

Black text – from standard FAA spec	Blue text – additions to FAA standard spec
Strikeout text – deletions from FAA standard spec	Red text – notes to the Engineer/won't appear in spec

**I. DESCRIPTION**

**A. GENERAL**

1. Excavation, embankment, preparation of subgrade.
2. In conformance with the plans and specifications

**II. CLASSIFICATION**

**A. UNCLASSIFIED**

1. All material shall be considered “unclassified excavation” unless otherwise noted

~~**B. ROCK EXCAVATION**~~

~~**C. MUCK EXCAVATION**~~

**D. DRAINAGE EXCAVATION**

1. For Ditch excavation only.
2. Excavation for drainage and utility pipes and structures will be included in cost of those items

**E. BORROW EXCAVATION**

1. Contractor-provided (from off the project site) material for embankment construction

**F. UNSUITABLE EXCAVATION**

1. Material containing vegetable or organic material
  - a) Not to be used in constructed fills
  - b) May be used on tops of fills where seeding required.

**G. SELECT/SUITABLE MATERIAL**

1. Maximum particle size: 3 inches
2. Maximum percent passing the #200 Screen: 25%
3. Maximum Liquid Limit (LL): 35
4. Maximum Plasticity Index (PI): 12
5. Measured and paid as unclassified excavation unless otherwise specified.

**H. SUBGRADE PREPARATION**

1. Scarification and recompaction of top of subgrade layer
2. Thickness as shown on plans
3. Separate payment item.

**III. CONSTRUCTION METHODS**

**A. GENERAL**

1. Clear and Grub per P-151 if required by plans
  - a) Suitability of excavated material for embankment (fill) will be subject to approval by Engineer
2. Unsuitable material to disposed of:
  - (1) Legally off the airport unless otherwise directed by the Engineer
  - (2) Disposal on the airport, where so directed, shall be graded to provide positive drainage
3. If historical or archaeological artifacts found
  - a) Discontinue work
  - b) Preserve artifacts
  - c) Will be considered Extra Work
4. Outside pavement areas, where soil becomes compacted by construction operations, scarify top 4 inches to loosen soil.
5. If earthwork operations interrupt surface drainage, or drainage courses, conduits or underground structures, Contractor shall:
  - a) Notify the Engineer

- b) Preserve or provide temporary drainage services.
  - c) Bear the cost of repairs of damage to drainage structures.
- B. EXCAVATION / SUBGRADE PREPARATION
1. General
    - a) No excavation until Engineer has approved staking and Engineer has surveyed elevations.
    - b) Suitable excavation to be used in construction of embankments (fills).
    - c) Excess suitable, and all unsuitable, material to be disposed of legally off the airport unless otherwise specified.
    - d) Maintain grade to drain
    - e) Intercept with temporary drains or ditches if necessary
    - f) Blasting not permitted.
  2. Selective Grading
    - a) Where Select Material is required (such as utility or structure backfill), Contractor shall stockpile material identified by the Engineer
  3. Undercutting
    - a) Undercut rock, shale, unstable sand or other unsuitable, by minimum of 12 inches or as directed by the Engineer.
    - b) Paid as unclassified excavation
    - c) Refill with Select Material and compact as specified in Table 1.
  4. Overbreak
    - a) Material removed beyond plan limits
      - (1) Not paid if avoidable.
      - (2) If avoidable, paid as unclassified excavation.
  5. Subgrade Compaction Requirements in Excavation/Subgrade Preparation Areas:
    - a) General
      - (1) Maximum Density to be determined per ASTM:
        - (a) Expansive Materials – ASTM D 698.
        - (b) For Materials with >30% retained on ¾-inch screen:
          - (i) AASHTO T-99
          - (ii) AASTO T-180
        - (c) All other materials:
          - (i) D 1557 – over 60,000# aircraft
          - (ii) D 695 – under 60,000# aircraft
      - (2) Field Density per:
        - (a) ASTM D 1556 or
        - (b) ASTM D 2167
        - (c) No stones > 4 inches within top 6 inches.
        - (d) Complete finished grading at least 1,000 ft ahead of paving operations
      - (3) Moisture Content:
        - (a) Compact within +/- 2% optimum.
      - (4) Use of Nuclear Gauges for Subgrade Compaction
        - (a) If allowed, calibrate for moisture content per ASTM D2922.
        - (b) See Section [20] of these Specifications for additional requirements re: use of nuclear gauges.
      - (5) Moisture – Density Testing Frequency and Acceptance:
        - (a) Before and after compaction
        - (b) Every 1,000 cubic yards per layer
    - b) Compaction Requirements for Subgrade under areas to be paved:
      - (1) Compact to depth below top of subgrade and to density per Table 1:

**TABLE 1 – SUBGRADE COMPACTION REQUIREMENTS**

NON-COHESIVE SOILS (PI < 3) Depth of Compaction, inch				COHESIVE SOILS (PI ≥ 3) Depth of Compaction, inch			
100%	95%	90%	85%	95%	90%	85%	80%
X	X-X	XX-XX	XX-XX	X	X-X	XX-XX	XX-XX

(NOTES TO THE ENGINEER: : include ONLY most demanding row/column for specific project):

GEAR TYPE	GROSS WEIGHT Lb.	NON-COHESIVE SOILS Depth of Compaction, inch				COHESIVE SOILS Depth of Compaction, inch			
		100%	95%	90%	85%	95%	90%	85%	80%
S	30,000	8	8-18	18-32	32-44	6	6-9	9-12	12-17
	50,000	10	10-24	24-36	36-48	6	6-9	9-16	16-20
	75,000	12	12-30	30-40	40-52	6	6-12	12-19	19-25
D (incls. 2S)	50,000	12	12-28	28-38	38-50	6	6-10	10-17	17-22
	100,000	17	17-30	30-42	42-55	6	6-12	12-19	19-25
	150,000	19	19-32	32-46	46-60	7	7-14	14-21	21-28
	200,000	21	21-37	37-53	53-69	9	9-16	16-24	24-32
2D (incls. B757, B767, A-300, DC-10-10, L1011)	100,000	14	14-26	26-38	38-49	5	6-10	10-17	17-22
	200,000	17	17-30	30-43	43-56	5	6-12	12-18	18-26
	300,000	20	20-34	34-48	48-63	7	7-14	14-22	22-29
	400,000 – 600,000	23	23-41	41-59	59-76	9	9-18	18-27	27-36
2D/D1, 2D/2D1 (incls. MD11, A340, DC10-30/40)	500,000 – 800,000	23	23-41	41-59	59-76	9	9-18	18-27	27-36
2D/2D2 (incls. B747 series)	800,000	23	23-41	41-59	59-76	9	9-18	18-27	27-36
	975,000	24	24-44	44-62	62-78	10	10-20	20-28	28-37
3D (incls. B777 series)	550,000	20	20-36	36-52	52-67	6	6-14	14-21	21-29
	650,000	22	22-39	39-56	56-70	7	7-16	16-22	22-30
	750,000	24	24-42	42-57	57-71	8	8-17	17-23	23-30
2D/3D2 (incls. A380 series)	1,250,000	24	24-42	42-61	61-78	9	9-18	18-27	27-36
	1,350,000	25	25-44	44-64	64-81	10	10-20	20-29	29-38

- 6. Removal of Utilities
  - a) To be done by others unless otherwise shown on plans.
  - b) Remove all foundations to 2 ft below top of subgrade.
    - (1) Backfill with Select Material and compact per this Table 1.

C. BORROW EXCAVATION

- 1. If not from within project limits, identify source at least 15 days prior.
- 2. Make vertical cuts to expose strata.
- 3. Leave in drainable, neat condition.

D. DRAINAGE EXCAVATION (DITCH EXCAVATION ONLY)

- 1. Construct intercepting ditches first.
- 2. Maintain to cross-section and clear of debris.
- 3. Select Material may be used as fill elsewhere on the project.
- 4. Unsuitable material disposed of legally off the airport.

E. PREPARATION OF EMBANKMENT AREA

- 1. Clear and/or grub and scarify to 6 inch depth.

2. Compact per paragraph F.6
  3. If slopes >3:1, bench as per plans.
  4. Blade surfaces to provide drainage.
- F. FORMATION OF EMBANKMENTS
1. Maximum layer thickness 8 inches loose depth.
  2. Do not incorporate brush, organics.
  3. Suspend operations for rain or other unsatisfactory site conditions.
  4. Material in each lift to be within +/- 2% optimum moisture before compaction.
  5. Sprinkle/ manipulate as necessary to obtain moisture content.
  6. Compaction Requirements in Embankment/Fill Areas:
    - a) Embankment/Fill Compaction Requirements under areas to be paved :
      - (1) See Table 1, above.
    - b) Embankment/Fill Compaction Requirements outside areas to be paved :
      - (1) Non-cohesive – 95%
      - (2) Cohesive – 90%
      - (3) No compaction required on top 4 inches.
  7. Test for moisture/density:
    - a) Before and after compaction
    - b) Every 1,000 cubic yards per layer
  8. Modify procedures as necessary based on test results.
  9. Keep compacted areas separate.
  10. Layer compaction must be approved prior to placing next higher layer.
  11. Route construction traffic over constructed area to provide additional compaction.
    - a) Empty and loaded trucks.
    - b) Distribute traffic evenly.
  12. Begin construction at deepest portion of embankment.
  13. Construct layers approximately parallel to finished surface.
  14. If excavation includes both soil and rock:
    - a) Incorporation of rock into outer portions of embankment is acceptable.
    - b) No rock > 4 inches in top 6 inches of fill.
    - c) Construct rockfill in layers.
    - d) Make every effort to fill voids with finer material.
    - e) Dispose of excess rock as directed by the Engineer.
    - f) If large rock pieces predominately larger than 8 inch, layer thickness may be increased to 2 feet, but only if greater than 4 ft below top of finished subgrade.
  15. No separate payment for embankment/fill:
    - a) Unless otherwise specified.
    - b) **Incidental to excavation.**
- G. FINISHING AND PROTECTING SUBGRADE
1. Remove Any soft or yielding areas:
    - a) Fill with Select Material and compact per Table 1.
  2. Grade surface to drain readily
  3. Protect compacted subgrade from damage.
  4. Prior to subbase/base construction:
    - a) Ruts and rough spots to be smoothed and recompacted
    - b) Subgrade to be approved by the Engineer
- H. HAUL
1. Considered incidental and no separate payment to be made.
- I. TOLERANCES
1. Areas where base/subbase to be placed:
    - a) Smoothness: ½ inch tested with 16 ft straightedge.
    - b) Grade: +/-0.05 from plan grade.
  2. Safety Areas, intermediate and other designated areas:

- a) Grade: +/0.10 from plan grade.
- b) No smoothness requirement.
- 3. Correct by reshaping and recompacting.

**IV. TOPSOIL [OPTIONAL – BASED ON FAA T-905 - INCLUDE ONLY IF REQUIRED FOR PROJECT]**

- 1. If specified, shall be salvaged from project stripping or grading operations.
  - a) May be stockpiled only in areas approved by the Engineer.
- 2. Topsoil
  - a) No admixture of refuse or material toxic to plant growth
  - b) Reasonably free of stumps, roots, etc. larger than 2 inches.
  - c) pH range of 5.5 to 7.6
  - d) Organic content 3% to 20% determined by wet-combustion (chromic acid reduction).
  - e) No more than 20% passing #200 sieve per ASTM C 117.
  - f) Natural topsoil may be amended to meet above requirements.
  - g) Provide source and samples within 10 days of bid acceptance.
- 3. Preparation
  - a) Loosen with disc or harrows minimum depth 2 inches
  - b) Clear surface of stones > 2 inches.
- 4. Placing
  - a) Place to uniform depth of 2 inches, unless otherwise specified.
  - b) Spread only when surface is dry.
- 5. Topsoil shall be considered unclassified excavation for purposes of payment.
- 6. No additional payment for stockpiling or secondary handling or amending.

**V. SUBMITTAL REQUIREMENTS**

- A. QUALITY TESTING FOR:
  - 1. Select material
  - 2. Topsoil
- B. PROOF OF LEGAL DISPOSAL FOR WASTE MATERIALS.

**VI. METHOD OF MEASUREMENT**

- A. UNCLASSIFIED EXCAVATION
  - 1. per cubic yard
  - 2. Measured by average end area method
- B. DRAINAGE EXCAVATION
  - 1. per cubic yard
  - 2. Measured by average end area method
- C. SUBGRADE PREPARATION
  - 1. per square yard
- D. OTHER

**VII. BASIS OF PAYMENT**

- A. PAID AT CONTRACT UNIT PRICE ITEM NUMBER
  - 1. 32.1 Unclassified Excavation – per cubic yard
  - 2. 32.2 Subgrade Preparation – per square yard
  - 3. 32.3 [Other] – per [ ]
  - 4. Is full compensation for all materials, labor, equipment, tools and incidentals.
  - 5. No separate payment for work in areas of night or limited-time construction area.

**VIII. TESTING REQUIREMENTS**

- A. ASTM D 698 MOISTURE-DENSITY RELATIONS OF SOILS AND SOIL-AGGREGATE MIXTURES
- B. ASTM D 1556 TEST FOR DENSITY OF SOIL IN PLACE BY THE SAND-CONE METHOD
- C. ASTM D 1557 TEST FOR LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING MODIFIED EFFORT
- D. ASTM D 2167 TEST FOR DENSITY AND UNIT WEIGHT OF SOIL IN PLACE BY THE RUBBER BALLOON METHOD

**IX. END OF SECTION**