

SITWORK ITEMS

ITEM P-151 CLEARING AND GRUBBING

DESCRIPTION

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

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

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

Selective tree removal requires the hand cutting (topping) of all types of trees either by chain saw or by other approved conventional hand clearing methods. Dispose of the tree in the same manner as clearing and grubbing spoil materials.

CONSTRUCTION METHODS

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

Vegetation clearing will follow the USFWS Recommended Time Periods for Avoiding Vegetation Clearing in Alaska in order to protect Migratory Birds unless the USFWS has been consulted to determine the most appropriate method to avoid impacts to nesting birds.

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

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

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

Perform blasting in accordance with all Federal, state, and local safety regulations. Submit notice 15 days prior to starting work. Submit a Blasting Plan, prepared and sealed by a registered professional Engineer that includes calculations for overpressure and debris hazard. Obtain written approval prior to performing any blasting and notify the Engineer 24 hours prior to blasting. Include provisions for storing, handling and transporting explosives as well as for the blasting operations in the plan. The Contractor is responsible for damage caused by blasting operations.

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

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

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

151-2.3 CLEARING AND GRUBBING. In areas designated to be cleared and grubbed, all stumps, roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed, except where embankments exceeding 4 feet in depth are to be made in areas that are not subject to aircraft or vehicle traffic loadings and are unpaved. For embankments that are greater than 4 feet in depth, which are not subject to aircraft or vehicle traffic loadings and are unpaved, all unsatisfactory materials shall be removed, but sound trees, stumps, and brush can be cut off flush with the original ground and allowed to remain. Tap roots and other projections over 1.5 inches in diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or slope elevation.

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

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

METHOD OF MEASUREMENT

151-4.1 Measure according to GCP Section 90 and the following:

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

BASIS OF PAYMENT

151-5.1 At the contract lump sum or unit price, for each of the pay items listed below that are shown in the bid schedule.

Payment will be made under:

Item P151.010.0000	Clearing – per acre
Item P151.020.0000	Clearing – per lump sum
Item P151.030.0000	Clearing & Grubbing – per acre
Item P151.040.0000	Clearing & Grubbing – per lump sum

ITEM P-152 EXCAVATION, SUBGRADE, AND EMBANKMENT

DESCRIPTION

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

MATERIALS

152-2.1 MATERIAL DEFINITIONS. The Contract will designate material to be removed from within the project lines and grades as classified excavation (common, rock or muck) or as unclassified excavation. Material obtained from outside the project lines and grades is borrow.

All material shall be described as defined below, but no quantity of material shall be defined or paid in more than one category:

- a. **Unclassified Excavation.** All material, regardless of its nature, which is not paid for under another contract item. May include common, rock or muck.
- b. **Common Excavation.** Suitable material such as silt, sand, gravel, and granular material that does not require blasting or ripping. Not rock or muck.
- c. **Rock Excavation.** Rock that cannot be excavated without blasting or ripping, and boulders containing a volume of more than 0.5 cubic yard.
- d. **Muck Excavation.** Soil, organic matter, and other material not suitable for embankment or foundation material, including material that will decay or produce subsidence in the embankment such as stumps, roots, logs, humus, or peat.
- e. **Drainage Excavation.** Excavation made for the primary purpose of controlling drainage including: intercepting, inlet or outlet ditches; temporary levee construction; or any other type as shown on the Plans.
- f. **Borrow.** Suitable material that is required for the construction of embankment or for other portions of the work. Borrow material shall be obtained from sources within the limits of the airport property but outside the project lines and grades, or from sources outside the airport property.
- g. **Foundation Soil.** In-situ soil or undisturbed ground.
- h. **Ditch Lining.** Use crushed or naturally occurring stones that are sound and durable, are not larger than 8 inches in greatest dimension, and containing not more than 50% by weight passing a 3-inch sieve and not more than 5% by weight passing the 1-in sieve as determined by ATM 304, or as accepted by the Engineer.

152-2.2 UNSUITABLE MATERIAL. Material that does not meet the testing requirement for suitable material. Material containing vegetable or organic matter, such as muck, peat, organic silt, or sod is considered unsuitable for use in embankment construction. Material that is contaminated by hazardous substances, including fuel or oil, in greater quantity than state and federal standards allow is considered unsuitable for use.

152-2.3 SUITABLE MATERIAL. Suitable material may be obtained from classified excavation, unclassified excavation, or borrow. The Engineer will approve material as "suitable" for use in embankment when the material meets the following criteria:

- a. Sand, rock, gravel, silt, concrete, asphalt pavement, and other inorganic material;

- b. Gradation of 100% by weight passing 6 inch screen; and
- c. Meets definition of Non-Frost Susceptible in GCP Subsection 10-03, except delete “6%” and replace with “10%” (passing No. 200 screen).

The Engineer may, in their discretion, approve oversize material as “suitable” for use in embankment when the material meets the following criteria:

- a. Sand, rock, gravel, silt, concrete, asphalt pavement, and other inorganic material;
- b. Gradation of 100% by weight passing 24 inch screen;
- c. Meets definition of Non-Frost Susceptible in GCP Subsection 10-03, except delete “6%” and replace with “10%” (passing No. 200 screen); and
- d. Rock is well graded with an even distribution of rock sizes, and can be compacted with a minimal amount of voids.

CONSTRUCTION METHODS

152-3.1 GENERAL. Perform all necessary clearing and grubbing in accordance with Item P-151, and construction surveying in accordance with Item G-135, including staking of lines and grades, prior to beginning excavation, grading, and embankment operations in any area.

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

Unsuitable material shall be disposed of in waste areas shown on the Plans or in locations acceptable to the Engineer. Material contaminated by hazardous substances shall require special handling and disposal, performed according to GCP Subsection 70-11.f. and using methods acceptable to the Engineer.

- a. **Waste Areas.** All waste areas shall be graded to allow positive drainage of the area and of adjacent areas. The surface elevation of waste areas shall not extend above the surface elevation of adjacent usable areas of the airport, unless specified on the Plans or approved by the Engineer. Unsuitable material shall not be left in windrows or piles, and shall not extend into the Obstacle-Free Zone as shown on the plans.

All waste areas shall be protected from erosion according to the SWPPP. Areas where seeding is called for, in which the top layer of soil material has become compacted, by hauling or other activities of the Contractor shall be scarified and disked to a depth of 4 inches, in order to loosen and pulverize the soil.

The Contractor shall obtain all permits required for placing waste in areas they choose, and which are not covered by Department obtained permits. When the Contractor is required to locate a disposal area outside the airport property limits at his/her own expense, he shall obtain and file with the Engineer, permission in writing from the property owner for the use of private property for this purpose.

- b. **Utility Work.** Utility work shall be performed, and compensation claims for utility work made, according to GCP Subsection 50-06. If it is necessary to work 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 Subsection 40-04, all Useable Excavation of suitable material shall be used in the formation of embankment or for other purposes shown on the Plans. All unsuitable material shall be disposed of in waste areas as shown on the Plans or as directed by the Engineer.

When the volume of the Useable Excavation exceeds that required to construct the embankments to the grades indicated, the excess material shall be used to grade the areas of ultimate development or disposed of as directed. When the volume of Useable Excavation is not sufficient for constructing the fill to the grades indicated, borrow shall be used to make up the deficiency.

The grade shall be maintained so that the surface is well drained at all times. When necessary, temporary drains and drainage ditches shall be installed to intercept or divert surface water that may affect the work. All temporary drains and drainage ditches shall be constructed and maintained according to the SWPPP.

In cuts, all loose or protruding rocks on the back slopes shall be scaled or otherwise removed to line of finished grade of slope. All cut-and-fill slopes shall be uniformly dressed to the slope, cross section, and alignment shown on the Plans or as directed by the Engineer.

- a. **Selective Grading.** When selective grading is required, the more suitable material as designated by the Engineer shall be used in constructing the upper layers of the embankment or pavement structure. If, at the time of excavation, it is not possible to place this material in its final location, it shall be stockpiled in approved areas.
- b. **Undercutting.** Rock, shale, hardpan, loose rock, boulders, or other material unsatisfactory for runways, taxiways, safety areas, subgrades, roads, shoulders, or any areas intended for turving shall be excavated to a minimum depth of 12 inches below the subgrade, or to the depth directed by the Engineer. Muck, peat, matted roots, or other yielding material that is unsatisfactory for foundation soil compaction, shall be removed to the depth specified. Unsuitable materials shall be disposed of at locations shown on the Plans. The excavated area shall be backfilled with suitable material, obtained from the grading operations or borrow areas and thoroughly compacted as specified. Where rock cuts are made and backfilled with suitable material. Any pockets created in the rock surface shall be drained according to the details shown on the Plans. The material removed will be paid as Unclassified Excavation.
- c. **Overbreak.** Overbreak, including slides, is that portion of any material displaced or loosened beyond the finished work, as planned or authorized by the Engineer. All overbreak shall be graded or removed by the Contractor and disposed of as directed by the Engineer. Payment will not be made for the removal and disposal of overbreak which the Engineer determines as avoidable. Unavoidable overbreak will be paid as 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 95% of the maximum density as determined by ATM 207, ATM 212, or ATM 309. The in-place field density and moisture content shall be determined according to ATM 213.

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 GCP Subsection 70-10. All damage done to the work or property shall be repaired at the Contractor's expense. All operations of the Contractor in connection with the transportation, storage, and use of explosives shall conform to all federal, state, local regulations, explosive manufacturers' instructions, and approved permits.

The Contractor shall submit a Safety Plan that includes descriptions of road and runway closures, warning signals; and plans 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, the Safety Plan and the Blasting Plan shall conform to FAA Order 7400.2 *Procedures for Handling Airspace Matters*, Chapter 27, and AC 150/5370-2 *Operational Safety on Airports During Construction*.

The Contractor shall keep a record of each blast fired, its date, time, and location; the amount of explosives used, maximum explosive charge weight per delay period, and, where necessary, seismograph records identified by instrument number and location. These records shall be made available daily to the Engineer.

The Engineer will keep the submitted plans and records, and has authority to review and reject plans.

152-3.3 BORROW SOURCES. Borrow sources within the airport property if available will be identified on the Plans. Excavation of borrow on airport property shall be made only at these identified locations and within the lines and grades staked.

Borrow sources outside of airport property may be identified in the Contract according to GCP Subsection 60-02. The Contractor shall furnish additional borrow sources if necessary.

Removal of overburden and waste material, permit costs, mineral royalties, and other costs of material source development are subsidiary and shall be included in the unit price for borrow.

152-3.4 DRAINAGE EXCAVATION. Drainage excavation for intercepting, inlet or outlet drains; for temporary levee construction; or for any other type as designed or as shown on the Plans. The work shall be performed in the proper sequence with the other construction and according to the SWPPP. All suitable material shall be placed in embankment fills; unsuitable material shall be placed in waste areas or as directed by the Engineer. Intercepting ditches shall be constructed prior to starting adjacent excavation operations. All necessary work shall be performed to secure a finish true to line, elevation, and cross section.

The Contractor shall maintain ditches constructed on the project to the required cross section and shall keep them free of debris or obstructions until the project is accepted.

Place and spread ditch lining materials so that the finished face is uniform and conforms with the lines and slope shown on the Plans or as directed.

152-3.5 PREPARATION OF EMBANKMENT AREA. In areas of Clearing and Grubbing, completely break up the subgrade by plowing or scarifying to a minimum depth of 6 inches. Where an embankment is to be constructed to a height of 4 feet or less, or where the embankment supports asphalt or concrete paving, compact the subgrade as indicated in Subsection 152-3.2.e. Where the height of fill is greater than 4 feet and the embankment does not support asphalt or concrete paving, compact the subgrade to the density of the surrounding ground before construction of embankment.

When new embankment is placed on slopes steeper than 4:1, the existing ground shall be continuously benched over the areas as the work is brought up in layers. Benching shall be of sufficient width to permit placing of material and compacting operations. Each horizontal cut shall begin at the intersection of the original ground and the vertical side of the previous bench. Material thus cut out and deemed suitable shall be blended and incorporated into the new embankment.

No direct payment shall be made for the work performed under this section. The necessary clearing and grubbing and the quantity of excavation removed will be paid for under the respective items of work.

152-3.6 FORMATION OF EMBANKMENTS. Embankments shall be formed in successive horizontal layers of not more than 8 inches in loose depth for the full width of the cross section, unless otherwise approved by the Engineer.

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

- a. **Suspension of Operations.** Operations on earthwork shall be suspended at any time when satisfactory results cannot be obtained because of rain, freezing, moisture content or other unsatisfactory conditions of the field. Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material. Material shall not be placed on surfaces that are muddy, frozen, or contain frost. The Contractor shall drag, blade, or slope the embankment to provide proper surface drainage.
- b. **Soft Foundations.** When embankments are to be constructed across wet or swampy ground, which will not support the weight of heavy hauling and spreading equipment, the Contractor shall use methods of embankment construction, and use hauling and spreading equipment, that will least disturb the soft foundation (defined as having a California Bearing Ratio less than 3). When soft foundations are encountered, and when approved by the Engineer, the lower part of the fill may be constructed by dumping and spreading successive vehicle loads in a uniformly distributed layer of a thickness not greater than that necessary to support the vehicle while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified. The Contractor shall not be required to compact the soft foundation, and at the Engineer's option, may not be required to clear and grub.
- c. **Moisture.** The material in the layer being placed shall be within $\pm 2\%$ 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 ATM 207 or ATM 212. Under all areas serving

aircraft or vehicle traffic loadings, the embankment shall be compacted to a density of not less than 98% of the maximum density as determined by ATM 207 or ATM 212. The in-place field density and moisture content shall be determined according ATM 202.

Keep dumping and rolling areas separate. Do not cover any layer by another until the proper density is obtained.

During construction of the embankment, the Contractor shall route their equipment at all times, both when loaded and when empty, over the layers as they are placed and shall distribute the travel evenly over the entire width of the embankment. The equipment shall be operated in such a manner that hardpan, cemented gravel, clay, or other chunky soil material will be broken up into small particles and become incorporated with the other material in the layer.

In the construction of embankments, layer placement shall begin in the deepest portion of the fill and progress in layers approximately parallel to the finished pavement grade line. Stones or fragmentary rock larger than 3 inches in their greatest dimensions will not be allowed in the top 6 inches of the embankment.

- e. **Oversize Material.** At the Engineer's discretion and direction, the Contractor may use oversize material or rockfill, as defined in Subsection 152-2.3, in the embankment. Place material in layers up to 2 feet thick. Fill voids with finer material. Level and smooth each layer with suitable leveling equipment. Use compaction equipment and construction methods that can form a dense, well-compacted embankment. Do not use oversize material within 4 feet of the top of finished subgrade.

Rock or boulders larger than 2 feet in thickness shall either be disposed of outside the excavation or embankment areas, in places and in the manner designated by the Engineer; or they may be crushed to less than 2 feet thickness and used in the embankment.

- f. **Subsidiary Costs.** Excavation and embankment is a single pay item; there will be no separate measurement or payment. The costs for material source development, blasting, excavation, hauling, placing in layers, compacting, disking, watering, mixing, sloping, grading, and other necessary operations for construction of embankments, are subsidiary and shall be included in the contract unit prices for excavation, borrow, or other pay items.

- g. **Frozen Material.** Frozen material shall not be placed in the embankment nor shall embankment be placed upon frozen material, unless this construction method is identified in the special provisions, or is part of a Contractor's Progress Schedule that the Engineer has approved.

152-3.7 FINISHING AND PROTECTION OF SUBGRADE. After the subgrade has been substantially completed, the full width shall be conditioned by removing any soft or other unstable material that will not compact properly. The resulting areas and all other low areas, holes or depressions shall be brought to finish subgrade elevation with suitable material. Scarifying, blading, rolling and other methods shall be performed to provide a thoroughly compacted subgrade, whose top is shaped to the lines and grades shown on the Plans.

Grading of the top of subgrade shall be performed so that it will drain readily. The Contractor shall take all precautions necessary to protect the subgrade from damage. The Contractor shall limit hauling over the finished subgrade to that which is essential for construction purposes.

All ruts, ponds or rough places that develop in a completed subgrade shall be repaired, smoothed and recompacted before another layer is placed on top of the subgrade.

No subbase, or surface course shall be placed on the subgrade until the subgrade has been approved by the Engineer. Erosion and sediment control shall be done according to the SWPPP. Work described in this subsection is subsidiary and shall be included in the contract unit prices.

152-3.8 TOLERANCES. In those areas upon which a subbase or base course is to be placed, the top of the subgrade shall be of such smoothness that, when tested with a 12-foot straightedge applied parallel and at right angles to the centerline, it shall not show any deviation in excess of 1/2 inch, or shall not be more than 0.05 foot from true grade as established by grade hubs or pins. Any deviation in excess of these amounts shall be corrected by loosening, adding, or removing materials; reshaping; and recompacting by watering and rolling.

On Runway Safety Areas, intermediate and other designated areas, the surface shall be of such smoothness that it will not vary more than 0.10 foot from true grade as established by grade hubs. Any deviation in excess of this amount shall be corrected by loosening, adding or removing materials, and reshaping.

152-3.9 TOPSOIL. When topsoil is specified or required as shown on the plans or under Item T-905, it may be salvaged from stripping or other grading operations. The topsoil shall meet the requirements of Item T-905. The material may be stockpiled at approved locations in conformance with the CSPP.

Upon completion of grading operations, topsoil shall be handled and placed as directed, or as required in Item T-905. No direct payment will be made for topsoil under Item P-152.

METHOD OF MEASUREMENT

152-4.1 The quantity of unclassified excavation, common excavation, rock excavation, and muck excavation, will be measured in cubic yards of excavated material, measured in its original position. Pay quantities will be computed to the neat lines staked, by the method of average end areas of materials acceptably excavated. Measurement will not include the quantity of materials excavated without authorization beyond project lines and grades, or the quantity of material used for purposes other than those directed or approved by the Engineer.

With the Engineer's written approval, excavation may be measured by any method described in Subsection 152-4.2.

152-4.2 The quantity of Borrow material to be paid will be by calculated by one of the following methods of measurement, as described in the Bid Schedule.

If Borrow is paid by source volume, the quantity will be measured in cubic yards of material, measured in its original position at the borrow source, after stripping of overburden and waste. Pay quantities will be computed by the method of average end areas from cross sections taken before and after borrow excavation. No shrink or swell factor will be used.

If Borrow is paid by design volume, the quantity will be measured in cubic yards of material, measured in its final compacted position. Pay quantities will be computed by the method of average end areas, as determined from original ground cross sections before placement (after clearing and grubbing) and to the neat lines staked and verified by the Engineer after placement. No allowance will be made for subsidence of the subgrade or for material placed outside the staked neat line limits. The quantity to be paid for will be the cubic yards of material placed and accepted in the completed embankment. No shrink or swell factor will be used.

If Borrow is paid by weight, the quantity will be measured in tons, by weighing system or by barge displacement method.

Ditch Lining will be paid by the ton in accordance with subsection GCP Subsection 90-02. Excavation required below normal ditch grade is subsidiary.

BASIS OF PAYMENT

152-5.1 Excavation and embankment (or waste disposal) is a single pay item. The costs for material source development, blasting, excavation, hauling, placing in layers, compacting, 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.

- a. For "Unclassified Excavation" payment will be made at the contract unit price per cubic yard.
- b. For "Common Excavation" payment will be made at the contract unit price per cubic yard.
- c. For "Rock Excavation" payment will be made at the contract unit price per cubic yard.
- d. For "Muck Excavation" payment will be made at the contract unit price per cubic yard.
- e. For "Drainage Excavation" payment will be made at the contract unit price per cubic yard.
- f. 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 P152.010.0000	Unclassified Excavation – per cubic yard
Item P152.040.0000	Rock Excavation – per cubic yard
Item P152.050.0000	Muck Excavation – per cubic yard
Item P152.070.0000	Drainage Excavation – per cubic yard

TESTING REQUIREMENTS

ATM 212	Determining the Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 207	WAQTC FOP for AASHTO T 99/ T 180 Moisture-Density Relations of Soils*
ATM 202	WAQTC FOP for AASHTO T 255/T 265 Moisture Content of Aggregate and Soils
ATM 213	WAQTC FOP for AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*.
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *

ITEM P-153 CONTROLLED LOW-STRENGTH MATERIAL (CLSM)

DESCRIPTION

153-1.1 This item shall consist of furnishing, transporting, and placing a controlled low-strength material (CLSM) as flowable backfill in trenches or at other locations shown on the plans or as directed by the Engineer.

MATERIALS

153-2.1 MATERIALS.

- a. **Portland cement.** Portland cement shall conform to the requirements of ASTM C150, Type I or II, or ASTM C595, Type IP, IS, S, or I(PM) as indicated on the plans. 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.
- b. **Fly ash.** Fly ash shall conform to ASTM C618, Class C or F.
- c. **Fine aggregate (sand).** Fine aggregate shall conform to the requirements of ASTM C33 except for aggregate gradation. Any aggregate gradation which produces performance characteristics of the CLSM specified here will be accepted, except as follows.

Sieve Size	Percent Passing by weight
3/4 inch	100
No. 200	0 - 12

- d. **Water.** Water used in mixing shall be potable and free of oil, salt, acid, alkali, sugar, vegetable matter, or other substances injurious to the finished product.

MIX DESIGN

153-3.1 PROPORTIONS. The Contractor shall submit, to the Engineer, a mix design including the proportions and source of aggregate, fly ash, cement, water, and approved admixtures. No CLSM mixture shall be produced for payment until the Engineer has given written approval of the proportions. The proportions shall be prepared by a laboratory and shall remain in effect for the duration of the project. Laboratory costs are incidental to this item. The proportions shall establish a single percentage or weight for aggregate, fly ash, cement, water, and any admixtures proposed.

- a. **Compressive strength.** CLSM shall be designed to achieve a 28-day compressive strength of 100 to 200 psi when tested in accordance with ASTM D4832. There should be no significant strength gain after 28 days.
- b. **Consistency.** CLSM should be designed to achieve a consistency that will produce an approximate 8-inch diameter circular-type spread without segregation when tested by: (1) filling a 3-inch inside diameter by 6-inch length flow cylinder (non-absorbent pipe) (2) strike off of the flow cylinder and start of lift within five seconds of filling and (3) by steady upward pull, lift the cylinder in a time period of between two and four seconds. Adjustments of the material proportions should be made to achieve proper solid suspension and flowable characteristics, however the theoretical yield shall be maintained at one cubic yard for the given batch weights.

CONSTRUCTION METHODS

153-4.1 PLACEMENT.

- a. **Placement.** CLSM may be placed by any reasonable means from a mixing unit into the space to be filled. Agitation is required during transportation and waiting time. Placement shall be performed so structures or pipes are not displaced from their final position and intrusion of CLSM into unwanted

areas is avoided. The material shall be brought up uniformly to the fill line shown on the plans or as directed by the Engineer. Each placement of CLSM shall be as continuous an operation as possible. If CLSM is placed in more than one layer, the base layer shall be free of surface water and loose foreign material prior to placement of the next layer.

- b. **Limitations of placement.** CLSM shall not be placed on frozen ground. Mixing and placing may begin when the air or ground temperature is at least 35°F and rising. At the time of placement, CLSM shall have a temperature of at least 40°F. Mixing and placement shall stop when the air temperature is 40°F and falling or when the anticipated air or ground temperature will be 35°F or less in the 24 hour period following proposed placement.

153-4.2 CURING AND PROTECTION

- a. **Curing.** The air in contact with the CLSM shall be maintained at temperatures above freezing for a minimum of 72 hours. If the CLSM is subjected to temperatures below 32°F, the material may be rejected by the Engineer if damage to the material is observed.
- b. **Protection.** The CLSM shall not be subject to loads and shall remain undisturbed by construction activities for a period of 48 hours or until a compressive strength of 15 psi is obtained. The Contractor shall be responsible for providing evidence to the Engineer that the material has reached the desired strength. Acceptable evidence shall be based upon compressive tests made in accordance with paragraph 153-3.1a.

153-4.3 ACCEPTANCE. Acceptance of CLSM delivered and placed as shown on the plans or as directed by the Engineer shall be based upon mix design approval and batch tickets provided by the Contractor to confirm that the delivered material conforms to the mix design. The Contractor shall verify by additional testing, each 1,000 cubic yards of material used. Verification shall include confirmation of material proportions and tests of compressive strength to confirm that the material meets the original mix design and the requirements of CLSM as defined in this specification. Adjustments shall be made as necessary to the proportions and materials prior to further production.

METHOD OF MEASUREMENT

153-5.1 MEASUREMENT. Controlled low-strength material shall be measured by the number of cubic yards as computed from the neatline plan and section, adjusted for the quantities for any embedments, and as specified, completed, and accepted.

BASIS OF PAYMENT

153-6.1 PAYMENT. Accepted quantities of controlled low-strength material shall be paid for at the contract unit price per cubic yard. Payment shall be full compensation for all materials, equipment, labor, and incidentals required to complete the work as specified.

Payment will be made under:

Item P153.010.0000	Dewatering – per lump sum
Item P153.020.0000	Infiltration Site – per lump sum
Item P153.030.0000	Upland Waste Disposal Site – per lump sum

TESTING REQUIREMENTS

ASTM D4832 Standard Test Method for Preparation and Testing of Controlled Low-Strength Material (CLSM) Test Cylinders

MATERIAL REQUIREMENTS

ASTM C33 Standard Specification for Concrete Aggregates

ASTM C150	Standard Specification for Portland Cement
ASTM C595	Standard Specification for Blended Hydraulic Cements
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

ITEM P-154 SUBBASE COURSE

DESCRIPTION

154-1.1 This item shall consist of a subbase course composed of granular materials constructed on a prepared subgrade or underlying course according to these Specifications, and in conformity with the dimensions and typical cross section shown on the Plans.

MATERIALS

154-2.1 MATERIALS. The subbase material shall consist of hard durable particles or fragments of granular aggregates. This material will be mixed or blended with fine sand, clay, stone dust, or other similar binding or filler materials produced from approved sources. This mixture must be uniform and shall comply with the requirements of these Specifications as to gradation, soil constants, and shall be capable of being compacted into a dense and stable subbase. The material shall be free from vegetable matter, lumps or excessive amounts of clay, and other objectionable or foreign substances. Pit-run material may be used, provided the material meets the requirements specified.

Aggregate gradation shall meet the requirements of Table 1, determined according to ATM 304.

**TABLE 1
AGGREGATE GRADATION REQUIREMENTS**

Sieve designation (Square opening)	Percentage by weight passing sieves
3 inch	90-100
No. 4	20-55
No. 200	0-6

The percent passing the No. 200 sieve will be determined on minus 3-inch material.

The portion of the material passing the No. 40 sieve shall have a liquid limit of not more than 25 and a plasticity index of not more than 6 when tested according to ATM 204 and ATM 205.

The gradations shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieves, or vice versa.

CONSTRUCTION METHODS

154-3.1 GENERAL. The subbase course shall be placed where designated on the Plans or as directed by the Engineer. The material shall be shaped and thoroughly compacted within the tolerances specified.

Granular subbases which, due to grain sizes or shapes, are not sufficiently stable to support the movement of construction equipment, shall be mechanically stabilized to the depth necessary to provide such stability as directed by the Engineer. The mechanical stabilization shall principally include the addition of a fine-grained medium to bind the particles of the subbase material sufficiently to furnish a bearing strength, so that the course will not deform under the traffic of the construction equipment. The addition of the binding medium to the subbase material shall not increase the soil constants of that material above the limits specified.

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

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

154-3.3 MATERIALS ACCEPTANCE IN EXISTING CONDITION. When the entire subbase material is secured in a uniform and satisfactory condition, such approved material may be moved directly to the spreading equipment for placing. The material may be obtained from gravel pits, stockpiles, or may be

produced from a crushing and screening plant with the proper blending. The materials from these sources shall meet the requirements for gradation, quality, and consistency. The moisture content of the material shall be approximately that required to obtain maximum density. The final operation shall be blading or dragging, if necessary, to obtain a smooth uniform surface true to line and grade.

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

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

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

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

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

The field density of the compacted material shall be not less than 98% of the maximum density, as determined according to ATM 207 or ATM 212. The in-place field density and moisture content shall be determined according to ATM 213.

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 GCP Subsection 90-02.

Subbase materials will not be included in any other excavation quantities.

BASIS OF PAYMENT

154-5.1 Subbase Course will be paid for at the contract price, per unit of measurement, accepted in place.

Hauling and placing of these materials is subsidiary.

Payment will be made under:

Item P154.010.0000	Subbase Course – per cubic yard
Item P154.020.0000	Subbase Course – per ton
Item P154.030.0000	Subbase Course Stockpile – per ton
Item P154.040.0000	Salvaged Subbase – per lump sum

TESTING REQUIREMENTS

ATM 212	Determining the Standard Density of Coarse Granular Materials using the Vibratory Compactor
ATM 304	WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates * .
ATM 204	WAQTC FOP for AASHTO T 89 Determining the Liquid Limit of Soils ..
ATM 205	WAQTC FOP for AASHTO T 90 Determining the Plastic Limit and Plasticity Index of Soils
ATM 207	WAQTC FOP for AASHTO T 99/ T 180 Moisture-Density Relations of Soils*
ATM 213	WAQTC FOP for AASHTO T 310 In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)*

ITEM P-160 EXCAVATION OF PAVEMENT

DESCRIPTION

160-1.1 Excavate, haul, and dispose of existing asphalt cement concrete (AC) pavement and portland cement concrete (PCC) pavement.

CONSTRUCTION REQUIREMENTS

160-2.1 Perform the work for this item according to the following instructions.

- a. **Excavation.** Excavate to the minimum depth necessary for removal of existing pavement where shown on the Plans. Saw cut where shown on the Plans.
- b. **Disposal.** Excavated pavement material becomes the property of the Contractor. Remove excavated material to an approved disposal site off of airport property in accordance with applicable Federal and State regulations.
- c. **Drainage.** Maintain drainage at all times. Install temporary drains and drainage ditches to intercept or divert surface water that may affect the prosecution or condition of the work.

METHOD OF MEASUREMENT

160-4.1 Section 90. Where portland cement concrete pavement is overlain by asphalt concrete pavement, the asphalt concrete pavement will not be measured separately and will be considered portland cement concrete pavement for payment purposes.

BASIS OF PAYMENT

160-5.1 At the contract unit price for excavation and disposal of pavement materials for either AC or PCC pavement.

Payment will be made under:

Item P160.010.0000	Excavation of Pavement, AC – per square yard
Item P160.020.0000	Excavation of Pavement, AC – per cubic yard
Item P160.030.0000	Excavation of Pavement, AC – per lump sum
Item P160.040.0000	Excavation and Disposal of Existing Pavement, AC – per square yard

ITEM P-161 RECYCLED ASPHALT PAVEMENT

DESCRIPTION

161-1.1 Excavate and process existing asphalt cement concrete (AC) pavement for use as Recycled Asphalt Pavement (RAP). Haul and place RAP on a prepared foundation, to the lines, grades, and depths shown on the plans or as directed by the Engineer.

MATERIAL AND CONSTRUCTION REQUIREMENTS

161-2.1 PROCESSING. Crush or pulverize existing pavement to meet the requirements of Table 161-1 for use as Recycled Asphalt Pavement (RAP). Process RAP to provide an asphalt content of 2.5 – 5.5 percent by weight.

Saw cut and process the full depth of existing pavement in areas shown on the plans or as directed by the Engineer. Excavate to the minimum depth necessary for removal of all existing pavement. Up to one inch of underlying base course material may be excavated along with the AC pavement.

**TABLE 161-1
RAP GRADATION REQUIREMENTS**

Sieve Size	Percent Passing
2 in.	100
1 in.	90-100

161-2.2 PLACEMENT AND SPREADING. Place RAP in 4-inch thick maximum lifts on the approved surface as required to achieve the depth shown on the plans after compaction.

Excess RAP is the property of the State. Place excess RAP in stockpiles located and shaped as shown on the plans, or as directed by the Engineer.

161-2.3 COMPACTION. Thoroughly compact the RAP layer by rolling. Density acceptance will be based on the use of a control strip in accordance with ATM 412 to determine a density standard. Compact to a density not less than 98% of the density standard. After rolling and with the RAP thoroughly set, reduce interstitial spaces to a minimum. Blade and roll alternately as required or directed to obtain a smooth, even and uniformly compacted surface. Do not roll the RAP course when the underlying course is soft or yielding or when the rolling causes undulation of the surface. In areas inaccessible to rollers, tamp RAP material thoroughly with hand held mechanical tampers.

161-2.4 RAP PROTECTION. Do not perform work on the RAP course during freezing temperatures, when the subgrade is wet, or when rain is expected. Hauling equipment may be routed over the finished RAP course, provided no damage results and provided that equipment is routed over the full width of the RAP surface to avoid rutting or uneven compaction. The Engineer has authority to stop all hauling over completed or partially completed RAP when, in his opinion, such hauling is causing damage. Repair at your expense, any damage to the RAP course resulting from the routing of equipment over RAP surfaces.

161-2.5 PROTECTION OF EXISTING STRUCTURES. Take all precautions necessary to ensure that existing structures within pavement removal areas are not damaged. If damage to any structure occurs, repair the damage at no cost to the Department.

161-2.6 DRAINAGE. Maintain drainage at all times. Install temporary drains and drainage ditches, when directed, to intercept or divert surface water that may affect the prosecution or condition of the work.

METHOD OF MEASUREMENT

161-4.1 Section 90. If RAP by unit area appears in the bid schedule, the item will be measured in original position before excavation. If RAP by unit volume appears in the bid schedule, the item will be measured in final position after processing and placement. Underlying base course material excavated along with the AC pavement will not be included in the measurement for payment of RAP measured by unit volume.

BASIS OF PAYMENT

161-5.1 At the contract unit price for recycled asphalt pavement accepted in place.

Payment will be made under:

Item P161.010.0000	Recycled Asphalt Pavement – per square yard
Item P161.020.0000	Recycled Asphalt Pavement – per cubic yard
Item P161.030.0000	Excavation of Pavement, AC – per cubic yard
Item P161.040.0000	Recycled Asphalt Pavement Placement – per square yard

TESTING REQUIREMENTS

ATM 412 Relative Standard Density of Treated Mixes by the Control Strip Method

ITEM P-162 PAVEMENT COLD PLANING

DESCRIPTION

162-1.1 Cold plane existing asphalt cement concrete (AC) pavement. Clean pavement surfaces after planing. Place and shape the material produced by cold planing (millings) on a prepared foundation, to the lines, grades, and depths shown on the plans.

Excess millings are the property of the State. Place excess millings in stockpiles located and shaped as shown on the plans or as directed by the Engineer.

EQUIPMENT

162-2.1 COLD PLANING MACHINE. Use a self-propelled specialized cold planing machine with the following capabilities:

- a. Removes the millings or cuttings from the pavement surface and loads them into a truck for disposal.
- b. Mills the pavement to the required depth and smoothness.
- c. Prevents damage to any part of the remaining pavement structure.
- d. Establishes grade control, by string line or laser.
- e. Controls transverse slope.
- f. Mills a minimum 3-foot width of pavement per pass.
- g. Effectively controls dust produced during planing operations.

162-2.2 POWER BROOM. Use a self-propelled or towed power broom capable of removing all loose material resulting from the cold planing operation.

CONSTRUCTION REQUIREMENTS

162-3.1 PLANING. Furnish all materials and survey control to accomplish this work. Mill the designated areas of pavement to the depths shown on the plans. Establish any controls required to maintain the specified depth of cut or grade. Establish a finished cold-planed surface that when checked with a four-foot straight edge, does not deviate more than 3/8-inch in either the transverse or longitudinal direction.

Ensure that the cold planing operation does not adversely affect the paving schedule due to breakdowns.

162-3.2 PROTECTION OF EXISTING PAVEMENT AND STRUCTURES. Repair or replace at your expense, any pavement that is torn, cracked, gouged, broken, or undercut as directed by the Engineer. Take all precautions necessary to ensure that existing structures within pavement planing areas are not damaged. If damage to any structure occurs, repair the damage at no cost to the Department.

162-3.3 FINAL CLEANING OF COLD-PLANED SURFACES. After cold planning is complete, use a power broom to remove all loose material from the planed surface.

METHOD OF MEASUREMENT

162-4.1 Section 90. By the area of pavement in original position regardless of depth of cut, milled to the required tolerances. Placement and shaping of millings and the clean up and disposal of surplus material is subsidiary to the item.

BASIS OF PAYMENT

162-5.1 Payment will be made at the contract unit price for acceptably completed quantities.

Payment will be made under:

Item P162.010.0000 Pavement Cold Planing – per square yard
Item P162.020.0000 Pavement Cold Planing – per cubic yard

ITEM P-163 SURFACE CLEANING

DESCRIPTION

163-1.1 Clean designated concrete areas to leave a sound and durable surface suitable for overlay. Collect all loose and friable material from unsound surfaces and crevices. Haul waste to the waste disposal site designated on the plans.

EQUIPMENT & MATERIALS

163-2.1 Provide the following equipment:

- a. Water sprayer rated and producing at least 3000 PSI.
- b. Truck-mounted sweeper with integrated vacuum unit.

Obtain approval for substitute equipment proposed for this work from the Engineer. Use equipment capable of leaving a sound surface without particulate residue.

Provide all water and other expendables necessary to complete the described work.

CONSTRUCTION REQUIREMENTS

163-3.1 Remove all loose and friable material from existing concrete. Collect all loosened particles and place them at the waste disposal site indicated in the plans. Sound and durable surfaces are those capable of withstanding a sustained application of the specified water spray with the nozzle placed against the concrete.

METHOD OF MEASUREMENT

163-4.1 Section 90. Surface cleaning areas will be determined by plan dimensions or as staked in the field.

BASIS OF PAYMENT

163-5.1 At the contract unit price for performing the work as described.

Payment will be made under:

Item P163.010.0000 Surface Cleaning – per square yard

ITEM P-165 REMOVAL OF STRUCTURES

DESCRIPTION

165-1.1 Remove and dispose of or salvage existing structures as specified. Backfill the resulting holes and pits.

CONSTRUCTION REQUIREMENTS

165-3.1 GENERAL. Obtain utility locates in the vicinity of the designated items. Work around and preserve any facilities within the work limits. Backfill all excavations with approved embankment or excavated materials and compact in accordance with item P-152.

- a. **Removed Structures Designated for Disposal.** Removed structures designated for disposal become your property. Excavate, load, and haul structures to an approved disposal site off of airport property in accordance with applicable Federal and State regulations. *[List specific structures designated for disposal.]*
- b. **Removed Structures Designated for Salvage.** Removed structures designated for salvage remain the property of the State. *[List specific structures designated for salvage and describe where each salvaged structure is to be delivered.]*

METHOD OF MEASUREMENT

165-4.1 This item will not be measured for payment. The Engineer's acceptance constitutes measurement.

BASIS OF PAYMENT

165-5.1 Payment will be made at the contract price for work acceptably completed. No separate payment will be made for hauling or transportation. All work associated with removal of specified items, including but not limited to labor, equipment, tools, hauling, transportation, and incidentals will be included in the contract price for removal of structures.

Payment will be made under:

Item P165.010.0000	Removal of Structures – per lump sum
Item P165.060.0000	Equipment Storage Building Relocation – per lump sum
Item P165.090.0000	Site Cleanup – per contingent sum
Item P165.100.0000	Labor – per hour

ITEM P-167 DUST PALLIATIVE

DESCRIPTION

167-1.1 Furnish all materials, equipment, and labor necessary to apply an approved dust palliative in accordance with these Specifications at the locations shown on the Plans.

The Contractor shall scarify, grade, and compact the aggregate surface course to meet finished grade and surface requirements prior to application of dust palliative.

MATERIAL REQUIREMENTS

167-2.1 GENERAL. The Contractor shall submit dust palliative manufacturer certification of compliance and documentation substantiating conformance to all requirements listed below at least 5 days prior to the pre-construction conference. Failure to meet any requirement or to provide acceptable documentation will result in rejection of the proposed product for use on the project.

The dust palliative must be capable of being topically applied over a prepared gravel surface.

167-2.2 CERTIFICATE OF COMPLIANCE. Submit manufacturer's certificate of compliance according to GCP Subsection 60-05, a current Safety Data Sheet, and manufacturer's storage and handling requirements. If the product cannot be stored in freezing temperatures, provide a storage plan or delivery schedule to avoid storage at the project site during cold weather.

The manufacturer and/or supplier shall certify that the following properties/characteristics are present:

- a. Synthetic fluid
- b. Immiscible in water
- c. Non-flammable and non-volatile
- d. Final product shall not stick to and be tracked by tire traffic one week of dwell time. (Non-Tacky)

Certify the dust palliative, confirmed by an independent certified laboratory, satisfies all requirements of the most current version of Boeing's D6-17487, "Evaluation of Airplane Maintenance Materials."

The contractor shall provide project soil and its gradation to the manufacturer or supplier in order to perform ATM 316. The contractor shall submit ATM 316 test results of untreated and treated project soil showing a reduction in dust emissions of no less than 85%.

Submit the manufacturer's recommended application rate with supporting documentation showing how the application rate was determined. The manufacturer's recommended application rate shall result in a design life of not less than 24 months without reapplication

167-2.3 ENVIRONMENTAL REQUIREMENTS. The Contractor shall submit proof to the Engineer in the form of test reports and certificates to verify that the dust palliative is in environmental compliance. The Contractor is responsible for any costs associated with the testing of soil and dust palliative prior to its application. Products shall not contain or emit chlorinated fluorocarbons (CFCs or Freon) and shall not contain or emit volatile organic compounds (VOCs) that exceed Federal or State air quality limitations.

Products and their degradation products, product off gassing, and products with imminent of hazards are prohibited for use by the Alaska Department of Environmental Conservation, the Environmental Protection Agency, 40 C.F.R. § 261.3, 42 U.S.C. § 7412, 15 U.S.C. § 2606 and any applicable law, rule or regulation.

The Contractor shall submit documentation from an accredited laboratory containing aquatic toxicity test results for lethal concentration at 50% (LC50) showing that the product has a rating of "slightly toxic" (LC50>10mg/L) or better as described in EPA guidelines. Acute and chronic toxicity testing must be

performed per EPA guidelines for all of the following species: Rainbow trout (*Oncorhynchus mykiss*), Fathead minnow (*Pimephales Promelas*), and Mysid Shrimp (*Americamysis bahia*).

Products or their components and degradation products shall be tested and certified by the manufacturer not to be substances or composed of substances known to be, or reasonably anticipated to be carcinogenic or toxic by the U.S. Department of Health and Human Services. Products must have hazardous Materials Identification System (HMIS) ratings equal to or less than the following for each category: H=1; F=1; R=1; PPE=X.

CONSTRUCTION METHODS

167-3.1 GENERAL. The dust palliative shall be applied to the areas as shown on the Plans after the surface course has been accepted for application of dust palliative.

An evenly applied spray application method shall be used. The dust palliative shall not be applied to a saturated surface, or when the in-situ moisture levels are greater than Optimum Moisture Content (OMC) +3% of the surface being treated.

167-3.2 RATE OF APPLICATION. Refer to the manufacturer's requirements for an appropriate application rate and as approved by the Engineer, see Subsection 167-3.6.

167-3.3 WEATHER LIMITATIONS. Do not apply dust palliative in the rain, or when rain is imminent, or in any condition where the dust palliative may wash away prior to its full penetration.

Do not apply dust palliative when the air temperature is below 50 °F unless approved by the Engineer.

Do not apply dust palliative during windy conditions which prevent a uniform distribution of the product.

167-3.4 EQUIPMENT. Provide equipment for applying the dust palliative that conforms to the manufacturer's requirements and the following:

Use a distributor that is designed, equipped, maintained and operated to apply the dust palliative uniformly through a calibrated spray bar system in accordance with the application rates. Nozzle height for application shall not exceed 20 inches.

167-3.5 APPLICATION SET-UP. Supply and follow the manufacturer's detailed guidelines or procedures for applying their product to surfaces. Ensure that the application system provides a uniform delivery of the dust palliative at the required application rates, and with an overlap of the spray pattern recommended by the dust palliative manufacturer.

167-3.6 CONTROL STRIP. Prior to full production the Contractor shall construct a control strip, a minimum of 250 square yards, and incorporating a minimum of two adjacent panels. The test area will be designated by the Engineer in an area representative of the project. The control strip will demonstrate application at the manufacturer's recommended rate, as well as to demonstrate the equipment and placement methods to be used. If the control strip should prove to be unsatisfactory, the necessary adjustments to the dust palliative application rate, placement operations and equipment shall be made. Additional control strips shall be placed and evaluated if required. Full production shall not begin without the Engineer's approval of an appropriate application rate. Acceptable control strips shall be paid for in accordance with Subsection 167-5.1.

167-3.7 CLEANUP. In addition to the requirements of GCP Subsection 40-07, remove all shipping containers, drums, or totes, unused dust palliative, and application equipment or its components from the project site. The Contractor shall remove from the work area all debris, waste, and by-products generated by the surface preparation and application operations to the satisfaction of the Engineer. The Contractor shall dispose of these wastes in strict compliance with all applicable state, local, and federal environmental statutes and regulations.

METHOD OF MEASUREMENT

167-4.1 The quantity of the dust palliative as applied to all areas of crushed aggregate surface course, or as ordered by the Engineer, will be measured as a single unit of work.

BASIS OF PAYMENT

167-5.1 The accepted quantity of dust palliative shall be paid for at the contract lump sum price, which shall be full compensation for furnishing all materials, labor, equipment, tools, and incidentals necessary to acceptably complete the work.

Payment will be made under:

Item P167.020.0000 Dust Palliative Lump Sum

TEST REQUIREMENTS

Alaska Test Methods

ATM 316 Dustfall Column Test

Boeing Specifications

D6-17487 Evaluation of Airplane Maintenance Materials.

ASTM Specifications

ASTM F1110 Sandwich Corrosion Test)

ASTM F484 Stress Crazing of Acrylic Plastics in Contact with Liquid or Semi-Liquid Compounds

ASTM F502 Effects of Cleaning and Chemical Maintenance Materials on Painted Aircraft Surfaces

ASTM F519 Mechanical Hydrogen Embrittlement Evaluation of Plating/Coating Processes and Service Environments

ITEM P-170 SOIL TESTING

DESCRIPTION

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

REQUIREMENTS

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

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

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

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

Soils will not be classified for deicer compound contamination.

170-2.3 SOIL TESTING AND DOCUMENTATION PROCEDURES. For areas that are excavated, determine if excavated soil is contaminated with hydrocarbon fuel and/or deicer compounds and classify the fuel contaminated materials for segregation and disposal as necessary. Conduct soil tests for deicer compound contamination only when required by DEC or when necessary to determine if deicer compound contamination is impacting field screening readings for fuel contamination.

Use DEC approved methods in accordance with the DEC Underground Storage Tank (UST) Procedures Manual, DEC Underground Storage Tank Regulations (18 AAC 78), and DEC Contaminated Site Regulations (18 AAC 75) to perform the following:

- a. **Sampling Based on Field Screening Results.** For excavated areas, use visual observation and conduct field screening using a photo-ionization detector (PID) or flame-ionization detector (FID) to determine the location of areas that could be contaminated and will require additional screening and sampling.
 - (1) **Field Screening.** From these areas with suspected contamination, determine sampling locations by field screening at a predetermined frequency for excavated soils and field screening the bottom of the excavation on a minimum 25-foot by 25-foot grid and the sidewalls at 25-foot

intervals half way between the top and bottom of the excavation except that trench excavations for storm drains, fueling systems, utilities, etc. may be field screened at the centerline and both side walls at 25 foot intervals.

- (2) Analytical Sampling and Testing.** If soil is to be left in place, collect samples for laboratory analysis from 25% of the field screening locations with the highest reading. Analyze the samples for DRO and GRO/BTEX. Samples can also be analyzed for glycols per the field sampling plan. Collect one duplicate sample for every 10 samples collected. Locate and document all excavation samples by field surveying. Trench soils excavated for storm drains, fueling systems, utilities, etc. may be characterized prior to excavation using borings. Perform borings at 25-foot intervals along the proposed trench centerlines. Return test results to the Engineer within a minimum of 5 days after sampling.
- (3) Storage Pile Sampling and Testing.** Store potentially warm or hot soil in 30 to 50 cubic yard segments prior to determination of final disposal. Collect a soil sample from each segment of storage pile soil to be analyzed for DRO. Collect one duplicate sample per every 10 soil samples collected. Additional soil samples can be collected to be analyzed for glycols per the field sampling plan. Return test results to the Engineer within a minimum of 5 days after sampling.

Submit field and laboratory results to DEC (original hard copy, two copies, and electronic format) and the Engineer (one copy). Brief the Engineer on a daily basis as required. Prepare and submit a draft report to the ASIG Environmental Manager 15 business days after receipt of the analytical results. Submit a final project report to include all field and lab results to the DEC, the Engineer, and ASIG (original in hard copy and electronic format and six copies to DEC, one copy to the Engineer).

170-2.4 TRENCH PLUGS. Where required to inhibit fuel contamination migration, provide minimum 4-foot vertical trench plugs, extending 2 feet below and 2 feet above the utility installation, and bentonite/sand ratio of 20% bentonite to 80% sand by weight. Comply with the following material requirements:

- a. **Bentonite.** Pulverized, 55 lbs/ft³, 75% - 90% passing 75 micro-meter sieve, supplied in bags clearly marked to show weight, grade, and supplier.
- b. **Sand.** Meet ASTM C144 Mason Sand.

170-2.5 DISPOSITION OF SOILS.

- a. **Clean Soils.** Clean soils meeting material requirements may be re-used in the project. Move any excess clean soils without organics to the disposal area shown in the Plans. Move excess clean soils with organics to an off-airport disposal site in accordance with P-152.
- b. **Hot Soils.** Haul soil classified as hot to Alaska Soil Recycling facility located at 2301 Spar Avenue, Anchorage for thermal remediation. As an alternative, the Engineer may direct hot soil to be stockpiled in accordance with item P-171. When hot soil is identified, immediately contact the ANC Environmental manager through the Engineer. Prior to and after delivery of contaminated soils to the thermal remediation facility, weigh haul vehicles at Carlile Enterprises, 1813 E 1st Avenue, Anchorage. Present a certified invoice to the Engineer and a copy to the ANC Environmental manager. Coordinate delivery of contaminated soils with the remediation facility prior to the haul. The remediation facility will not accept soil without ANC Environmental and DEC's approval. Coordinate with remediation and weigh facilities to determine limitations on the type of haul vehicle and comply with any limitations.
- c. **Warm Soils.** Segregate and store warm contaminated soil removed from the excavations separate from other project storage piles. Transport soil classified as contaminated warm directly to the landspreading area at the direction of the Engineer, unless re-used in accordance with DEC screening and analytical sampling requirements.

170-2.6 LANDSPREADING AND TEMPORARY CONTAMINATED SOIL STOCKPILE AREAS. Determine dimensions for temporary stockpiles. Clearly mark, map, and document soil lots within landspreading and temporary stockpile areas. Identify and delineate the stockpile and landspreading areas by field markings that are unaffected by the elements and designed for long term storage. Identify, document, and correlate all

field markings to test results in the report document. Estimate and document quantities of material placed in the landspreading and temporary stockpile areas using truck counts.

METHOD OF MEASUREMENT

170-4.1 Subsection 90-05 and measured as specified in the directive authorizing the work.

BASIS OF PAYMENT

170-5.1 As specified in the directive authorizing the work and as follows.

For Soil Testing Program, payment for all labor (including the environmental consultant), equipment, and materials necessary to conduct sampling and testing, the screening of the area to be excavated, field testing and screening of excavated material including laboratory correlation, locating and documenting all excavation samples by field surveying, stockpile marking, mapping, and documentation to correlate soil lots to test results will be made in accordance with subsection 90-05 Compensation For Extra Work On Time And Materials Basis.

For Supplemental Laboratory Test, payment will be made in accordance with subsection 90-05 Compensation for Extra Work On Time and Materials Basis to furnish all labor, equipment, and materials necessary for additional composite or discrete sample tests ordered by the Engineer.

For "Hot" Material Offsite Transportation and Disposal, payment will be made in accordance with subsection 90-05 Compensation for Extra Work On Time and Materials Basis to furnish all labor, equipment, and materials necessary to transport and dispose of contaminated "hot" soil.

Field surveying to locate and document excavation samples will be paid for under the Soil Testing Program pay item. Field surveying to locate and document additional sample tests ordered by the Engineer will be paid for under the Supplemental Laboratory Test pay item.

Payment will be made under:

Item P170.010.0000	Soil Testing Program – per lump sum
Item P170.020.0000	Soil Testing Program – per contingent sum
Item P170.030.0000	Supplemental Laboratory Test – per each
Item P170.040.0000	Supplemental Laboratory Test – per contingent sum

ITEM P-171 TEMPORARY CONTAMINATED SOIL STOCKPILE AREA

DESCRIPTION

171-1.1 At the location shown on the plans or as directed by the Engineer, establish a temporary petroleum contaminated soil storage area and construct contaminated soil stockpiles according to the requirements for *[specify short-term or long-term]* stockpiling as defined in Alaska Department of Environmental Conservation (DEC) Contaminated Site Regulations (18 AAC 75) for *[specify short-term or long-term]* storage of petroleum contaminated soil. This area serves as temporary storage for material that has been designated fuel contaminated soil.

Nothing in this contract is intended to impose on the Contractor the status under state or federal law of a facility owner or operator or the status of an owner or generator of the hazardous substances or contaminated materials that existed on the designated sites before the contract. The Contractor must carefully abide by all applicable laws, regulations, plans and practices to avoid becoming a facility owner or operator, or an owner or generator of contaminated materials by a release of hazardous substances.

MATERIALS

171-2.1 BERM. Use uncontaminated suitable material from project excavations.

171-2.2 SUBMITTALS. At least 5 days before ordering liner and cover material, submit manufacturer's product bulletins for approval. Include in the submittal proposed seam layout and joining methods, if applicable.

171-2.3 LINER. Use a membrane impervious to petroleum that meets the minimum specifications for *[specify short-term or long-term storage]* as per 18 AAC 75.370, Table D

171-2.4 COVER. Use 0.006 inch (6 mil) reinforced polyethylene for cover sheeting with manufacturer or field sealed seams.

171-2.5 TEMPORARY FENCE. Provide a 6-foot high chain-link fence on a tubular frame supported with concrete foundation blocks.

CONSTRUCTION REQUIREMENTS

171-3.1 CONTAMINATED CRITERIA. The applicable criteria for determining what soil is fuel contaminated and placed in this area is described in Item P-170 and P-152.

171-3.2 STOCKPILE AREA PREPARATION. Construct separate bermed areas for each stockpile by placing suitable material from unclassified excavation on a prepared site. Prepare site by removing objects that may damage the liner and grade to smooth contours.

171-3.3 LINER. Cover both the berm and the stockpile floor with the liner.

171-3.4 COVER. Lap the edge of the cover over the bottom liner to prevent water from running through the soil. Maintain the top cover over the stockpiled material. Secure sheeting against displacement throughout the project. Use rope, sandbags, and/or netting to secure the cover. Do not use tires.

171-3.5 TEMPORARY FENCE. Surrounding the completed temporary stockpiles, erect a 6-foot high fence.

171-3.6 REMOVAL. Remove berm, liner, cover and temporary fence following disposition of the temporarily stockpiled material.

METHOD OF MEASUREMENT

171-4.1 Subsection 90-05 Compensation For Extra Work On Time And Materials Basis and measured as specified in the directive authorizing the work.

BASIS OF PAYMENT

171-5.1 Subsection 90-05 Compensation for Extra Work on Time and Materials Basis and paid for as specified in the directive authorizing the work.

Payment will be made under:

Item P171.010.0000	Temporary Contaminated Soil Stockpile – per contingent sum
Item P171.020.0000	Temporary Contaminated Soil Stockpile – per lump sum
Item P171.030.0000	Contaminated Soil Cell – per each
Item P171.040.0000	Contaminated Soil Excavation – per contingent sum

ITEM P-180 RIPRAP

DESCRIPTION

180-1.1 Construct riprap bank and slope protection.

MATERIALS

180-2.1 Use evenly graded stones that are hard, angular, and have no more than 50% wear at 500 revolutions as determined by AASHTO T 96. Use stones with breadth and thickness at least 1/4 of its length. Do not use rounded boulders or cobbles on slopes steeper than 2:1.

Meet the following gradation for the class specified. Percents are by total weight, weights are for each stone:

Class I	0-50% weighing up to 25 pounds 0-10% weighing more than 50 pounds
Class II	50-100% weighing 200 pounds or more 0-15% weighing up to 25 pounds 0-10% weighing more than 400 pounds
Class III	50-100% weighing 700 pounds or more 0-15% weighing up to 25 pounds 0-10% weighing more than 1400 pounds
Class IV	50-100% weighing 2000 pounds or more 0-15% weighing up to 400 pounds 0-10% weighing more than 5400 pounds

CONSTRUCTION REQUIREMENTS

180-3.1 Provide a level, compact area large enough to dump and sort typical loads of riprap at approved location(s). Dump the loads specified in this area and assist the Engineer as needed to sort and measure the stones in the load to determine if the riprap is within specifications. Provide the equipment needed to assist in this sorting.

Excavate a footing trench along the toe of the slope as shown on the Plans.

Place stones to the thickness, height, and length shown on the Plans, or as staked, in a well-graded mass with a minimum of voids. Fill in unacceptable voids with smaller stones. Place riprap to its full course thickness in one operation. Avoid displacing the underlying material. Do not place riprap in layers or use methods likely to cause segregation.

Manipulate the rock sufficiently using a backhoe, rock tongs, or other suitable equipment to secure a reasonably regular surface and stability.

METHOD OF MEASUREMENT

180-4.1 Section 90. By neat line volume or by weight. Excavation and backfill will not be measured for payment and is considered subsidiary.

BASIS OF PAYMENT

180-5.1 Payment will be made at the contract unit price for each item below that appears on the bid schedule.

Payment will be made under:

Item P180.010.0000	Riprap, Class I – per cubic yard
Item P180.030.0000	Riprap, Class II – per cubic yard
Item P180.050.0000	Riprap, Class III – per cubic yard

Item P180.070.0000 Riprap, Class IV – per cubic yard

ITEM P-185 ARMOR STONE

DESCRIPTION

185-1.1 Furnish all plant, labor, equipment and materials and perform the work necessary to manufacture and place stone protection on both ends of the runway as shown on the plans or as directed by the Engineer.

MATERIAL

185-2.1 GENERAL. Conform to the following quality and gradation requirements. Submit a quarrying, blasting and processing plan to the Engineer for required materials. Do not place materials prior to acceptance.

Provide primary armor and filter or underlayer stone; stone shall not be elongated or tabular. The minimum dimension of each individual stone shall be at least one-third of the stone's maximum dimension. Provide stone that conforms to the specified size requirements after processing. Conduct loading, placement or stockpiling operations in a manner that eliminates breakage. Comply with the following requirements for armor stone

- a. **Primary Armor and Filter Stone.** Provide uniformly graded stone that falls within the limits shown in the following gradations, based on class:

Primary Armor Stone - Class _____		
<u>Stone Weight</u>	Approximate <u>Diameter</u>	Allowable % Smaller <u>by Stone Count</u>
___ lb	___ inch	100%
___ lb	___ inch	0-50%
___ lb	___ inch	0%

Filter Stone - Class F-___ lb		
<u>Stone Weight</u>	Approximate <u>Diameter</u>	Allowable % Smaller <u>by Stone Count</u>
___ lb	___ inch	100%
___ lb	___ inch	0-50%
___ lb	___ inch	0%

- b. **Underlayer Stone.** Provide uniformly graded underlayer stone that falls within the limits shown in the following gradations, based on class:

Underlayer Stone - Class UL-___ lb		
<u>Stone Weight</u>	Approximate <u>Diameter</u>	Allowable % Smaller <u>by Stone Count</u>
___ lb	___ inch	100%
___ lb	___ inch	0-50%
___ lb	___ inch	0%

CONSTRUCTION METHODS

185-3.1 GENERAL. Provide a level, compact area large enough to dump and sort at approved locations(s). Dump the loads specified in this area and assist the Engineer as needed to sort and measure the stones in the load to determine if the riprap is within specifications. Provide the equipment needed to assist in this sorting.

Place primary armor and filter or underlayer stones on prepared slopes within the limits shown on the plans. Construct a uniform and regular surface with slopes no steeper than those shown on the plans. Maintain the armor stone until final acceptance, and replace any displaced material to the design slopes, lines, and grades at the Contractor's expense.

Place materials in a manner that produces a well-keyed mass of stone, with each individual stone having three points of contact. Ensure that finished surfaces of all layers are free from pockets of single sized stone. Placement of small stone in primary armor and filter or underlayer stone layers to choke the spaces between large stones or for leveling the surface is not permitted. Breaking of individual pieces in place by blasting or mechanical methods is not permitted. Place filter or underlayer stone to the full course thickness in one operation and in a manner that avoids displacing underlying materials. Placement by methods likely to cause segregation, such as end dumping, side dumping or pushing into position with earth-moving equipment, are not permitted. Obtain the desired distribution of various sizes of armor stones throughout the mass by selective loading and by controlled placement of successive loads during placement. Materials that do not meet the specified requirements for size, quality or distribution of sizes will not be allowed for use.

Orient each stone individually so that the long axis of the stone is perpendicular to the structure's sloped surface. Rearrange individual stones as required to the extent necessary to correct deficiencies and to provide a uniform, well-keyed slope.

Place each class of stone to the full thickness and depth shown on the drawings. No minus tolerance is permitted. A greater thickness is permitted provided the outside slopes present a uniform appearance with a minimum of pieces projecting outside the plane of the finished slope surface. A greater depth is permitted in the toe apron provided uniform appearance and finished depths are maintained.

Stone of a certain weight classification that is rejected because of cracks or seam defects, as described in the Quality Control subsection of this specification, may be used for a lower weight classification if other quality and shape requirements are met.

185-3.2 CONSTRUCTION SEQUENCING. Schedule construction activities in general conformance with the following sequencing plan.

- a. Clearly delineate the limits of use of each type of stone, both in the field and on as-built drawings.
- b. Construct the embankment and slope protection in conformance with the plans and specifications.

185-3.3 QUALITY CONTROL. Establish and maintain quality control for stone to assure compliance with contract requirements and to maintain records of its quality control for all operations, including but not limited to the following

- a. Produce stone of the size specified, verifying sizes by selected samples when requested by the Engineer.

Acceptability of stone quality is determined by visual inspection. The Engineer may reject materials not found to meet the specified requirements at any time during the performance of the contract, at the source or project site.

- a. Test stone material for weight, gradation, and shape to assure compliance with the specifications. Conduct tests at the production site before transporting materials to the project site. Place materials that do not meet the specified requirements in a separate area to assure they do not get mixed in with acceptable materials. Perform tests at uniform intervals throughout the project to meet testing frequency requirements.
- b. Before delivery of materials to the project site, meet with the Engineer at the production site and select stones that meet the required weight and shape. Set aside stones at the production site as reference samples. Select reference samples representing each size in the stone gradation and clearly mark and retain until completion of the project.
- c. Testing frequency for this project is shown below

<u>STONE</u>	<u>TYPE OF TEST</u>	<u>NO. OF TESTS</u>
Primary Armor	Visual Inspection/Measurement	10% of Stones
	Weight	10% of Stones
Filter or Underlayer	Measurement	1% of Material Produced

Tests, other than weight, are on individual stones. Failing tests do not count toward the number of tests required. Increase testing frequency as necessary to maintain quality control during production.

1. **Visual Inspections** Make a visual check of the stones at the production site for elongation, cracks, deterioration, and other defects visible to the naked eye, on at least $\frac{2}{3}$ of the surface area of the stone. Wet five percent of the stones checked for cracks and re-inspected for minute cracks to determine if they are detrimental to the stone quality and if additional inspections are necessary on all stone. Do not transport stones with cracks that are detrimental to stone longevity to the placement site.
2. **Measurement** Measure stones on three mutually perpendicular axes and compute weight using the appropriate specific gravity. Record computed weights and measurements daily and provide signed copies to the Engineer before the start of the next work shift. Select stones for measurement that represent all sizes specified in order to verify conformance with specified shape and grading limits.
3. **Weight** In addition to weighing for payment purposes, weigh primary armor in order to verify conformance with the gradation limits specified. Accomplish by placing stones of similar size into a truck or loader, weighing the stones, and calculating an average individual stone weight (e.g., 20 stones placed in a truck weigh 20,000 pounds; this is equivalent to 20 stones with an average weight of $20,000/20 = 1,000$ pounds). Use other methods of weighing stones for grading purposes only if approved by the Engineer.

Provide quality test results meeting the following requirements as performed by a certified lab

PROPERTY	TEST METHOD	LIMITS
Specific gravity (SSD)	AASHTO T-85	2.65 min.
Absorption	ASTM C97	2% max.
Soundness (Sodium Sulfate)	ASTM C88	5% max. loss
Solubility & Durability (Ethylene Glycol)	COE CRD-C-148	2% max. loss after 15 days
LA Abrasion	ASTM C535	10% max. loss after 200 revs. and 50% max. loss after 1000 revs.
Degradation	ATM T-13	40 min.

185-3.4 PLACEMENT. Before placing armor materials, establish clear and understandable construction control for the workers. Establish minimum control to delineate the horizontal limits of all stone classes, both toe and shoulder lines. Unless specified in writing, follow the slope lines and grades indicated on the drawings for the limits of the in-place stone.

Survey each layer to document material placement. Make periodic checks as the work progresses to verify line and grade of the armor placement. Provide a copy of the check surveys to the Engineer and obtain approval before placing the next layer of material. Approval of cross-sections does not constitute final acceptance. Take cross-sections at 25-foot intervals and at the ends of each typical section range. Take horizontal cross-section at 5-foot intervals and at grade breaks along the survey grades.

Submit a plan detailing how the check surveys will be completed, including the methodology and equipment proposed. Do not place stones until the Engineer approves the method for performing check surveys.

METHOD OF MEASUREMENT

185-4.1 Primary armor stone and filter or underlayer stone will be measured by the tons of material placed, based on project weight records, and in accordance with the dimensions shown on the plans, or as directed by the Engineer. No payment will be made for material placed in excess of these dimensions.

BASIS OF PAYMENT

185-5.1 Payment for primary armor and filter or underlayer stone will be made at the contract unit price and includes all labor, materials, tools, equipment, testing, and incidentals required to construct shore protection.

Payment will be made under:

Item P185.010.0000	Primary Armor Stone, Class I – per ton
Item P185.090.0000	Underlayer Stone, Class I – per ton
Item P185.170.0000	Filter Stone – per ton
Item P185.220.0000	Recovered Primary Armor Stone – per ton

ITEM P-186 SACKED SLOPE PROTECTION

DESCRIPTION

186-1.1 Furnish and place sacks (sandbags) filled with granular soils on a prepared slope as shown on the plans.

MATERIALS

186-2.1 SACKS. Provide new sacks with an approximate capacity of 1.25 cubic feet, made of at least ten ounce burlap, and measuring approximately 19-1/2 inches by 36 inches inside the seams when the sack is laid flat.

186-2.2 GRANULAR SOILS. Use granular soils for filling the sacks that meets the requirements of base course material as specified in item P-209.

186-2.3 GEOTEXTILE. Provide separation geotextile in accordance with the material requirements of specification P-681 Geotextile for Separation & Stabilization.

CONSTRUCTION REQUIREMENTS

186-3.1 Prepare slopes that are designated for sacked slope protection as shown on the plans. Repair damaged slopes where geotextile is to be placed and smoothly finish within 0.2 foot of the designated slopes. Place, join, and repair geotextile in accordance with the requirements of item P-681.

Place approximately one cubic foot of base course material in each sack. Immediately after filling, place each closed sack in position and firmly tamp to a stable condition. Conform each sack to the slope and to the adjacent sacks already in place. Prepare the excavation for toe sacks to the approximate depths and elevations shown on the plans. Place toe sacks to form a multiple row of stretchers in this prepared excavation. Prepare the next course consisting of a single row of headers. Prepare the third and remaining courses consisting of a single row of stretchers placed in such a manner that joints in succeeding courses are staggered. Remove all dirt and debris from the tops of sacks before the placing the following course. Place stretchers so that the folded ends will not be adjacent. Place headers with the folds turned in towards the bank. When, in the opinion of the Engineer, there is a lack of solid contact or there are gaps between adjacent sacks, adjust the sacks before continuing with the work.

Place two independent layers of sacked slope protection so that all joints are firm and staggered.

METHOD OF MEASUREMENT

186-4.1 Section 90. By the unit, completed and accepted in place.

BASIS OF PAYMENT

186-5.1 The accepted quantity of sacked slope protection will be paid for at the contract unit bid price per each sack, complete and in place. This price is full compensation for all materials, for preparation of slopes, for geotextiles, sacks, and base course material and for all labor, tools, equipment and incidentals for the slope protection.

Payment will be made under:

Item P186.010.0000	Sacked Slope Protection- per square yard
Item P186.020.0000	Sacked Slope Protection – per each

ITEM P-189 GABIONS

DESCRIPTION

189-1.1 Construct wire gabion bank protection at locations shown on the plans.

MATERIALS

189-2.1 WIRE MESH. Use 11 gage minimum wire, except that the selvage may be heavier. Meet or exceed ASTM A641 medium hardness and tensile strength; Class 3 coating. Furnish at least one sample of each component of the mesh for testing.

Use mesh with 4-inch openings in the longest dimension.

Use wire mesh that is designed to be nonraveling. It must resist pulling apart at any of the connections forming the mesh when a single wire strand in a section of mesh is cut.

Tie and Connecting Wire: Conform to the same specifications as wire used in the mesh except that it may be not more than 2 gauges smaller. Supply sufficient quantity for securing and fastening all edges of the gabion baskets and diaphragms, for fastening adjacent gabion baskets together, and to provide cross connecting wires in each gabion cell as specified below.

189-2.2 GABION BASKETS. Supply baskets, as specified, in various lengths and heights. Make the lengths multiples (2, 3, or more) of the horizontal width. Furnish all gabion baskets in uniform width of not less than 24 inches or more than 48 inches.

Fabricate the sides, ends, lid, and diaphragms for field assembly into a rectangular basket of the required size. Construct gabions as a unit. The base, ends and sides are either to be woven into a single unit or one edge of these members connected to the base so that strength and flexibility at the point of connection is at least equal to that of the mesh.

189-2.3 DIAPHRAGMS. Where the length of the gabion exceeds its horizontal width, divide the gabion equally with diaphragms of the same mesh and gage as the gabion basket and make compartments of a length approximately equal to horizontal width. Furnish the gabion with the necessary diaphragms secured in proper position on the base section so that no additional tying at this juncture is necessary.

Securely selvage or bind all perimeter edges so that the joints formed by tying the selvages have approximately the same strength as the body of the mesh.

189-2.4 GABION BACKFILL. Stone and gravel, uniformly graded from 4 to 12 inches in least dimension and having no more than 60% wear (AASHTO T 96).

CONSTRUCTION REQUIREMENTS

189-3.1 Construct gabions to the lines and grades as staked. Meet the details shown on the plans.

Assemble gabion baskets per the manufacturer's recommended procedures. Align each row or tier of gabion baskets before filling the baskets. Install tie wires in both directions horizontally so that layers between ties are not more than 14 inches thick. Space tie wires not more than 14 inches apart horizontally within any gabion basket cell. Loop tie wires around at least 3 meshes of the gabion basket and tie or twist securely. Fill each gabion basket so the lid, when secure, will bear on the gabion filler. Securely fasten gabion baskets to all adjacent baskets, using sufficient wire to provide the same strength as the body of the mesh.

Meet the requirements of section P-152 for all excavation and backfill for gabions.

METHOD OF MEASUREMENT

189-4.1 By the calculated neat line volume of gabion baskets in place using the manufacturer's specified dimensions.

BASIS OF PAYMENT

189-5.1 Excavation for gabions will be paid for under section P-152.

Payment will be made under:

Item P189.010.0000 Gabion – per cubic yard

TESTING REQUIREMENTS

AASHTO T 96 Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

ASTM A641 Zinc-Coated (Galvanized) Carbon Steel Wire

ITEM P-190 INSULATION BOARD

DESCRIPTION

190-1.1 Furnish and install polystyrene insulation board where shown on the plans.

MATERIALS

190-2.1 Use materials that conform to the following:

- a. **Insulation Board.** AASHTO M 230, Type VI, except that extrusion is not required, and the maximum water absorption is 0.3% by volume, as determined by ASTM C272. Insulation board must meet or exceed the minimum thickness called out in the plans, and have a 20-year warranted thermal resistance (R-Value) @ 75°F of 4.5 per inch of thickness as determined by ASTM C177 or ASTM C518.
- b. **Sand Blanket.** Sand containing no muck, frozen material, roots, sod or other deleterious matter and with a plasticity index not greater than 6 as determined by ATM 204 and ATM 205. Meet the grading requirements of Table 1 as determined by ATM 304:

**TABLE 1
SAND BLANKET MATERIAL GRADATION**

SIEVE	PERCENT PASSING BY WEIGHT
3/8 in.	100
No. 4	15-65
No. 200	0-6

CONSTRUCTION REQUIREMENTS

190-3.1 Prior to placing the insulation board, blade, shape, and compact the area per item P-152. Place a sand blanket leveling course at least four inches thick. Finish the leveling course surface so it does not vary more than 0.10 foot when tested using a 12-foot straightedge.

Set each board accurately to the line and grade established and anchor firmly in place by driving a minimum of two wood dowels per panel. Place insulation to the required thickness, using a minimum of two layers. The required thickness is shown on the plans and is actual thickness, not nominal thickness. Stagger all joints between layers.

Cover the insulation board with twelve inches of sand blanket material prior to placing subsequent lifts. Use approved spreading and compacting equipment.

METHOD OF MEASUREMENT

190-4.1 By the square foot of insulation board with the required "R" value in final position, including transitions, regardless of thickness, complete and accepted.

Sand blanket material is will be paid under P-152.200.0000, Borrow, per ton.

BASIS OF PAYMENT

190-5.1 At the contract unit price.

Payment will be made under:

Item P190.010.0000	Insulation Board – per square foot
Item P190.020.0000	Insulation Board – per 1,000 board feet (MBM)

TESTING REQUIREMENTS

ATM 204

WAQTC FOP for AASHTO T 89 Determining the Liquid Limit of Soils

ATM 304

WAQTC FOP for AASHTO T 27/T 11 Sieve Analysis of Fine and Coarse Aggregates *

MATERIAL REQUIREMENTS

ASTM C272

Water Absorption of Core Materials for Sandwich Constructions

ASTM 177

Steady-State Heat Flux Measurement and Thermal Transmission Properties by Means of the Guarded-Hot Plate Apparatus