material: a liquid suitable for sealing electrical wire in saw cuts in pavement and sealing light fixtures or bases in pavement; a paste suitable for embedding light fixtures and aircraft tie-downs in the pavement. Both types of material are two-component filled formulas with the characteristics specified in Subsection 606-2.4. Materials supplied for use with hot mix asphalt pavements must be formulated so they are compatible with the hot mix asphalt.

### EQUIPMENT AND MATERIALS

**606-2.1 CURING.** When prewarmed to 77 °F, mixed, and placed according to manufacturer's directions, the materials shall cure at temperatures of 45 °F or above without the application of external heat.

**606-2.2 STORAGE.** The adhesive components shall not be stored at temperatures over 86 °F.

**606-2.3 CAUTION.** Installation and use shall be according to the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

**606-2.4 CHARACTERISTICS.** When mixed and cured according to the manufacturer's directions, the materials shall have the following properties shown in Table 1.

### SAMPLING, INSPECTION, AND TEST PROCEDURES

**606-3.1 TENSILE PROPERTIES.** Tests for tensile strength and elongation shall be conducted according to ASTM D 638.

**606-3.2 EXPANSION.** Tests for coefficients of linear and cubical expansion shall be conducted according to ASTM D 1168, Method B, except that mercury shall be used instead of glycerin. The test specimen(s) shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inches long by 3/8 inch in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for 1 week before conducting the test. The test temperature range shall be from 35 to 140 °F.

**606-3.3 TEST FOR DIELECTRIC STRENGTH.** Test for dielectric strength shall be conducted according to ASTM D 149 for sealing compounds to be furnished for sealing electrical wires in pavement.

**606-3.4 TEST FOR ARC RESISTANCE.** Test for arc resistance shall be conducted according to ASTM D 495 for sealing compounds to be furnished for sealing electrical wires in pavement.

**606-3.5 TEST FOR ADHESION TO STEEL.** The ends of two smooth, clean, steel specimens (approximately 1 inch X 1 inch X 6 inches) are bonded together with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch.

**TABLE 1. PROPERTY REQUIREMENTS**

Physical or Electrical Property	Minimum	Maximum	ASTM Method
Tensile			
Portland Cement Concrete	1,000 psi		D 638
Hot Mix Asphalt	395 psi		
Elongation			
Portland Cement Concrete	8% \1\		D 638
Hot Mix Asphalt	50%		D 638
Coef. of cub. exp., cm <sup>3</sup> /cm <sup>3</sup> /°C	0.00090	0.00120	D 1168
Coef. of lin. exp., cm/cm/°C	0.00030	0.00040	D 1168
Dielectric strength, short time test	350 volts/mil.		D 149
Arc resistance	125 secs.		D 495
Adhesion to steel	1,000 psi		
Adhesion to portland cement concrete	200 psi		
Adhesion to asphalt concrete	(no test available)		

\1\ 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

#### **606-3.6 ADHESION TO PORTLAND CEMENT CONCRETE.**

- a. Concrete Test Block Preparation.** The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons of water per bag of cement, a cement factor of 6, plus or minus 0.5, bags of cement per cubic yard of concrete, and a slump of 2-1/2 inches plus or minus 1/2 inch. The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%, plus or minus 0.5%, and it shall be obtained by the addition to the batch of an air-entraining admixture such as vinsol resin. The mold shall be metal with a metal base plate. Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several 1-inch by 2-inch by 3-inch test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured according to AASHTO T 126.

**TABLE 2. AGGREGATE FOR BOND TEST BLOCKS**

Type	Sieve Size	Percent Passing
Coarse Aggregate	3/4 in.	97 to 100
	1/2 in.	63 to 69
	3/8 in.	30 to 36
	No. 4	0 to 3
Fine Aggregate	No. 4	100
	No. 8	82 to 88
	No. 16	60 to 70
	No. 30	40 to 50
	No. 50	16 to 26
	No. 100	5 to 9

- b. **Bond Test.** Prior to use, oven-dry the test blocks to constant weight at a temperature of 220 to 230 °F, cool to room temperature, 73.4 ±3 °F, in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the 1-inch X 3-inch sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch.

**606-3.7 COMPATIBILITY WITH HOT MIX ASPHALT.** Test for compatibility with asphalt according to ASTM D 3407.

**606-3.8 CERTIFICATION.** The Contractor shall furnish the vendor's certified test reports for each batch of material delivered to the project. The report shall certify that the material meets specification requirements and is suitable for use with portland cement concrete or hot mix asphalt pavements. The report shall be delivered to the Engineer before permission is granted for use of the material. In addition the Contractor shall obtain a statement from the supplier or manufacturer which guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

**606-3.9 APPLICATION.** Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations.

#### **METHOD OF MEASUREMENT**

**606-4.1** The adhesive compound will be measured by the pound of adhesive as specified, in place, complete and accepted. When required in the installation of an in-runway lighting system or portion thereof, or for aircraft tie-down, no measurement will be made for direct payment of adhesive, as the cost of furnishing and installing will be considered as a subsidiary obligation in the completion of the installation.

#### **BASIS OF PAYMENT**

**606-5.1** Payment will be made, where applicable, at the contract unit price per pound for the adhesive.

Payment will be made under:

Item P-606a      Adhesive Compound - per pound

#### **TESTING REQUIREMENTS**

AASHTO T 126	Making and Curing Concrete Test Specimens in the Laboratory
ASTM D 149	Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies
ASTM D 495	High-Voltage, Low-Current, Arc Resistance of Solid Electrical Insulating Materials
ASTM D 638	Tensile Properties of Plastics
ASTM D 1168	Hydrocarbon Waxes Used for Electrical Insulation
ASTM D 3407	Joint Sealants, Hot-Poured, For Concrete and Asphalt Pavements

## ITEM P-609 SEAL COATS AND ASPHALT SURFACE TREATMENT

### DESCRIPTION

**609-1.1** This item shall consist of an asphalt surface treatment as a wearing course composed of a single or multiple application of liquid asphalt material and aggregate cover placed on the prepared primed base or properly cured wearing surface, according to these Specifications, and shall conform to the dimensions and typical cross section shown on the Plans.

**609-1.2 QUANTITIES OF MATERIALS.** The approximate amounts of materials per square yard for the asphalt surface treatment shall be as provided in Table 1 for the treatment specified on the Plans or in the Special Provisions. The exact amounts to be used shall be determined by the Engineer.

**TABLE 1. QUANTITIES OF MATERIALS**

Application No	Aggregate lb/yd <sup>2</sup>	Asphalt gal/yd <sup>2</sup>	Type of Asphalt \1\
1	40-50	0.35-0.45	Asphalt Cement
		0.40-0.50	Emulsified Asphalt
2	20-25	0.15-0.25	Asphalt Cement
		0.20-0.35	Emulsified Asphalt
3	15-20	0.15-0.20	Emulsified Asphalt

\1\ See Table 3 for grades of asphalt and spraying temperatures.

### MATERIALS

**609-2.1 AGGREGATE MATERIALS.** The aggregate material shall be either crushed stone or crushed gravel. The cover material shall be screenings; sand may be used when specified.

If the material is to be crushed stone, it shall be manufactured from sound, hard, durable rock of accepted quality and crushed to specification size. All strata, streaks, and pockets of clay, dirt, sandstone, soft rock, or other unsuitable material accompanying the sound rock shall be discarded and not allowed to enter the crusher.

If the material is to be crushed gravel, it shall consist of hard, durable, fragments of stone or gravel of accepted quality and crushed to specification size. All strata, streaks, and pockets of sand, excessively fine gravel, clay, or other unsuitable material including all stones, rocks, and boulders of inferior quality shall be discarded and not allowed to enter the crusher. The crushing of the gravel shall result in a product in which the material retained on the separate No. 4, 3/8-inch, and 1/2-inch sieves shall have at least 75% of particles with at least one fractured face as determined by WAQTC FOP for AASHTO TP 61.

The crushed aggregate shall not contain more than 8%, by weight, of elongated or flat pieces per ATM 306 and shall be free from wood, roots, vegetable, organic, or other extraneous matter. The crushed coarse aggregate shall have a percentage of wear not more than 40 at 500 revolutions, per AASHTO T 96.

The aggregate shall show no evidence of disintegration nor show a total loss greater than 12% when subjected to five cycles of the sodium sulfate accelerated soundness test specified in AASHTO T 104.

Aggregates shall have a minimum degradation value of 50 when tested according to ATM 313.

The crushed aggregate for the applications shall meet the requirements for gradation given in Table 2 when tested according to WAQTC FOP for AASHTO T 27/T 11.

**TABLE 2. REQUIREMENTS FOR GRADATION OF AGGREGATE**

Sieve Designation (square openings)	Percentage by Weight Passing Sieves
Aggregate for first application	
1 in.	100
3/4 in.	90-100
1/2 in.	20-55
3/8 in.	0-15
No. 4	0-5
No. 200	0-1
Aggregate for second application	
1/2 in.	100
3/8 in.	85-100
No. 4	10-30
No. 8	0-10
No. 16	0-5
No. 200	0-1
Aggregate for third application	
3/8 in.	100
1/4 in.	90-100
No. 4	60-85
No. 8	0-25
No. 16	0-5
No. 200	0-2

The gradations in the table represent the limits which shall determine suitability of aggregate for use for the specified applications from the sources of supply. The final gradations decided on, within the limits designated in the table, shall be uniformly graded from coarse to fine.

The cover aggregate used in the third application shall be a light-colored material whose color and reflectivity shall be approved by the Engineer.

The aggregate to be used shall show no evidence of stripping or swell when tested according to according to ATM 414 The use of antistrip agents for the control of stripping shall be used if necessary.

**609-2.2 ASPHALT MATERIAL.** The types, grades, controlling specifications, and application temperatures for the asphalt materials are shown in Table 3. The Engineer shall designate the specific material to be used.

**TABLE 3. ASPHALT MATERIALS**

Type and Grade	Specification	Spraying Temperature \1\Deg. F
Asphalt Cement		
AC 2.5, AC-5	ASTM D 3381	275+
AR-1000, 2000	ASTM D 3381	280+
120-150, 200-300	ASTM D 946	270+
Emulsified Asphalt		
RS-1	AASHTO M 140	70-140
RS-2	AASHTO M 140	125-175
MS-1, HFMS-1	AASHTO M 140	70-160
CRS-1	AASHTO M 208	125-175
CRS-2	AASHTO M 208	125-175

\1\ The maximum temperature for asphalt cements shall be below that at which fogging occurs.

## CONSTRUCTION METHODS

**609-3.1 WEATHER LIMITATIONS.** Asphalt material shall be applied only when the existing surface is dry and the atmospheric temperature is above 60 °F. No material shall be applied when rain is imminent or when dust or sand is blowing.

**609-3.2 EQUIPMENT AND TOOLS.** The Contractor shall furnish all equipment, tools, and machines necessary for the performance of the work.

- a. **Pressure Distributor.** The distributor shall be designed, equipped, maintained, and operated so that asphalt material at even heat may be applied uniformly on variable widths of surface at the specified rate. The allowable variation from the specified rate shall not exceed 10%. Distributor equipment shall include a tachometer, pressure gages, volume-measuring devices or a calibrated tank, and a thermometer for measuring temperatures of tank contents. The distributor shall be self-powered and shall be equipped with a power unit for the pump and full circulation spray bars adjustable laterally and vertically.
- b. **Aggregate Spreader.** The aggregate spreader shall be a self-propelled mechanical spreader or truck-attached mechanical spreader capable of uniformly distributing aggregate at the specified rates.
- c. **Roller.** The roller shall be a pneumatic-tired roller with an effective rolling width of at least 60 inches and capable of exerting a minimum contact pressure of 40 psi.
- d. **Power Broom.** A power broom and/or blower shall be provided for removing loose material from the surface to be treated.

**609-3.3 PREPARING UNDERLYING COURSE.** The surface of the underlying course shall be prepared, shaped, and conditioned to a uniform grade and section, as shown on the Plans and as specified. Loose dirt and other objectionable material shall be removed from the surface.

On those type of bases where a prime coat is required and specified, the prime shall be applied and satisfactorily cured before starting the asphalt surface treatment.

When specified, the Contractor shall be required to patch, with premixed material, any holes or other malformations deviating from the true cross section and grade. The premixed material shall be made of the asphalt material specified and prepared by the method directed by the Engineer. All small patches shall be thoroughly hand tamped while the large patches shall be rolled with a power or pneumatic roller.

**609-3.4 APPLICATION OF ASPHALT MATERIAL.** Asphalt material shall be applied upon the properly prepared surface at the rate and temperature specified using a pressure distributor to obtain uniform distribution at all points. To insure proper drainage, the strips shall begin along the centerline of the pavement on a crowned section or on the high side of the pavement with a one-way slope. During all applications, the surfaces of adjacent structures shall be protected in such manner as to prevent their being spattered or marred. Asphalt materials shall not be discharged into borrow pits or gutters or upon the airport area.

**609-3.5 APPLICATION OF AGGREGATE MATERIAL.** Immediately after the application of the asphalt material or when directed, the aggregates at the rate specified for each designated application shall be spread uniformly over the asphalt material. Trucks spreading aggregate shall be operated backward so that the asphalt material will be covered before the truck wheels pass over it. The aggregate shall be spread in the same width of application as the asphalt material and shall not be applied in such thickness as to cause blanketing. Back-spotting or sprinkling of additional aggregate material, and pouring additional asphalt material over areas that show up having insufficient cover or asphalt, shall be done by hand whenever necessary. Additional spreading of aggregate material shall be done with a motor-patrol grader equipped with broom moldboard, a broom drag, or a power broom, as directed by the Engineer.

Immediately after spreading each application, the aggregate shall be rolled. The rolling shall be continued until no more aggregate can be worked into the surface. In the construction of the second and third application, blading with the wire-broom moldboard attachment or broom dragging shall begin as soon as possible after the rolling has started and after the surface has set sufficiently to prevent excessive marking. Further blading and rolling on the strip being placed and on adjacent strips previously placed, shall be done as often as necessary to keep the aggregate material uniformly distributed. These operations shall be continued until the surface is evenly covered and cured to the satisfaction of the Engineer.

Succeeding applications shall not be applied until the preceding application has set and in no case until at least 24 hours have elapsed. If dust, dirt, or other foreign matter accumulates on the surface between the applications, the Contractor shall be required to sweep and clean the surface as specified herein. The asphalt material and the aggregate shall be spread upon the clean and properly cured surface and handled as required. Extreme care shall be taken in all applications to avoid brooming or tracking dirt or any foreign matter on any portion of the pavement surface under construction.

All surplus aggregate from the final application shall be swept off the surface and removed prior to final acceptance of the work.

**609-3.6 CORRECTION OF DEFECTS.** Any defects, such as raveling, low centers, lack of uniformity, or other imperfections caused by faulty workmanship, shall be corrected to the satisfaction of the Engineer.

**609-3.7 CERTIFICATION.** Samples of the asphalt materials that the Contractor proposes to use, together with a statement as to their source and character, shall be submitted and approval obtained before use of such materials begins.

The Contractor shall furnish vendor's certified test reports for each carload, or equivalent, of asphalt shipped to the project. The report shall be delivered to the Engineer before permission is granted for use of the material. The furnishing of the vendor's certified test report for the asphalt material shall not be interpreted as a basis for final acceptance. All such test reports shall be subject to verification by testing sample materials as received for use on the project.

**609-3.8 FREIGHT AND WEIGH BILLS.** Before the final estimate is allowed the Contractor shall file with the Engineer receipted bills where railroad shipments are made, and certified weight bills when materials are received in any other manner, of the asphalt and covering materials actually used in the construction covered by the contract. The Contractor shall not remove asphalt material from the tank car or storage tank until the initial outage and temperature measurements have been taken by the Engineer, nor shall the car or tank be released until the final outage has been taken by the Engineer. Copies of all freight bills and weigh bills shall be furnished to the Engineer during the progress of the work.

## **METHOD OF MEASUREMENT**

**609-4.1** The asphalt material will be measured by the ton. Water added to emulsified asphalt will not be measured for payment.

**609-4.2** The quantity of aggregate materials for the first application to be paid for will be the number of tons of aggregate used for the accepted work.

**609-4.3** The quantity of aggregate material for the second application to be paid for will be the number of tons of aggregate used for the accepted work.

**609-4.4** The weight of aggregate for the third application to be paid for will be the number of tons of aggregate used for the accepted work.

## **BASIS OF PAYMENT**

**609-5.1** Payment will be made at the contract unit price per ton for asphalt material for surface treatment and per ton for the first, second and third aggregate application.

Payment will be made under:

Item P 609a	Asphalt Material - per ton
Item P 609b	First Application Aggregate - per ton
Item P 609c	Second Application Aggregate - per ton
Item P 609d	Third Application Aggregate - per ton

#### **TESTING REQUIREMENTS**

ATM 306	Percentage of Flat and Elongated Particles in Coarse Aggregate
ATM 414	Anti-Strip Requirements of Hot Mix Asphalt
ATM 313	Degradation Value of Aggregate
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
WAQTC FOP for AASHTO TP 61	Percentage of Fracture in Coarse Aggregate
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils

#### **MATERIAL REQUIREMENTS**

AASHTO M 140	Emulsified Asphalt
AASHTO M 208	Cationic Emulsified Asphalt
ASTM D 946	Penetration-Graded Asphalt-Cement for Use in Pavement Construction
ASTM D 1250	Petroleum Measurement Tables
ASTM D 3381	Viscosity-Graded Asphalt-Cement for Use in Pavement Construction



## 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.

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.

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 water-reducing, 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 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.

**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.

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
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-620 RUNWAY AND TAXIWAY PAINTING

### DESCRIPTION

**620-1.1** This item shall consist of the painting of numbers, markings, and stripes on the surface of runways, taxiways, and aprons, according to these Specifications and at the locations shown on the Plans, or as directed by the Engineer.

### MATERIALS

**620-2.1 MATERIALS ACCEPTANCE.** The Contractor shall furnish manufacturer's certified test reports for materials shipped to the project. The certified test reports shall include a statement that the materials meet the specification requirements. The reports can be used for material acceptance or the Engineer may perform verification testing. The reports shall not be interpreted as a basis for payment. The Contractor shall notify the Engineer upon arrival of a shipment of materials to the site.

**620-2.2 PAINT.** Paint shall be waterborne or solvent base according to the requirements of Subsection 620-2.2, a. or b. Paint shall be furnished in white (37925) and yellow (33538 or 33655) according to Federal Standard No 595. Paint shall be furnished in Type II (fast drying time for no-pick-up) when tested according to ASTM D 711.

- a. **Waterborne.** Paint shall meet the requirements of Federal Specification TT-P-1952D, Type II.
- b. **Solvent Base.** Paint shall meet the requirements of Federal Specification A-A-2886A, Type II, or the State of Alaska DOT&PF maintenance specification for "Traffic Paint - No-Heat Instant Dry Pavement Marking Material".

**620-2.3 REFLECTIVE MEDIA.** Glass beads shall meet the requirements of Fed. Spec. TT-B-1325, Type I, gradation A. Glass beads shall be treated with adhesion promoting and/or flotation coatings as specified by the manufacturer of the paint.

### CONSTRUCTION METHODS

**620-3.1 WEATHER LIMITATIONS.** The painting shall be performed only when the surface is dry and when the surface temperature is at least 40 °F and rising and the pavement surface temperature is at least 5 °F above the dew point.

**620-3.2 EQUIPMENT.** Equipment shall include the apparatus necessary to properly clean the existing surface, a mechanical marking machine, a bead dispensing machine, and such auxiliary hand-painting equipment as may be necessary to satisfactorily complete the job.

The mechanical marker shall be an atomizing spray-type marking machine suitable for application of traffic paint. It shall produce an even and uniform film thickness at the required coverage and shall apply markings of uniform cross sections and clear-cut edges without running or spattering and without over spray.

**620-3.3 PREPARATION OF SURFACE.** Immediately before application of the paint, the surface shall be dry and free from dirt, grease, oil, laitance, or other foreign material which would reduce the bond between the paint and the pavement. The area to be painted shall be cleaned by sweeping and blowing or by other methods as required to remove all dirt, laitance, and loose materials. Areas which cannot be satisfactorily cleaned by brooming and blowing shall be scrubbed as directed with a 10% solution of tri-sodium phosphate or an equally suitable solution. After scrubbing, the solution shall be rinsed off and the surface dried prior to painting.

**620-3.4 LAYOUT OF MARKINGS.** The proposed markings shall be laid out in advance of the paint application. The locations of markings to receive glass beads shall be shown on the Plans. Space control points at such intervals to ensure accurate location of all markings. Provide an experienced technician to supervise the location, alignment, layout dimensions, and application of the paint.

**620-3.5 APPLICATION.** Paint shall be applied at the locations and to the dimensions and spacing shown on the Plans. Paint shall not be applied until the layout and condition of the surface have been approved by the Engineer.

The edges of the markings shall not vary from a straight line more than 1/2 inch in 50 feet, and the marking dimensions and spacings shall be within the following tolerances:

Dimension and Spacing	Tolerance
Less than 36 inches	1/2 inch
36 inches to 6 feet	1 inch
6 feet to 60 feet	2 inches
Over 60 feet	3 inches

The paint shall be mixed and applied according to the manufacturer's instructions. The addition of thinner will not be permitted. The paint shall be applied to the pavement with a marking machine at the rate shown in Table 1

**TABLE 1. APPLICATION RATES FOR PAINT AND GLASS BEADS**

Paint Type	Paint, ft <sup>2</sup> /gal maximum	Glass Beads lb/gal of paint (±2 oz.)
Waterborne	80	7
Solvent Base	80	7

Pressure apply the glass beads on the marked areas at the locations shown on the Plans using a mechanical dispenser mounted not more than 12 inches behind the paint dispenser. Beads shall be applied at the rate shown in Table 1 and shall adhere to the cured paint or all marking operations shall cease until corrections are made.

All emptied containers shall be returned to the paint storage area for checking by the Engineer. The containers shall not be removed from the airport or destroyed until authorized by the Engineer.

**620-3.6 PROTECTION.** After application of the paint, all markings shall be protected from damage until the paint is dry. All surfaces shall be protected from excess moisture and/or rain and from disfiguration by spatter, splashes, spillage, or drippings of paint.

## **METHOD OF MEASUREMENT**

**620-4.1** The quantity of runway and taxiway markings to be paid for will be the number of square feet of painting and the number of pounds of reflective media, performed according to the Specifications and accepted by the Engineer.

## **BASIS OF PAYMENT**

**620-5.1** Payment will be made at the respective contract price per square foot for runway and taxiway painting and per pound for reflective media.



Payment will be made under:

Item P-620a	Runway and Taxiway Painting - per square foot
Item P-620b	Reflective Media - per pound

### **TESTING REQUIREMENTS**

ASTM C 371	Wire-Cloth Sieve Analysis of Nonplastic Ceramic Powders
ASTM D 92	Flash and Fire Points by Cleveland Open Cup
ASTM D 711	No-Pick-Up Time of Traffic Paint
ASTM D 968	Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D 1652	Epoxy Content of Epoxy Resins
ASTM D 2074	Total Primary, Secondary, and Tertiary Amine Values of Fatty Amines by Alternative Indicator Method
ASTM D 2240	Rubber Products-Durometer Hardness
ASTM G 53	Operating Light and Water-Exposure Apparatus (Florescent UV-Condensation Type) for Exposure of Nonmetallic Materials.
Federal Test Method Standard No. 141	Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

### **MATERIAL REQUIREMENTS**

Alaska DOT/PF Yellow	Traffic Paint - No-Heat Instant Dry Pavement Marking Material; White and Yellow
ASTM D 476	Titanium Dioxide Pigments
Code of Federal Regulations	40 CFR Part 60, Appendix A, 29 CFR Part 1910.1200
Commercial Item Description (CID) A-A 2886A	Paint, Traffic, Solvent Based
Fed. Spec. TT-B-1325	Beads (Glass Spheres) Retroreflective
Fed. Spec. TT-P-1952D	Paint, traffic and Airfield Marking, Waterborne
Federal Standard 595	Colors used in Government Procurement

## ITEM P-625 COAL-TAR PITCH EMULSION SEAL COAT

### DESCRIPTION

**625-1.1** This item shall consist of an application of a coal-tar emulsion seal coat, with or without mineral aggregate, applied on an existing, previously prepared bituminous surface, according to these Specifications for the area shown on the Plans or as designated by the Engineer. The material is intended for use as a fuel-resistant sealer.

### MATERIALS

**625-2.1 AGGREGATE.** The aggregate shall either be a natural or manufactured angular aggregate and shall be composed of clean, hard, durable, uncoated particles, free from lumps of clay and all organic matter. The aggregate shall meet the gradation in Table 1, when tested according to WAQTC FOP for AASHTO T 27/T 11.

**TABLE 1. GRADATION OF AGGREGATES**

Sieve size	Percent Passing, By Weight
No. 8	100
No. 16	97-100
No. 20	85-100
No. 30	15-85
No. 50	2-10
No. 100	0-2

**625-2.2 BITUMINOUS MATERIALS.** The bituminous material shall be a coal-tar pitch emulsion prepared from a high temperature, coal-tar pitch conforming to the requirements of ASTM D 490, grade 11/12. Oil and water gas tar shall not be used even though they comply with ASTM D 490. The coal-tar pitch emulsion shall conform to all requirements of ASTM D 5727, except that the water content shall not exceed 50%.

**625-2.3 WATER.** The water used in mixing shall be potable and free from harmful soluble salts. The temperature of the water added during mixing shall be at least 50 °F. The pH of the water, added during mixing, shall conform to the requirements of the coal-tar emulsion manufacturer.

### COMPOSITION AND APPLICATION

**625-3.1 COMPOSITION.** The coal-tar pitch emulsion seal coat shall consist of a mixture of coal-tar pitch emulsion, water, and aggregate in proportions that fall within the ranges shown in Table 2.

**625-3.2 JOB MIX FORMULA.** The Contractor shall submit the recommended formulation of water, emulsion, and aggregate and application rate proposed for use to the Engineer at least 15 calendar days prior to the start of operations. The mix design shall be within the range shown in Table 2. No seal coat shall be produced for payment until a job mix formula has been approved by the Engineer. The job mix formula for each mixture shall be in effect until modified in writing by the Engineer.

**TABLE 2. COMPOSITION OF MIXTURE**

Type of Seal Coat	Water gal/gal of emul.	Aggregate lb/gal of emul.	Application Rate gal/yd <sup>2</sup> (per application)
Sand Slurry	0.15 (max)	2-5	0.15-0.20
Plain Emulsion	0.10 (max)	--	0.08-0.10

**625-3.3 APPLICATION RATE.** The sand slurry coal-tar emulsion seal coat shall be applied in 2 coats. The application rate submitted with the job mix formula shall be verified during placement of the test section and shall fall within the limits shown in Table 2.

**625-3.4 TEST SECTION.** Prior to full production, the Contractor shall prepare a quantity of mixture in the proportions shown in the approved mix design. The amount of mixture shall be sufficient to place a test section a minimum of 250 yd<sup>2</sup> at the rate specified in the job mix formula. The area to be tested will be designated by the Engineer and will be located on a representative section of the pavement to be seal coated. The actual application rate will be determined by the Engineer during placement of the test section and will depend on the condition of the pavement surface.

The test section shall be used to verify the adequacy of the mix design and to determine the application rate. The same equipment and method of operations shall be used on the test section as will be used on the remainder of the work.

If the test section should prove to be unsatisfactory, the necessary adjustments to the mix composition, application rate, placement operations, and equipment shall be made. Additional test sections shall be placed and evaluated, if required. Full production shall not begin without the Engineer's approval.

## **CONSTRUCTION METHODS**

**625-4.1 WEATHER LIMITATIONS.** The seal coat shall not be applied when the surface is wet or when the humidity or impending weather conditions will not allow proper curing. The seal coat shall be applied only when the pavement surface temperature is 60 °F or higher.

**625-4.2 EQUIPMENT AND TOOLS.** The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of the work.

- a. **Distributors.** Distributors or spray units used for the spray application of the seal coat shall be self-propelled and capable of uniformly applying 0.15 to 0.55 gal/yd<sup>2</sup> of material over the required width of application. Distributors shall be equipped with removable manhole covers, tachometers, pressure gauges, and volume-measuring devices.

The mix tank shall have a mechanically powered, full-sweep mixer with sufficient power to move and homogeneously mix the entire contents of the tank.

The distributor shall be equipped with a positive placement pump so that a constant pressure can be maintained on the mixture to the spray nozzles.

- b. **Mixing Equipment.** The mixing machine shall have a continuous flow mixing unit capable of accurately delivering a predetermined proportion of aggregate, water, and emulsion, and of discharging the thoroughly mixed product on a continuous basis. The mixing unit shall be capable of thoroughly blending all ingredients together and discharging the material to the spreader box without segregation.
- c. **Spreading Equipment.** Attach to the mixing machine a mechanical-type squeegee distributor, equipped with flexible material in contact with the surface to prevent loss of slurry from the spreader box. It shall be maintained to prevent loss of slurry on varying grades and adjusted to assure uniform spread. There shall be a lateral control device and a flexible strike-off capable of being adjusted to lay the slurry at the specified rate of application. The spreader box shall have an adjustable width. The box shall be kept clean; coal-tar emulsion and aggregate build-up on the box shall not be permitted.
- d. **Calibration.** The Contractor shall furnish all equipment and materials and labor necessary to calibrate the equipment. It shall be calibrated to assure that it will produce and apply a mix that

conforms to the job mix design. Commercial equipment should be provided with a method of calibration by the manufacturer. All calibrations shall be made with the approved job materials prior to applying the seal coat to the pavement. A copy of the calibration test results shall be furnished to the Engineer.

**625-4.3 PREPARATION OF PAVEMENT SURFACE.** Bituminous pavement surfaces which have been softened by petroleum derivatives or have failed due to any other cause shall be removed to the full depth of the damage and replaced with new bituminous concrete similar to that of the existing pavement. Areas of the pavement surface to be treated shall be in a firm consolidated condition. They shall be sufficiently cured so that there is no concentration of oils on the surface. This can usually be determined by pouring water on the surface to be treated. If the water, after standing for a short period, picks up a film of oil, the surface is not sufficiently cured for the application of emulsion.

A minimum of 15 days shall elapse between the placement of a bituminous surface course and the application of the seal coat.

**625-4.4 CLEANING EXISTING SURFACE.** Prior to placing the seal coat, the surface of the pavement shall be clean and free from dust, dirt, or other loose foreign matter, grease, oil, or any type of objectionable surface film. When directed by the Engineer, the existing surface shall be cleaned with wire brushes and a power blower.

Where vegetation exists in cracks, the vegetation shall be removed and the cracks cleaned to a depth of 2 inches, where practicable. These cracks shall be treated with a concentrated solution of an herbicide approved by the Engineer.

Route out cracks less than 1/2 inch wide and seal them. Fill existing cracks greater than 1/2 inch wide with sealer and aggregate meeting Subsection 625-2.1. Crack sealer shall meet the requirements of AASHTO M 324 remaining flexible to -40 °F. Areas that have been subjected to fuel or oil spillage shall be wire brushed to remove any dirt accumulations. The area shall then be primed with shellac or a synthetic resin to prevent the seal coat from debonding.

**625-4.5 TACK COAT.** A tack coat shall be applied only if recommended by the emulsion supplier. After the surface has been prepared, a tack coat of 3 parts water to 1 part emulsified binder, as specified in Subsection 625-2.2, shall be applied at the rate of 0.05 to 0.10 gal/yd<sup>2</sup> of surface.

When a tack coat is not specified, the pavement shall be dampened with a fog spray of water if recommended by the supplier. No standing water shall remain on the surface.

Following the application, the surface shall be allowed to cure without being disturbed for such period of time as may be necessary to permit adhesion of the seal coat. This period shall be determined by the Engineer. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

**625-4.6 APPLICATION OF PLAIN EMULSION.** Plain emulsion shall be applied at a uniform rate with a distributor at the rate as determined in Subsection 625-3.4. When it is necessary to dilute the emulsion in order to aid application, the emulsion may be diluted with clean water but not by more than 10%.

**625-4.7 APPLICATION OF SAND SLURRY.** The sand slurry shall be applied at a uniform rate with a distributor or squeegee at the rate determined in Subsection 625-3.4. When the emulsion, water, and aggregate are blended, the material shall be premixed to produce a homogeneous mixture of uniform consistency. The quantities of materials to be combined in each batch shall be according to the approved mix design.

The mixing sequence of the various components shall be the same as indicated in the job mix formula. After all constituents are in the mixer, the mixing shall continue for approximately 5 minutes or longer, if necessary. The mixing shall produce a smooth, free flowing homogeneous mixture of uniform consistency.

Slow mixing shall be continuous from the time the emulsion is placed into the mixer until the slurry is applied by distributor truck or poured into the spreading equipment. During the entire mixing process, no breaking, segregating, or hardening of the emulsion nor balling, lumping, or swelling of the aggregate shall be permitted. The slurry shall be applied at a uniform rate to provide the quantity determined during placement of the test strip.

When a spreader box is used, a sufficient amount of slurry shall be fed in the spreader box to keep a full supply against the full width of the squeegee, so that complete coverage of all surface voids and cracks is obtained.

Manufacturer's recommendations regarding application by spraying or squeegeeing should be followed. In areas inaccessible to equipment, the slurry may be applied by means of a hand squeegee.

Upon completion of the work, the seal coat shall have no pinholes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform texture.

Each application shall be allowed to dry thoroughly before the next coat is applied. Suitable precautions shall be taken by the Contractor to protect the surface against damage during this interval.

**625-4.8 CURING.** The mixture shall be permitted to dry for a minimum of 24 hours after the final application before opening to traffic and shall be sufficiently cured to drive over without damage to the seal coat. Any damage to the uncured mixture will be the responsibility of the Contractor to repair.

**625-4.9 HANDLING.** The mixture shall be continuously agitated from the initial mixing until its application on the pavement surface. The distributor or applicator, pumps, and all tools shall be maintained in a satisfactory working condition.

## **QUALITY CONTROL**

**625-5.1 CONTRACTOR'S CERTIFICATION.** The Contractor shall furnish the manufacturer's certification that each consignment of emulsion shipped to the project meets the requirements of ASTM D 5727, except that the water content shall not exceed 50%. The certification shall also indicate the solids and ash content of the emulsion and the date the tests were conducted. The certification shall be delivered to the Engineer prior to the beginning of work.

**625-5.2 INSPECTION.** The Contractor shall have an independent technical consultant on the job site during the seal coat operations. The consultant shall have knowledge of the materials, procedures, and equipment described in this specification and shall assist the Contractor regarding proper mixing of the component materials and application of the seal coat. The consultant shall have a minimum of 3 years experience in the use of coal-tar seal coats. Documentation of this experience shall be furnished to the Engineer prior to the start of operations.

## **METHOD OF MEASUREMENT**

**625-6.1** The coal-tar pitch emulsion will be measured by the ton of undiluted coal-tar emulsion.

**625-6.2** The mineral aggregate will be measured by the ton.

### **BASIS OF PAYMENT**

**625-7.1** Payment will be made at the contract unit prices for materials complete in place, including acceptable test sections.

The cost of the technical consultant is subsidiary.

Payment will be made under:

Item P-625a	Coal-Tar Pitch Emulsion - per ton
Item P-625b	Aggregate - per ton

### **TESTING REQUIREMENTS**

WAQTC FOP for AASHTO T 27/T 11     Sieve Analysis of Aggregates & Soils

### **MATERIAL REQUIREMENTS**

AASHTO M 324	Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM D 490	Tars, (For Use in Road Construction)
ASTM D 5727	Emulsified Refined Coal Tar (Mineral Colloid Type)

## ITEM P-626 EMULSIFIED ASPHALT SLURRY SEAL SURFACE TREATMENT

### DESCRIPTION

**626-1.1** This item shall consist of a mixture of emulsified asphalt, mineral aggregate, and water properly proportioned, mixed, and spread on an asphalt prepared underlying course or existing wearing course according to these Specifications and shall conform to the dimensions shown on the Plans or as directed by the Engineer.

**626-1.2 ACRONYMS.** Also see Subsection GCP-10-02.

ISSA International Slurry Surfacing Association, Washington, DC

### MATERIALS

**626-2.1 AGGREGATE.** The aggregate shall consist of sound and durable manufactured sand, slag, crusher fines, crushed stone, or a combination thereof. The aggregate shall be clean and free from vegetable matter, dirt, and other deleterious substances. The aggregate shall have a sand equivalent of not less than 45% when tested according to WAQTC FOP for AASHTO T 176. The aggregate shall show a loss of not more than 35% when tested according to AASHTO T 96. The sodium sulfate soundness loss shall not exceed 12%, or the magnesium soundness loss shall not exceed 20% after 5 cycles when tested according to AASHTO T 104. Aggregate shall be 100% crushed. Aggregates shall have a minimum degradation value of 50 when tested according to ATM 313.

The combined aggregate shall conform to the gradation shown in Table 1 when tested according to WAQTC FOP for AASHTO T 27/T 11.

**TABLE 1. GRADATION OF AGGREGATES**

Sieve Size	Percent by Weight Passing Sieve		
	Type I	Type II	Type III
3/8 in.	100	100	100
No. 4	100	90 - 100	70 - 90
No. 8	90 - 100	65 - 90	45 - 70
No. 16	65 - 90	45 - 70	28 - 50
No. 30	40 - 65	30 - 50	19 - 34
No. 50	25 - 42	18 - 30	12 - 25
No. 100	15 - 30	10 - 21	7 - 18
No. 200	10 - 20	5 - 15	5 - 15
Residual asphalt content, percent dry weight of aggregate	10% - 16%	7.5% - 13.5%	6.5% - 12%

The job mix formula (mix design) shall be run using aggregate within the gradation band for the desired type shown in Table 1. Once the mix design has been submitted and approved, the aggregate used on the project shall not vary by more than the tolerances shown in Table 2. At no time shall the aggregate used go out of the gradation bands in Table 1.

The aggregate will be accepted at the job location or stockpile. The stockpile will be accepted based on 5 gradation tests samples according to WAQTC FOP for AASHTO T 2. If the average of the 5 tests is within the gradation tolerances, the materials will be accepted. If the tests show the material to be out of tolerance, the Contractor has the choice either to remove the material or blend other aggregates with the stockpile material to bring it into specification. Materials used in blending shall meet the quality tests before blending and shall be blended in a manner to produce a consistent gradation. This blending may require a new mix design.

Screening shall be required at the project stockpile site if there are any problems created by having oversize materials in the mix. Precautions shall be taken to prevent segregation of the aggregate in storing and handling. The stockpile shall be kept in areas that drain readily.

- a. **Aggregate Tolerance.** Once the mix design has been accepted, the aggregate gradation used on the project may vary from the aggregate gradation used in the mix design on each sieve by the percentages shown in Table 2. If the project aggregate fails to remain within this tolerance, a new mix design will be required by the Engineer at the expense of the Contractor.

**TABLE 2. TOLERANCES**

<b>Sieve Size</b>	<b>Tolerance, percent passing by weight</b>
3/8 in.	± 5
No. 4	± 5
No. 8	± 5
No. 16	± 5
No. 30	± 5
No. 50	± 4
No. 100	± 3
No. 200	± 2
Residual Asphalt, percent dry weight of aggregate	± 1

**626-2.2 MINERAL FILLER.** If mineral filler, in addition to that naturally present in the aggregate, is necessary, it shall meet the requirements of AASHTO M 17 and shall be used in the amounts required by the mix design. The mineral filler shall be considered as part of the aggregate.

**626-2.3 EMULSIFIED ASPHALT.** The emulsified asphalt shall conform to the requirements of AASHTO M 140 and/or AASHTO M 208 and shall be SS, CSS, CQS, or QS type emulsions.

**626-2.4 WATER.** All water used in making the slurry shall be potable and free from harmful soluble salts and chemicals.

## **COMPOSITION AND APPLICATION**

**626-3.1 COMPOSITION.** The slurry seal shall consist of a mixture of emulsified asphalt, mineral aggregate, and water.

**626-3.2 JOB MIX FORMULA.** No slurry seal for payment shall be placed until a mix design has been approved by the Engineer. The mix design shall be developed by a laboratory with experience in designing slurry seal mixes and a signed copy shall be submitted in writing by the Contractor to the Engineer at least 10 days prior to the start of operations.

The laboratory report (mix design) shall indicate the proportions of aggregates, mineral filler (min. and max.), water (min. and max.) and asphalt emulsion based on the dry aggregate weight. It shall also report the quantitative effects of moisture content on the unit weight of the aggregate (bulking effects). The mix design shall be in effect until modified in writing by the Engineer. Should a change in sources of materials be made, a new mix design shall be established before the new material is used.

The Contractor shall submit to the Engineer for approval a complete mix design on the materials proposed for use, prepared and certified by an approved laboratory. Compatibility of the aggregate, emulsion, mineral filler, and other additives shall be verified by the mix design. The mix design shall be made with the same



aggregate and grade of emulsified asphalt that the Contractor will provide on the project. At a minimum the required tests and values needed are as follows:

TEST	DESCRIPTION	SPECIFICATION
ISSA TB-100	Wet Track Abrasion Loss, One Hour Soak	50 g/ft <sup>2</sup> Max
ISSA TB-115	Determination of Slurry Seal Compatibility	Pass

**626-3.3 APPLICATION RATE.** Unless otherwise specified, the slurry seal shall be applied to at the application rates shown in Table 3 for that gradation of material used. The rate of application shall not vary more than  $\pm 2$  lb/yd<sup>2</sup>.

**TABLE 3. APPLICATION RATES**  
Pounds of mixture per square yard

Type I	Type II	Type III
8 - 12	12 - 20	18 - 30

**626-3.4 TEST SECTIONS.** Test sections, of 60 yd<sup>2</sup> each, shall be placed prior to the start of the slurry seal work in the presence of the Engineer. The test area will be designated by the Engineer and will be located on the existing pavement. Test strips shall be made by each machine after calibration. Samples of the slurry seal may be taken and the mix consistency verified by using ISSA TB-106 Slurry Seal Consistency test. In addition, the proportions of the individual materials may be verified by the Engineer by using the calibration information provided after machine calibration. If any test does not meet specification requirements, additional tests shall be made at the expense of the Contractor, until an acceptable test strip is placed.

## CONSTRUCTION METHODS

**626-4.1 WEATHER LIMITATIONS.** The slurry seal shall not be applied if the pavement temperature is below 60 °F. No slurry seal shall be applied when there is danger that the finished product will freeze before 24 hours. The mixture shall not be applied when weather conditions prolong opening to traffic beyond a reasonable time.

**626-4.2 EQUIPMENT AND TOOLS.** The Contractor shall furnish all equipment, tools, and machinery necessary for the performance of this work.

- a. **Slurry Mixing Equipment.** The machine shall be specifically designed and manufactured to lay slurry seal. The material shall be mixed by a self-propelled slurry seal mixing machine of either truck mounted or continuous run design. Either type machine shall be able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, and water to a revolving mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for materials to maintain an adequate supply to the proportioning controls.

If continuous run equipment is used, the machine shall be equipped to allow the operator to have full control of the forward and reverse speed of the machine during application of the slurry seal, with a self-loading device, with opposite side driver stations, all part of original equipment manufacturer design.

The aggregate shall be prewetted immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all ingredients. No excessive mixing shall be permitted. The mixing machine shall be equipped with a fines feeder that provides an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer at the same time and location that the aggregate is fed into the mixer.

The mixing machine shall be equipped with a water pressure system and fog-type spray bar adequate for complete fogging of the surface with an application of 0.05 to 0.10 gal/yd<sup>2</sup> preceding the spreading equipment.

Sufficient machine storage capacity to mix properly and apply a minimum of 5 tons of the slurry shall be provided. Proportioning devices shall be calibrated prior to placing the slurry seal.

- b. **Slurry Spreading Equipment.** The mixture shall be spread uniformly by means of a conventional surfacing spreader box attached to the mixer and equipped to agitate and spread the material evenly throughout the box. A front seal shall be provided to insure no loss of the mixture at the surface contact point. The rear seal shall act as the final strike-off and shall be adjustable. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off. The spreader box shall have suitable means provided to side shift the box to compensate for variations in the pavement geometry. A burlap drag or other approved screed may be attached to the rear of the spreader box to provide a uniform mat.

A continuous spreading operation shall be maintained by means of a continuous charging operation so that a minimum of construction joints occur. Continuous operating is defined as one in which the spreading operation progresses prior to initial setting or breaking of the slurry mix, which starts within approximately 15 minutes.

Provide suitable storage facilities for the asphalt emulsion, using containers equipped to prevent water from entering the emulsion. If necessary, suitable heat shall be provided to prevent freezing.

- c. **Auxiliary Equipment.** Other tools or equipment such as brushes, hand squeegees, hose equipment, tank trucks, water distributors and flushers, power blowers, barricades, etc., shall be provided as required.
- d. **Roller.** The roller, if required, shall be a self-propelled pneumatic-tired roller capable of exerting a contact pressure during rolling of 50 psi. It shall be equipped with a water spray system, to be used if the slurry is picking up on the tires during rolling.
- e. **Tack Coat and Distributor.** Normally a tack coat is not required unless the surface to be covered is extremely dry and raveled or is concrete or brick. If required, the tack coat should consist of one part emulsified asphalt and three parts water. The emulsified asphalt may be the same as that used in the mix. Pressure distributors used for application of the diluted asphalt emulsion tack coat shall be self-propelled, equipped with pneumatic tires, and capable of uniformly applying 0.05 to 0.15 gal/yd<sup>2</sup> of the diluted emulsion over the required width of application. Distributors shall be equipped with tachometers, pressure gages, and volume-measuring devices. The tack coat shall be applied at least 2 hours before the slurry seal but within the same day.

**626-4.3 EQUIPMENT CALIBRATION.** Each slurry mixing unit to be used on the project shall be calibrated in the presence of the Engineer prior to construction. Previous calibration documentation covering the exact materials to be used may be accepted by the Engineer provided they were made during the calendar year. The documentation shall include an individual calibration of each material at various settings, which can be related to the machine's metering devices. No machine will be allowed to work on the project until the calibration has been completed and/or accepted.

**626-4.4 PREPARATION OF EXISTING SURFACE.** Prior to placing the tack coat and slurry seal coat, unsatisfactory areas shall be repaired and the surface shall be cleaned of dust, dirt, or other loose foreign matter, grease, oil, excessive rubber accumulation, or any type of objectionable surface film. Any standard cleaning method will be acceptable except that water flushing will not be permitted in areas where considerable cracks are present in the pavement surface.

All painted stripes or markings on the surface of the runways or taxiways to be treated, shall be removed. Cracks wider than 1/4 inch shall be cleaned with compressed air, and sealed with a compatible crack sealer.

prior to applying the slurry seal. Cracks wider than 3/4 inch shall be pre-filled and sealed with the slurry mixture prior to surfacing. Cracks that show evidence of vegetation shall be cleaned and treated with an approved herbicide.

**626-4.5 APPLICATION OF SLURRY SEAL COAT.** Charge the mixture in the following order:

- a. Water
- b. Aggregate
- c. Asphalt Emulsion

No violent mixing will be permitted. Maintain temperature range at the mixer between 90 and 120 °F. Mix until a uniform coating of the aggregate is obtained. Continue mixing until the mixture is discharged into the spreader box. Discard the entire batch if there is evidence that the emulsion has broken.

The surface shall be prewet by fogging ahead of the slurry spreader box. Water used in prewetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the slurry spreader box. The slurry mixture shall be of the desired consistency when deposited on the surface, and no additional elements shall be added. Total time of mixing shall not exceed 2 minutes. A sufficient amount of slurry shall be carried in all parts of the spreader box at all times so that complete coverage of all surface voids and cracks is obtained. Care shall be taken not to overload the spreader box which shall be towed at a slow and uniform rate not to exceed 5 mph. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and fines from the coarse aggregate will be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement surface. A sufficient amount of slurry shall be fed into the box to keep a full supply against the full width of the spreader box. The mixture shall not be permitted to overflow the sides of the spreader box. No breaking of the emulsion will be allowed in the spreader box.

Apply the slurry seal to form a film with a maximum thickness of 3/8 inch. Isolated depressions and cracks may have a thickness greater than 3/8 inch in order to obtain a smooth surface.

The finished surface shall have no more than 4 tear or drag marks greater than 1/2 inch wide and 4 inches long in any 12 foot by 22 foot section. It shall have no tear or drag marks greater than 1 inch wide and 3 inches long.

The finished surface shall have no transverse ripples of 1/4 inch or more in depth, as measured with a 10-foot straight edge laid upon the surface.

Adjacent lanes shall be lapped at the edges a minimum of 2 inches with a maximum of 4 inches to provide complete sealing at the overlap. Construction longitudinal and transverse joints shall be neat and uniform without buildup, uncovered areas, or unsightly appearance. All joints shall have no more than 1/4 inch difference in elevation when measured across with a 10-foot straight edge.

After application of the slurry seal, the surface shall be rolled with a pneumatic-tired roller a minimum of 2 complete passes. The roller shall be operated at a tire pressure of approximately 50 psi.

The fresh slurry seal application shall be protected by barricades and markers and permitted to dry for 4 to 24 hours, depending on weather conditions. Any damage to uncured slurry shall be repaired at the expense of the Contractor.

In areas where the spreader box cannot be used, the slurry shall be applied by means of a hand squeegee. Upon completion of the work, the seal coat shall have no holes, bare spots, or cracks through which liquids or foreign matter could penetrate to the underlying pavement. The finished surface shall present a uniform and skid resistant texture satisfactory to the Engineer. All wasted and unused material and all debris shall be removed from the site prior to final acceptance.

Upon completion of the project, the Contractor shall sweep the finished surface with a conventional power rotary broom, to remove any potential loose material from the surface. The material removed by sweeping shall be disposed of in a manner satisfactory to the Engineer.

**626-4.6 CERTIFICATION.** Samples of the emulsion that the Contractor proposes to use, together with a statement as to its source, shall be submitted, and approval shall be obtained before using such material. The Contractor shall submit to the Engineer a manufacturer's certified report for each consignment of the emulsion. The manufacturer's certified report shall not be interpreted as a basis for final acceptance. All such reports shall be subject to verification by testing samples of the emulsion as received for use on the project.

#### **METHOD OF MEASUREMENT**

**626-5.1** The emulsified asphalt for slurry coat will be measured by the square yard.

**626-5.2** Aggregate will be measured by the ton of dry aggregate.

**626-5.3** Tack coat will be measured by the ton.

#### **BASIS OF PAYMENT**

**626-6.1** Payment will be made at the contract unit price per square yard for the slurry coat and at the contract price per ton for aggregate and tack coat.

Payment will be made under:

Item P-626a	Emulsified Asphalt for Slurry Coat - per square yard
Item P-626b	Aggregate - per ton
Item P-626c	Emulsified Asphalt for Tack Coat - per ton

#### **TESTING REQUIREMENTS**

AASHTO T 96	Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
AASHTO T 104	Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
ATM 313	Degradation Value of Aggregate
ISSA A 105	Recommended Performance Guidelines
ISSA TB-100	Wet Track Abrasion Loss
ISSA TB-106	Slurry Seal Consistency
ISSA TB 111	Outline Guide Design Procedure for Slurry Seal
ISSA TB-115	Determination of Slurry Seal Compatibility
WAQTC FOP for AASHTO T 2	Sampling Aggregates
WAQTC FOP for AASHTO T 27/T 11	Sieve Analysis of Aggregates & Soils
WAQTC FOP for AASHTO T 176	Sand Equivalent

#### **MATERIAL REQUIREMENTS**

AASHTO M 17

Mineral Filler for Bituminous Paving Mixtures

AASHTO M 140

Emulsified Asphalt

AASHTO M 208

Cationic Emulsified Asphalt

## ITEM P-630 PAVEMENT GROOVING

### DESCRIPTION

**630-1.1** This item shall consist of saw cutting of grooves on runways, taxiways, or other paved surfaces to the dimensions shown on the Plans or as directed by the Engineer.

### EQUIPMENT AND MATERIALS

**630-2.1 PAVEMENT GROOVING MACHINE.** The pavement grooving machine shall be a single self-propelled unit with multiple cutting blades mounted on a single shaft. The machine shall have a minimum cutting width of 36 inches and shall have diamond cutting blades. The unit shall have sufficient control to cut grooves to the tolerance specified below.

**630-2.2 WATER.** The grooving machine shall be furnished with a continuous source of water for cutting and clean-up. The Contractor shall be responsible for locating a water source capable of providing the quality and quantity of water necessary to ensure a continuous grooving operation.

### CONSTRUCTION METHODS

**630-3.1 LAYOUT.** The area to be grooved shall be laid out in the field by the Contractor. The Contractor shall use string or chalk line or other method approved by the Engineer.

**630-3.2 SAWING GROOVES.** Grooves shall be cut at right angles to the centerline for grooving or runways or taxiways or in the direction specified for other surfaces. Grooves shall be cut continuously from beginning of the cut to the end without stopping. The alignment of grooves with respect to centerline shall be monitored continuously and corrected at the end of each shift or a maximum of 300 feet.

Grooves shall extend a minimum of 6 feet beyond the edge of structural pavement (side stripe) on surfaces with paved shoulders. On pavements without paved shoulders, grooves shall be cut as close as practicable to the edge of the pavement.

Should one cutting blade break during operations, work may continue until the end of that shift at which time the blade must be replaced. Should more than one blade break, work shall be suspended until all defective blades are replaced.

**630-3.3 PAVEMENT CURING.** No grooving will be allowed on a newly placed paved surface until sufficient time has elapsed to allow the pavement to cure. For Hot Mixed Asphalt (HMA) pavement, a minimum of 14 calendar days shall have elapsed before grooving. For Portland Cement Concrete (PCC) pavement, a minimum of 7 days shall have elapsed.

**630-3.4 IN-PAVEMENT FIXTURES.** Grooves shall be sawed no less than 6 inches and no more than 18 inches from in-pavement fixtures such as light fixtures or surface sensors.

No grooving shall occur through longitudinal or diagonal saw kerfs where lighting or surface sensor cables are installed. Grooves may be continued through longitudinal construction joints in PCC pavement.

**630-3.5 CLEAN-UP.** Clean-up shall be continuous throughout the grooving operation. Waste material collected during the grooving operation shall be disposed of by flushing with water, sweeping or by vacuuming. If waste material is flushed from the surface, the material shall not be allowed to enter any airport storm drain or sanitary sewer system.

**630-3.6 TOLERANCES.** Grooves shall be 1/4 inch deep and 1/4 inch wide with a tolerance of  $\pm 1/16$  inch. Not more than 60% of the grooves shall be less than 1/4 inch. Grooves shall be spaced at 1-1/2 inches center to center with a tolerance of +0 inch and -1/8 inch.

Grooves shall be perpendicular to the established centerline  $\pm 1$  degree. The grooves shall not vary more than 3 inches in alignment for a 75-foot groove length.

#### **METHOD OF MEASUREMENT**

**630-5.1** Pavement grooving will be measured either by neat line dimensions as shown in the Plans or as a single item of work. No deductions will be made for areas skipped to avoid joints or in-pavement fixtures.

#### **BASIS OF PAYMENT**

**630-6.1** Payment will be made at the contract unit price or the lump sum price for pavement grooved and accepted by the Engineer.

Payment will be made under:

Item P-630a	Pavement Grooving - per square yard
Item P-630b	Pavement Grooving - per lump sum

## 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	Segmented Circle (Barrel-Type) - per lump sum
Item P-640b	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)

## **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.

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.

**650-2.2 SOIL ANCHOR TIE-DOWNS.** Soil anchors shall be Duckbill model 88-DB1 or Manta Ray model MR-88, as manufactured by Foresight Products, Commerce City, CO, or an approved equal.

**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.

**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 lap link to the end of the chain.

**650-3.2 SOIL ANCHOR TIE-DOWNS.** Soil anchors shall be driven 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.

**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.

### **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 - per set
Item P-650b	Rock Anchor Tie-down - per set
Item P-650c	Temporary Tie-down – per set

## **ITEM P-680 GEOTEXTILE FOR SILT FENCE**

### **DESCRIPTION**

**680-1.1** Furnish, place, maintain, and remove temporary silt fence as shown on the Plans or as directed.

### **MATERIALS**

**680-2.1 GEOTEXTILE.** Use geotextile that meets AASHTO M 288 for Temporary Silt Fence.

**680-2.2 POSTS.** Use posts made of wood, steel, or approved synthetic material that will adequately support the fence under forces induced by water and sediment loading.

### **CONSTRUCTION REQUIREMENTS**

**680-3.1** Erect geotextile fence before excavation or embankment construction begins.

**680-3.2 POST INSTALLATION.** Place posts a maximum of 8 feet apart and drive a minimum of 18 inches into the ground.

**680-3.3 GEOTEXTILE PLACEMENT.** Install geotextile on posts in a vertical position and support by a wire mesh fence or self-support system. Set at the height specified in the Contract. Secure the bottom 18 inches of the geotextile on the upslope side of the fence as shown on the Plans. Backfill trench with tamped soil. Join adjacent sections of geotextile only at posts with a minimum of 6 inches overlap.

**680-3.4 MAINTENANCE AND REMOVAL.** Maintain the integrity of the fence as long as it is necessary to contain sediment runoff. Inspect the fence daily and correct deficiencies immediately. Remove and dispose of the fence when adequate vegetative growth insures no further erosion of the slopes. Cut off the fabric at ground level and remove the fabric, wire and posts. When thickness of trapped sediment is in excess of 4 inches above the ground, either remove sediment from the site or spread sediment uphill of the fence and seed all exposed soil immediately, following the requirements of Item T-901.

### **METHOD OF MEASUREMENT**

**680-4.1** Fence will be measured in place, on the ground along the post line.

### **BASIS OF PAYMENT**

**680-5.1** Payment will be made as follows: 60% for installation. 25% for maintenance and repairs, prorated at the Engineer's discretion, 15% for removing it from the site.

Payment will be made under:

Item P-680a      Silt Fence – per linear foot

## ITEM P-682 GEOTEXTILE FOR DRAINAGE AND EROSION CONTROL

### DESCRIPTION

**682-1.1** Prepare surfaces and furnish and place geotextiles for embankment drainage as shown on the Plans.

### MATERIALS

**682-2.1** Use geotextiles that conform to the following:

- a. Drainage.** Geocomposite comprised of a tri-planar geonet structure with thermally bonded non-woven geotextile on both sides, capable of removing subsurface water from the embankment. Meet ASTM D-4716 for Transmissivity.

The Drainage Geocomposite shall be:

ROADRAIN 7100-2  
TENAX Corporation, Geosynthetics Division  
4800 East Monument Street  
Baltimore, MD 21205  
1-800-356-8495  
[www.tenax.net](http://www.tenax.net)

or approved equal.

### CONSTRUCTION REQUIREMENTS

**682-3.1 Surface Preparation.** Prepare Borrow surface by removal of stumps, brush, boulders, and sharp objects. Borrow surface should be smooth and to the design grade. Fill holes and large ruts with Borrow, or as approved.

**682-3.2 Geotextile Placement.** Unroll geotextile directly onto the prepared surface. Rolls shall be placed along roadway direction, with the main flow direction orientated down slope towards roadway edge. Stretch geotextile to remove any creases or wrinkles. Do not expose geotextiles to the elements for longer than 5 days.

**682-3.3 Joining.** Side-to-Side joints shall overlap a minimum of 3 inches. End-to-End joints shall be overlapped a minimum of 3 inches or butted together. The top geotextile layer shall be sewn together at the seams using butterfly or j-seams. All seams shall be double-lock stitched.

**682-3.4 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.

**682-3.5 Geotextile Repair.** Prior to covering the deployed geocomposite, each roll shall be inspected for damage. Potential repair techniques will be separated for just geotextile damage and for damage resulting on the entire geocomposite (geonet damaged).

- a. **Geotextile damage:** Small holes shall be patched with an 8" x 8" geotextile piece. Apply spray adhesive to one side of the 8x8" textile patch. Firmly press 8x8" textile patch over repair area. If the damaged area of the geotextile is greater than this patch size, a bigger patch is recommended. If the geotextile is damaged beyond 50 percent of the width of the roll, a continuous piece of fabric the same width as the repaired geocomposite may be cap-stripped directly to the adjacent seams by sewing a portion of new geotextile in place.
- b. **Geocomposite damage:** If rip, tear or damaged area on the deployed geocomposite is more than 50 percent of the width of the roll, the damaged area shall be cut out and the two portions of the geonet shall be joined as explained above. Other rips, tears or damaged areas on the deployed geocomposite shall be removed and patched by placing a patch extending 12 inches beyond the edges of the damaged area. The patch shall be secured to the original geonet with cable ties.

#### **METHOD OF MEASUREMENT**

**682-4.1** 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**

**682-5.1** 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-682a Geotextile, Drainage - per square yard

## ITEM S-143 FUEL TANK

### DESCRIPTION

**143-1.1** This item consists of furnishing and installing a protected aboveground motor vehicle fuel or heating oil tank complete with fuel and accessories as specified. Prepare for Department use, an EPA approved Spill Prevention, Control and Countermeasure Plan (SPCC plan).

### MATERIALS

**143-2.1 TANK.** Provide skid-mounted, doublewall, aboveground steel tank. The tank shall be of the type and capacity shown in the bid schedule. Equip tank with accessories as shown on the Plans and as follows:

- a. Overfill Alarm.** Provide a mechanical, audible overfill alarm, Ventalarm Signal as manufactured by Scully Signal Company, 70 Industrial Way, Wilmington, MA 01887 or approved equal.
- b. Automatic Shut-Off Device.** Provide a positive closing, mechanical, automatic shut-off device. Clay & Bailey model F-30 as manufactured by Clay and Bailey Manufacturing Co., 6401 East 40th Street, Kansas City, MO 64129 or approved equal.
- c. Tank-Mounted Mechanical Fuel Gauge.** Provide mechanical gauge with 12-hour clock face in feet and inches readout, activated by a stainless steel float connected to a stainless steel cable. Morrison Model 818 as manufactured by Morrison Bros. Co., P.O. Box 238, Dubuque, Iowa 52004 or approved equal.
- d. Openings.** Provide the following threaded openings and accessories on tank top:
  - One 2-inch Interstitial Monitoring with plug
  - One 2-inch Normal Vent with screen
  - One 2-inch Product fill opening with locking cap
  - One 2-inch Product pump opening with plug
  - One 2 to 4-inch Liquid level gauge
  - One 4 to 8-inch Emergency vent with plug, primary tank
  - One 4 to 8-inch Emergency vent with plug, secondary tank
  - No Drain Opening at bottom
- e. Exterior Coating.** Abrasive blast the exterior surface of the outer tank according to SSPC-SP 6. Coat the exterior surface with 8 mils total thickness of epoxy paint base and urethane paint finish.
- f. UL Labeling.** Heating oil tanks shall be manufactured and labeled according to UL 142. Motor vehicle fuel tanks shall be manufactured and labeled according to UL 142 and UL 2085.
- g. Insulation.** For motor vehicle fuel tanks install 3-inch thickness of insulation according to ASTM C-332 and ASTM C-495.

When a motor vehicle fuel-dispensing tank is specified, it shall meet or exceed the requirements of UL 2085, Underwriters Laboratories Standard for Safety for Protected Aboveground Tanks for Flammable and Combustible Liquids. Equip with a threaded opening for the specified fuel pump.

Tanks larger than 2,500 gallons require additional openings and accessories for UL rating.

**143-2.2 MANUAL DISPENSING SYSTEM.** Provide a double-action pump, equipped with detachable, self-venting bung adapter, set screws and strainer screen. Provide a dispensing system that is not gravity fed. The pump shall have 16 feet of 3/4-inch diameter hose with shut-off nozzle and deliver a minimum of 20 gallons/100 strokes. The pump supplied shall be a Gasboy, Model 1720, or approved equal.

**143-2.3 ELECTRIC DISPENSING SYSTEM.** Provide an electric suction or submerged turbine pump with a delivery rate up to 18 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 [Capacity in gallons] - 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 [Capacity in gallons] – per each
Item S-143f	Spill Prevention Control and Countermeasure Plan - 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.

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. Use either of the following methods:

**a. Hydraulic Method.**

- (1) Mix a slurry of seed, fertilizer, water, and other components as required by the Special Provisions. Add seed to the slurry mixture no more than 30 minutes before application.
- (2) Use hydraulic seeding equipment that will maintain a continuous agitation and apply a homogeneous mixture through a spray nozzle. The pump must produce enough pressure to maintain a continuous nonfluctuating spray that will reach the extremities of the seeding area, without causing damage to the seed bed. Use a hose attachment to reach areas where a fixed nozzle cannot reach.
- (3) If mulch material is required, add it to the water slurry in the hydraulic seeder after adding the proportionate amounts of seed and fertilizer.
- (4) Apply slurry at a rate that distributes all materials evenly.

**b. Dry Method.**

- (1) Use mechanical spreaders, seed drills, landscape seeders, cultipacker seeders, fertilizer spreaders, or other approved mechanical spreading equipment.
- (2) Moisten the soil prior to the application of seed and fertilizer and immediately afterwards.
- (3) Mix or rake the seed and fertilizer into the seed bed to a depth of 1/2 inch, unless mulch material is to be applied immediately.

**901-3.4 MAINTENANCE OF SEEDED AREAS.** Protect seeded areas against traffic using approved warning signs or barricades. 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.

Water the seeded areas, as required, for proper germination and growth. Use equipment that can acceptably water all seeded areas without vehicular traffic on seeded areas.

Reseed any seeded areas not showing evidence of satisfactory growth, as directed.

**901-3.5 FINAL ACCEPTANCE.** Final acceptance will be based on the following criteria and must provide 70% vegetative coverage of the seeded area. If seeding is completed by July 15th, coverage must be attained by September 30th. If seeding is completed by August 15th, coverage must be attained by June 15th of the following season. Final acceptance will be based on the Engineers approval.

**METHOD OF MEASUREMENT**

**901-4.1** 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 seeded, fertilized, and maintained. Required reseeding is subsidiary.
- b. Seeding by the pound.** By the weight of seed acceptably placed. Fertilizer is subsidiary. Any other work required will be measured separately.

- c. **Water for maintenance.** By the 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-901a	Seeding - per acre
Item T-901b	Seeding - per pound
Item T-901c	Water 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.** 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.

Meet the grading requirements in Table 1 for the class of topsoil 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 the grades shown on the Plans. Maintain the prescribed grades in an even and properly compacted condition to prevent the formation of low places or pockets where water will stand.

Clear the surface of the area to be topsoiled of all stones larger than 2 inches in any diameter and all litter or other material which may be detrimental to proper bonding, the rise of capillary moisture, or the proper growth of the desired planting.

Immediately prior to dumping and spreading the topsoil, loosen the surface, by approved means, to a minimum depth of 2 inches to facilitate bonding of the topsoil to the covered subgrade soil.

**905-3.2 OBTAINING TOPSOIL.** Prior to the stripping of topsoil from designated areas, remove any vegetation, stumps and large roots, rubbish or stones found on such areas, which may interfere with subsequent operations, using approved methods.

When suitable topsoil is available on the site, remove this material from the designated areas to the depth directed. Spread the topsoil on areas already tilled and smooth-graded, or stockpile in approved areas. Grade the stockpile sites and adjacent areas which have been disturbed if required and put into a condition acceptable for seeding.

When suitable topsoil is secured off the airport site, locate and obtain the supply, subject to approval. Notify the Engineer sufficiently in advance of operations in order that necessary measurements and tests can be made. Remove the topsoil from approved areas and to the depth as directed. Haul the topsoil to the site of the work and stockpile or spread as required.

**905-3.3 PLACING TOPSOIL.** Spread the topsoil evenly on the prepared areas to a uniform depth of 4 inches after compaction. Do not spread when the ground or topsoil is frozen or excessively wet.

After spreading, break up any large stiff clods and hard lumps with a pulverizer or other effective means. Rake up and dispose of all stones or rocks (2 inches or more in diameter), roots, litter, or any foreign matter. After spreading, compact the topsoil with a cultipacker or by other approved means. The compacted topsoil surface shall conform to the required lines, grades, and cross sections. Promptly remove any topsoil or other dirt falling upon pavements or other surface courses.

#### **METHOD OF MEASUREMENT**

**905-4.1** 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.

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 Plans.

### 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,  $\pm$  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,  $\pm$  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.

### 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 or matting and the

soil. 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.

**908-3.2 APPLICATION.** 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.

**908-3.3 MAINTENANCE.** Reshape and reseed any damaged areas and repair the mulch or matting as required.

Maintain the mulch 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-908a	Mulching - per square yard
Item T-908b	Rolled Matting - per square yard

# APPENDIX

(Designer to add Appendix Items here and list them in Table of Contents)