File

AC 150/5370-4

PROCEDURES GUIDE FOR USING THE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF AIRPORTS

May 29, 1969

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

AC NO: 150/5370-4

DATE: 5/29/69

ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: PROCEDURES GUIDE FOR USING THE STANDARD SPECIFICATIONS FOR CONSTRUCTION OF AIRPORTS

1. PURPOSE. This advisory circular provides guidance to the public in the use and application of the Standard Specifications for Construction of Airports.

2. REFERENCES. The following advisory circulars are basic references and should be consulted when using this circular.

   a. AC 150/5320-5A, Airport Drainage, dated January 28, 1966 ($0.45).

   b. AC 150/5370-1A, Standard Specifications for Construction of Airports, dated May 1968 ($3.50).

   These publications may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Send a check or money order in the amount shown above for each document. No c.o.d. orders are accepted.

   c. AC 150/5320-6A, Airport Paving, dated May 9, 1967.

   d. AC 150/5340-7A, Marking and Lighting of Deceptive, Closed, and Hazardous Areas on Airports.

   e. AC 150/5345-1B, Approved Airport Lighting Equipment.

   f. AC 150/5370-2, Safety on Airports During Construction Activity.

   These advisory circulars may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590.

Initiated by: AS-580

3. HOW TO OBTAIN THIS CIRCULAR. Additional copies of this circular, AC 150/5370-4, Procedures Guide For Using the Standard Specifications for Construction of Airports, may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590.

Clyde W. Pace, Jr.
Acting Director
Airports Service

TABLE OF CONTENTS

CHAPTER I. INTRODUCTION AND SCOPE

1. INTRODUCTION. This circular has been prepared for guidance in amending and incorporating into airport construction contracts the various provisions of Advisory Circular 150/5370-1A, Standard Specifications for Construction of Airports. It is not intended to be a substitute for consultation with the appropriate Federal Aviation Administration (FAA) airports district or area office, but to supplement such consultation.

   a. Although the specifications reflect the latest acceptable standards, practices, and techniques in airport construction, various permissible options with regard to different materials, methods, quality-control testing, bases of payment, etc., are also included. For contracting purposes and specific projects, it is necessary that the contract documents (usually the Special Provisions) clarify, define, or designate the particular options applicable to the project. This is sound contract administration procedure and it minimizes possible disputes, misinterpretations, and the need for unnecessary costly contract bid prices on the part of construction contractors. As appropriate, this circular summarizes and "flags" most of the typical optional items and other provisions in the specifications which usually need special attention or treatment in the contract documents.

   b. Careful review and check of Division I, General Provisions, of the specifications is necessary to assure compatibility with local laws, regulations, and contracting procedures. The typical general provisions which usually require amendments are also itemized and discussed.

   c. The appendices provide detailed checklists for some significant or major construction items, and they also illustrate possible sample formats for preparing the special provisions to a contract.

2. APPLICATION AND BASIC POLICIES.

   a. Public agencies that administer construction contracts as part of their routine operations have developed their own standard formats for invitations for bids and contract agreements which reflect their local requirements and statutes. When amended to include the Federal requirements for projects involving Federal funds, they are generally acceptable for use in Federal-aid Airport Program (FAAP) contracts. Inclusion of such requirements (relating to labor, wage rates, equal opportunity, etc.) are mandatory. Obtain guidance regarding the current statutory requirements for these mandatory provisions from the nearest FAA area airports branch.

b. It is the FAA policy to encourage sponsors and their engineers to use the technical or construction specification items contained in the FAA Standard Specifications for Construction of Airports in all airport projects to the maximum extent practicable. A key objective of this policy is to standardize, simplify, and economize on the engineering effort required in the preparation, adaptation, review, and approval of project contract documents. Another very important objective is to assure an acceptable standard construction in the system of airports.

c. The basic intent and scope of the specifications are further defined on Page iv under "Note to Sponsors," as follows:

"The specification items contained in this book are of necessity general in scope. Inherent local conditions, practices, and needs may require the modification or alteration of some items to make them consistent with local requirements. The sponsor of the project, his representative, and an FAA engineer can best judge the local requirements for modifications or alterations. No attempt has been made to include any modifications in this book as they can be best evaluated by the sponsor. In a similar manner, the sponsor may add additional items to satisfy special local requirements."

3. RESPONSIBILITY FOR ENGINEERING ADEQUACY. As a general rule, the verbatim incorporation of the specifications into a contract without any amendments or modifications is impracticable because of the inherent variables found in airport projects. Prudent engineering judgement is always necessary and, therefore, must be applied in adapting these specifications to specific construction projects. In all cases, the contract documents, including specifications and plans, shall be technically complete, adequate, and responsive to project engineering requirements. The ultimate responsibility for this engineering adequacy must rest largely with the engineers in charge of the project.

4. TYPICAL CONSTRUCTION CONTRACT DOCUMENTS. The typical documents comprising an airport construction contract are summarized, along with the appropriate references or definitions given in Division I, General Provisions, of the specifications. Local airport authorities, municipalities, or state agencies usually have standard forms or established formats that are regularly used for contract documents, and the typical documents in this category are indicated by an asterisk.

CONTRACT DOCUMENT	PARAGRAPH REFERENCE
* Notice to Contractors	20 - 01
* Proposal	10 - 31 and 32
* Contract	10 - 10
* Proposal Guaranty (or Bid Bond)	10 - 33
* Contract Bond	10 - 11
* Payment Bond	10 - 28
* Notice of Award	10 - 24
* Notice to Proceed	10 - 25
* Addenda (as applicable)	
* General Provisions	Division I
Special Provisions	10 - 39
Technical Provisions or Specifications	Division II - VI
Contract Plans or Drawings (Complete Set)	
Federal Statutory Requirements (wages, labor, equal opportunity, etc.) as given in current FAA policy documents and are mandatory for FAAP projects.	

5. QUALITY CONTROL TESTING AND SPECIFICATION T-611. Note especially that the current edition of the specifications adds new or revised requirements for quality control testing which were not contained in the 1959 edition. The key items affected are Bituminous Concrete (central plant mix), Portland Cement Concrete, and the Compaction Control Tests (T-611) for earthwork, subbase, and base construction. These quality control test requirements are classified into two categories in most of these items on the basis of pavement design loadings, namely:

   a. Pavements designed for gross aircraft weights of less than 30,000 pounds.

   b. Pavements designed for gross aircraft weights of more than 30,000 pounds.

   The engineer shall clearly designate by special provisions or elsewhere in the contract documents which pavement design loading category ("a" or "b" above) will apply to the project contract and will govern the quality control test requirements. With the objective of further upgrading construction quality, Appendix I gives a recommended frequency of control testing for various construction items.

6. RUNWAY SLIPPERINESS AND BITUMINOUS SEAL COATS. Recently, it has been determined that undesirable runway slipperiness has resulted after the application of certain nonaggregate seal coats (bituminous material only), especially on relatively new or dense-textured pavements. In some instances, landing aircraft have skidded off runways after such seal coats were applied, either as part of new construction or as maintenance. Accordingly, airport authorities and their engineers are advised that as a general rule, runway seal coats should conform to Item P-609 or P-626 of the specifications. Do not modify them to eliminate the use of the aggregate specified therein.

CHAPTER 2. GENERAL PROVISIONS

7. DEFINITION OF TERMS (SECTION 10). Certain items under Section 10 should be clarified or expanded in the contracts, drawings, and specifications as applicable.

	Paragraph	Example
a.	10-04 Airport	Add official name of airport.
b.	10-14 Engineer	Specify project engineer organization.
c.	10-18 Inspector	Specify inspector's organization.
d.	10-20 Laboratory	Designate testing laboratory for project.
e.	10-26 Owner	Designate owner or sponsor of project.
f.	10-29 Plans	Add listing of contract plans or drawings.
g.	10-30 Project	Include appropriate title and description.
h.	10-35 Resident Engineer	Specify resident engineer's organization.
i.	10-50 Working Time	Modify if contract time will be based on calendar rather than working days.

8. PROPOSAL REQUIREMENTS AND CONDITIONS (SECTION 20). When there is unacceptable variance with local legal requirements or contract administration policies, appropriately modify or replace the affected general provisions under Section 20 to conform to those customarily used by the sponsor.

9. AWARD AND EXECUTION OF CONTRACT (SECTION 30). The general provisions under Section 30 contain various references to specified time (days) and to specified amounts (percentages) which shall be checked for conformance with local requirements. As in the case of the Section 20 provisions noted above, appropriately modify or replace the portions of Section 30 to conform to those customarily used by the sponsor.

10. SCOPE OF WORK (SECTION 40).

    a. Maintenance of Traffic (40-06). The problems and requirements associated with maintaining airport traffic during construction vary with different airport projects and usually must be given special consideration and treatment in the contract documents. Some typical items that may need to be specified in detail are as follows:

        (1) Designated phasing or scheduling of the project construction work to minimize unacceptable interruptions or conflicts with airport operations.

        (2) Limitations on the operations of construction contractors (prohibited airport areas, designated haul roads and work areas on the airport, allowable construction methods on active aircraft pavement areas, etc.).

(3) Communications and coordination procedures between ATC tower personnel, airport management, and contractors.

(4) Standard operating rules of the airport management applying generally to all contractors and their personnel working on the airport.

(5) Special airport safety regulations to be observed by contractors in addition to the FAA requirements given in Paragraphs 60-06 and 60-07, Section 60.

b. Removal and Disposal of Structures and Obstructions (40-07). This paragraph provides that all material found on the airport, or removed therefrom, shall remain the property of the owner (airport owner usually), unless otherwise indicated. If certain material may be salvaged by the contractor or become contractor's property, then clarify the contract by providing special provisions so that "credit" for such material is appropriately reflected in contract bid prices.

c. Use of Materials Found on the Work (40-08). If necessary, clarify or modify the details and requirements covering the use of aggregates found on the airport site to minimize subsequent contractor disputes, as well as to obtain more responsive and reasonable contract prices. If on-site materials are available for use, inform the contractors in the contract plans or specifications.

11. CONTROL OF WORK AND MATERIALS (SECTION 50).

a. Cooperation of Contractor (50-04). Modify this paragraph or include a separate special provision when the contractor shall be required to furnish building(s) and/or utilities for the engineer's office, testing laboratory, etc. (Note that unless specified, the contractor is not required to do so by the provisions in Division I.)

b. Construction Stakes (50-05). If necessary, clarify or modify the responsibilities for construction staking and layout work, as well as the purchase of construction stakes, to conform with the particular engineering contract requirements and work layout responsibilities established for the particular project.

c. Approval and Testing of Materials (50-06 through 50-08). If necessary, modify these paragraphs to conform with the provisions of the project engineering contract or with the organizational setup of the airport authority, with respect to sampling, testing, approval, rejection, and similar requirements governing the materials to be used in the project. Refer to the limitations on the authority and responsibility of FAA personnel regarding the inspection and approval of construction materials and work given in Paragraph 60-04. As a general rule, preconstruction conferences should also discuss and cover this subject matter in detail for the benefit of all parties involved in the project.

12. LEGAL RELATIONS AND RESPONSIBILITIES TO PUBLIC (SECTION 60).

a. Federal Participation (60-04). Give special attention to this paragraph which states the authority and requirements of the FAA applicable to FAAP projects and the contractural relationship of the Federal Government in such projects.

b. Public Convenience and Safety (60-06). When appropriate for specific airport projects, amend this paragraph by including additional safety provisions and special requirements. Reference should be made to AC 150/5370-2.

c. Barricades, Signs, and Hazard Markings (60-07). If necessary, supplement this paragraph or the plans to designate specific types and arrangement of barricades; warning signs; danger signals; and lighting that may be required by the airport management; in addition to the FAA standards herein referenced, including AC 150/5340-7A.

d. Protection and Restoration of Property (60-09). When a project is to be done at an airport where there are FAA navigational aids or Weather Bureau facilities, consideration should be given to include a special provision similar to that in Appendix 3 as part of this paragraph.

e. Opening of Section of Airport to Traffic (60-11). When it is necessary to stipulate the sequence, timing, or priorities for completing and opening certain airport facilities to traffic, the engineer shall specify such requirements under this paragraph by a special provision.

13. PROSECUTION AND PROGRESS (SECTION 70). The engineer shall carefully check the general provisions included under this Section 70 to assure compatibility with local contracting procedures, legal requirements, and project policies of the sponsor. In particular, the following provisions may be subject to special treatment or modification:

a. Paragraph 70 - 01 Subletting or Assigning of Contract.

b. Paragraph 70 - 02 Prosecution of Work.

c. Paragraph 70 - 06 Determination and Extension of Contract Time for Completion.

d. Paragraph 70 - 07 Failure to Complete Work (particularly the schedule of liquidated damages).

e. Paragraph 70 - 09 Termination of Contract.

f. Paragraph 70 - 10 Procedure for Completion of Seasonal Work.

g. Paragraph 70 - 11 Fulfillment of Contract.

14. MEASUREMENT AND PAYMENT (SECTION 80). The general provisions included under this Section 80 normally do not require modification by the engineer, unless they are at an unacceptable variance with local requirements or contract administration procedures.

CHAPTER 3. CLEARING, EARTHWORK, AND SUBBASES

15. CLEARING AND GRUBBING (ITEM P-151). If necessary, the engineer should clarify or specify by plan details and/or special provisions the following items referenced in this specification:

    a. Designated areas for the disposal of spoil materials removed by the clearing operation.

    b. Special regulations governing blasting operations and the burning of spoil material.

    c. Instructions pertaining to the salvaging and disposal of merchantable timber and ownership rights.

    d. Instructions to the contractor regarding the removal, relocation, or preservation of existing utilities, structures, and operational facilities in areas to be cleared.

    e. Applicable pay items and basis of payment for work required in the project and covered by this specification.

16. EXCAVATION AND EMBANKMENT (ITEM P-152). Because of its broad scope, the engineer shall carefully review and appropriately modify or adapt this earthwork specification to suit the unique site conditions and specific local requirements governing the airport project. The various items that may need to be noted, specified, or supplemented are summarized in Table I, Appendix 2. Earthwork usually is a significant cost item, as well as a critical factor in quality pavement construction. It is also a construction item that is subject to frequent field change orders and contractor's claims, unless the engineer carefully and comprehensively executes the design investigations, final plans, and specifications.

17. WATERING (ITEM P-153). It may not be necessary to specify "watering" for separate payment, unless it is a costly item or local practice and procedures generally require it.

18. SUBBASE COURSE (ITEM P-154). Listed below are typical items which shall be given special attention by the engineer.

    a. The gradation limits given in Table I (Item P-154) are quite broad for subbase aggregate. Accordingly, the engineer shall consider specifying by special provisions, mechanical stabilization requirements, and/or tighter gradation limits, which are applicable to the locally available subbase materials and assure a better and more uniform subbase quality.

b. Note that where frost penetration is a problem, a test shall be performed to determine the degree of frost susceptibility of the soil. Generally, the maximum amount of material finer than 0.02 mm. shall be less than 3 percent (Paragraph 154-2.1).

c. At the discretion of the engineer, include special provisions to indicate the required method of mixing (plant or in-place).

d. Subbase course shall be constructed in layers not less than 3 inches nor more than 8 inches of compacted thickness (Paragraph 154-3.8).

e. In accordance with AC 150/5320-6A, one of the following types of base courses also may be specified for subbase in lieu of Item P-154, depending on the pavement design analysis and inherent project conditions:

(1) Item P-206 Dry and Water-Bound Macadam Base Course.

(2) Item P-208 Aggregate Base Course.

(3) Item P-213 Sand-Clay Base Course.

(4) Item P-216 Mixed In-Place Base Course.

(5) Item P-301 Soil Cement Base Course.

(6) Item P-201 Bituminous Base Course (Stability less than 1800).

Note: Do not use P-216 or P-201 as subbase unless a treated base course is placed or proposed for the future.

19. LIME-TREATED SUBGRADE (ITEM P-155). Typical items that engineers may need to include or specify in the plans and/or special provisions for this item are as follows:

a. The type of lime.

b. Whether the soil used for this work shall be from select materials on the site, selected from off-site sources, or in-place subgrade material.

c. The required depth of subgrade lime treatment and any special laboratory test requirements for the lime-treated soil mixture desired for the project. (This may include a specified percentage of lime, minimum compressive strength, plasticity index, etc.).

d. Where there is a preference, the particular required method (dry or slurry placing) for the application and mixing of lime with the soil.

e. Special curing requirements, if a modification to Paragraph 155-6.5 is desired to conform with local practice or conditions.

CHAPTER 4. FLEXIBLE BASES AND BITUMINOUS SURFACE COURSES

20. GENERAL. The basic requirements in selecting any flexible base course given in the specifications are summarized as follows:

a. In accordance with AC 150/5320-6A, the following types of flexible bases are permitted as a base course only for pavements designed to serve aircraft with gross weights of less than 30,000 pounds, as a minimum—

(1) Item P-206 Dry and Water-Bound Macadam Base Course.

(2) Item P-208 Aggregate Base Course.

(3) Item P-213 Sand-Clay Base Course.

(4) Item P-216 Mixed In-Place Base Course.

b. For flexible pavements designed to serve aircraft with gross weights greater than 30,000 pounds, or where such loadings can be reasonably anticipated for the future, the engineer shall specify one of the following types of flexible base courses—

(1) Item P-201 Bituminous Base Course.

(2) Item P-209 Crushed Aggregate Base Course.

(3) Item P-210 Caliche Base Course.

(4) Item P-211 Lime Rock Base Course.

(5) Item P-212 Shell Base Course.

(6) Item P-214 Penetration Macadam Base Course.

(7) Item P-215 Cold Laid Bituminous Base Course.

c. Selection of the type of base course is the responsibility of the pavement designer, and it is usually governed by the engineering design analysis and the economic and construction factors inherent to each airport project.

21. UNTREATED BASE COURSES. Typical significant items that usually require the attention of the engineer, with respect to modification or adaptation by plans and/or special provisions for base course items, are listed in Table I, Page 15, Untreated Base Courses.

22. BITUMINOUS BASE AND SURFACE COURSES. The various bituminous base and surface courses (except bituminous surface treatments and seal coats) included in the specifications are itemized in Table II, Page 16. Typical important items for the engineer to specially note or to specify a definite selection are therein listed. Note that Item P-216, Mixed In-Place Base Course, is permitted as a base course only for pavements designed to serve aircraft of less than 30,000 pounds gross weight. Item P-401, Bituminous Surface Course, is the recommended surface course for pavements designed to serve aircraft of more than 30,000 pounds gross weight. Item P-408, Blended Natural Limestone Rock Asphalt and Sand Bituminous Surface Course, may be substituted for Item P-401 in those few geographical areas where it is economically competitive and preferred by local experience. Other items to be considered in this type of bituminous work are as follows:

a. Reference is made to Bituminous Base Course (Item P-201) and Table 2 gradation for Sand-Bituminous Base (Item P-201). The use of Table 2 mix gradation shall be permitted only for pavements designed for aircraft of less than 30,000 pounds gross weight, unless it is demonstrated that stability requirements of 1,800 pounds (ASTM D-1559) or a 40 stabilometer reading (ASTM D-1560) can be obtained. Likewise, apply these same considerations to the use of a bituminous mixture based on gradation "D" of Table 1 (Item P-201). Crushed aggregate is recommended and may be necessary to meet stability requirements.

b. The engineer shall select and/or clarify which type of stability test requirements (ASTM D-1559 or D-1560) will control Items P-201, P-401, and P-408 when any of these items are included in a project, as well as whether the pavement design loading shall be greater or less than 30,000 pounds gross weight.

c. For jet runway construction, the recommended tolerance for finished surface grade for bituminous surface courses is ±1/4-inch of the grade shown on the plans. The engineer shall include such a grade tolerance in the contract documents where appropriate. Accordingly, if necessary, require electronic screed control or similar grade control mechanisms for the bituminous paver used on the runway work in order to meet this surface grade tolerance and also the 16-foot straight-edge test requirements (±1/4-inch) given in Items P-401 and P-408.

d. In developing the job mix formula for bituminous surface courses, consideration must be given to the resultant surface texture. A mix containing excessive asphalt or an unusually smooth surface texture will tend to become slippery. Bituminous surfaces properly designed and constructed have satisfactory slipperiness coefficients.

e. When a bituminous base or surface course is used for an overlay, the removal of existing runway paint, rubber deposits, and debris, and the repair and sealing of existing cracks should be covered in the special provisions.

f. For minor projects or projects in remote areas designed for less than 30,000 pounds gross weight aircraft, it may be permissible to eliminate reference to ASTM D-1559 and D-1560 and substitute 92 percent theoretical specific gravity as the density requirement.

TABLE I. UNTREATED BASE COURSES

SPECIFICATION ITEM	TYPICAL ITEMS FOR ENGINEER TO SELECT AND SPECIFY: AGGREGATE GRADATION	AGGREGATE TYPE	CONSTRUCTION METHOD AND PER LAYER COMPACTED THICKNESS	SPECIAL NOTEWORTHY ITEMS
*P-206 Macadam	Table I, Unless Otherwise Specified	Crushed Stone or Slag	Dry or Water-Bound Vibrated: 4" - 8" Non-Vibrated: 3" - 4"	Sand Insulation Course is Optional (Para. 206-3.4)
*P-208 Aggregate	A, B, or C	Crushed or Uncrushed Stone, Slag, or Gravel	Plant-Mix or Mixed In-Place Per Layer: 2½" - 4½"	Sand Filler Amount and Gradation may be tightened (Para. 208-2.2) Percent Crushed Material needed
P-209 Aggregate	A, B, or C	Stone, Gravel, or Slag (All Crushed)	Crusher Run, Central Plant, or Travel Plant Mixing Per Layer: 2½" - 4½"	Note Crushing Limits for Gravel (Para. 209-2.1)
P-210 Caliche	Tighter Limits for Gradation may be specified	Caliche, Caliche-Gravel Caliche-Lime-Stone or Other	Plant-Mix or Mixed In-Place Per Layer: 3" - 6"	Note LL of 35 and PI of 10 as maximums
P-211 Lime Rock	Tighter Limits for Gradation may be specified	Specify locally available materials	Per Layer: 4" - 6"	Note Chemical Qualities for Lime Rock (Para. 211-2.1)
P-212 Shell	No Comment	Specify locally available materials	Plant-Mix or Mixed In-Place Per Layer: 4" - 6"	Note type of shell materials (Oyster or Clam)
*P-213 Sand-Clay	A or B	Specify Desired Type of Material	Plant-Mix or Mixed In-Place Per Layer: 4" - 6"	Note PI of 4 in gradation "B" (maximum)

*Note: Base Course Items P-206, P-208, and P-213 are permitted as base course only for pavements serving aircraft of less than 30,000 pounds gross weight.

TABLE II. BITUMINOUS BASES AND SURFACE COURSES

Specification Item	TYPICAL ITEMS FOR ENGINEER TO SELECT AND SPECIFY			
	Aggregate Gradation	Aggregate Type	Bituminous Material	Compacted Thickness (Each Layer)
P-201 Base (Central-Plant Hot-Mix)	A, B, C, or D of Table 1 unless Table 2 is approved.	Specify desired material and whether crushed or uncrushed (Note: Crushed Material is preferable)	In accordance with local conditions and preference, specify the particular type, grade, controlling specification, and mixing temperatures for bituminous material to be used for each of these bases and surface courses.	Maximum 3" unless waived (Para. 201-1.1)
P-214 Macadam (Penetration)	A or B for Coarse Aggregate	Crushed Stone or Slag		Minimum 2" Maximum 4"
P-215 Base (Cold-Laid)	A, B, or C	Specify desired material		Maximum 5" for machine spreading
*P-216 Base (Mixed In-Place)	A, B, C, or D	Specify type of aggregate		Maximum 4"
P-401 Surface (Central-Plant Hot-Mix)	A or B unless C is approved (Para. 401-3.2)	Specify desired material and whether 60% or 90% crushing required.		Preferably 2" per layer
P-408 Surface (Natural Rock Asphalt)	No comment	Specify desired material		Preferably 2" per layer

*Note: Base Course Item P-216 is permitted as base course only for pavements serving aircraft of less than 30,000 pounds gross weight.

CHAPTER 5. RIGID BASES AND PAVEMENTS

23. SOIL-CEMENT BASE COURSE (ITEM P-301). In accordance with AC 150/5320-6A, Item P-301 shall be permitted as a base course only for pavements serving aircraft with gross weights of less than 30,000 pounds. Note that the minimum thickness specified for a soil cement base course is 6 inches, and any compacted thickness over 8 inches in depth shall be placed in multiple layers (Paragraph 301-4.3). If necessary, clarify the following items of this specification or supplement them by the contract documents:

    a. Whether side forms for longitudinal construction joints shall be definitely required.

    b. Preferred type of portland cement (standard or air-entrained).

    c. Designated type, grade, controlling specification, application rate, and temperature range of bituminous material to be used for curing.

    d. Special laboratory test requirements for soil-cement to conform with local specifications and experience. (This may include specifying a minimum compressive strength requirement, the cement content range by weight, and specific type and quality characteristics of the soil aggregate, such as allowable gradation, plasticity index, etc.)

    e. Desired or preferred method of soil-cement construction to be followed (central-plant mixed or mixed in-place methods).

    f. Whether the soil to be used shall be from select materials on the site, selected from off-site sources, or in-place material.

24. CEMENT TREATED BASE COURSE (ITEM P-304). If necessary, clarify the following items of this specification or supplement them by the contract documents:

    a. Whether forms will definitely be required for longitudinal construction joints. (Refer to Paragraph 304-4.4).

    b. Preferred type of portland cement (standard or air-entrained).

    c. Required type of aggregate (crushed or uncrushed). (Note that if crushed aggregate is selected, this suggested quality crushing requirement may be specified by the engineer: 90 percent by weight of material retained on Number 4 sieve shall have one or more fractured faces.)

d. Preferred specific gradation for the base course aggregate from Table I (A, B, or C), (Item P-304), based on local experience and conditions.

e. Desired type, grade, controlling specification, and application rate and temperature range of the bituminous material to be used for curing the cement-treated base course.

In accordance with AC 150/5320-6A, the minimum permissible thickness of Item P-304 shall be 6 inches, and one inch of P-304 is structurally equivalent to 1-1/2 inches of untreated base material for purposes of pavement design, construction, and evaluation. Where a cement-treated base is preferred and selected by the engineer, specify Item P-304 rather than P-301 for pavements designed to serve aircraft with gross weights greater than 30,000 pounds. For this type of base course, note that the approximate cement content is 3 percent to 6 percent by weight and a compressive strength of at least 750 p.s.i. in 7 days is required (Paragraphs 304-3.1 and -3.2).

25. PORTLAND CEMENT CONCRETE PAVEMENT (ITEM P-501). Refer to Table II, Appendix 2, for the various items in this specification that usually need to be specified or which may be supplemented by the engineer in the plans and special provisions of the contract.

CHAPTER 6. MISCELLANEOUS CONSTRUCTION ITEMS

26. BITUMINOUS PRIME COAT (ITEM P-602). The engineer shall specify the particular type of bituminous material for the prime coat, including the rate and temperature ranges of application, and shall designate a particular unit of measurement (ton or gallon).

27. BITUMINOUS TACK COAT (ITEM P-603). The engineer shall specify the particular type of bituminous material for the tack coat, including the rate and temperature ranges of application, and shall designate a particular unit of measurement (ton or gallon).

28. JOINT SEALING FILLER (ITEM P-605). The engineer shall specify the particular type or types of joint sealing materials required for the pavements and, where appropriate, those for structures. Where jet aircraft use may be anticipated, sealers of the jet-fuel resistant category may be selected. A separate pay item may not be necessary for joint sealers, unless specified otherwise (refer to Paragraphs 605-4.1 and -5.1).

29. ADHESIVE COMPOUNDS, TWO COMPONENT, FOR SEALING WIRE AND LIGHTS IN PAVEMENT (ITEM P-606). As a general note, follow the manufacturer's directions and requirements for adhesive installation. Direct payment for adhesives may not be necessary, unless specified otherwise (refer to Paragraphs 606-4.1 and -5.1).

30. SEAL COATS AND BITUMINOUS SURFACE TREATMENTS (ITEM P-609). The following items of this specification shall be clarified by the contract documents:

    a. Specify a particular type of bituminous surface treatment required for the project (seal coat, double, or triple application).

    b. Designate applicable rates or amounts of the bituminous material desired and the aggregate required for each application in accordance with Table 1.

    c. Depending on local conditions, indicate the preferred type of coarse aggregate and whether screenings or sand shall be utilized as cover material. Note the requirement that crushed gravel shall have at least 75 percent of particles, with at least one fractured face for material coarser than No. 4. For cover aggregate, also note that light-colored material shall be used (Paragraph 609-2.1).

    d. Specify applicable pay items and unit of measurement for each.

31. STRUCTURAL PORTLAND CEMENT CONCRETE (ITEM P-610). Refer to Table III, Appendix 2, for the various items in this specification that need to be adapted or supplemented.

32. RUNWAY AND TAXIWAY PAINTING (ITEM P-620). Indicate in the plans the location, type, and dimensions for runway and taxiway paint markings. The engineer shall specify the type of paint -- reflective with glass spheres or nonreflecting without glass spheres. It may be advisable in some cases to specify a minimum time interval between the completion date of bituminous surfacing and the application date of pavement marking, and as required, any special methods or requirements for preparing the pavement surface for painting which may include the removal of existing marking.

33. TAR EMULSION PROTECTIVE SEAL COAT (ITEM P-625). In reference to Table 1, Item P-625, the engineer shall specify the particulars of the desired tar seal coat, including the type, method of application, and application rates for liquid emulsion and fine aggregate. This seal coat is intended for apron areas of flexible pavements where repeated jet fuel spillage is a problem. For runway and taxiway sealing, either Item P-609 or P-626, which have better slipperiness coefficients, should be used. Give special attention to using proper methods for preparing and cleaning the pavement surface to suit existing pavement conditions.

34. ASPHALTIC EMULSION SLURRY SEAL OR SURFACE TREATMENT (ITEM P-626). If necessary, clarify or specify the following items of this specification in the contract documents:

    a. Whether the asphaltic emulsion slurry seal shall be a one- or two-course application.

    b. Where appropriate, the preferred gradation, asphalt content, and amount of aggregate for each application. (Refer to Table 1, Item P-626). Note that the crushing requirement for aggregates is 100 percent for Plus No. 50 material and 90 percent for Minus No. 50 material.

    c. Preferred type of bituminous material and its characteristics, depending on local practice and conditions.

    d. Special requirements for cleaning and preparing the pavement surface to suit existing pavement conditions.

    e. Note that the pay items are for "undiluted" emulsified asphalt per gallon or per ton.

35. FENCING (ITEMS F-160, F-161, and F-162). The engineer shall indicate and specify in the plans the locations and specific classes of the following fencing that may be required for the project:

    a. Item F-160 Wire Fence with Wood Posts (Class A or B).

    b. Item F-161 Wire Fence with Steel Posts (Class C or D).

    c. Item F-162 Chain-Link Fence (Class E).

    For Item F-162, commercial products may be referenced, if equivalent to the type herein required. Local preference may dictate the particular type of barbed wire to be used, and it shall be specified accordingly, where appropriate. Note that the provision of gates are covered by separate pay items in these fencing specifications. Where not specifically covered, the type, grade, and gauge of wire and posts should be covered in the special provisions.

36. AGGREGATE - TURF PAVEMENT (ITEM P-217). The typical items that the engineer shall note or appropriately clarify for this specification are as follows:

    a. In accordance with AC 150/5320-6A, Item P-217 is permitted only as surfacing for airport areas serving small aircraft, generally less than 12,500 pounds gross weight. The engineer shall clarify the particular type of aggregate-turf pavement required for the project and specify the applicable FAA turf specifications to be used.

    b. Where a base course shall be used, the engineer shall specify the required aggregate gradation (A, B, or C) from Table 1 (Item P-217) and the particular aggregate type (gravel, stone, or slag), if there is a preference.

    c. Where stabilizer aggregate is specified to be mixed with in-place materials, the engineer shall specify the required gradation (D, E, or F) from Table 2 (Item P-217) and the preferred aggregate type (crushed stone, crushed slag, crushed gravel or uncrushed gravel) in the special provisions.

    d. Note that payment is specified under nine different pay items. The contract documents shall indicate which pay items and bases of payment are applicable to the project.

CHAPTER 7. DRAINAGE FACILITIES

37. GENERAL. Along with the earthwork and paving, the installation of drainage facilities is normally a major construction item in airport projects. The design and preparation of drainage plans and specifications merit careful attention by the engineer to assure that the airport drainage facilities are adequate and will be properly installed by the contractor. In general, the FAA specifications for drainage items can be readily adapted with appropriate modifications to suit the variable type, scope, and character of the drainage work required at different airport sites.

38. DRAINAGE PIPE (ITEM D-701 and D-705). Refer to Tables IV and V in Appendix 2 for the typical items that may need to be specified, noted, or clarified in the plans and/or special provisions for adapting the following drainage pipe specifications:

a. D-701 Pipe for Storm Sewers and Culverts.

b. D-705 Pipe Underdrains for Airports.

39. MISCELLANEOUS DRAINAGE STRUCTURES (ITEMS D-751, D-752, and D-754).

a. General. Provide in the project plans, the necessary information on the types and locations, including lines, grades, dimensions, and appropriate structural details of the various drainage structures covered by the following specifications:

(1) D-751 Manholes, Catch Basins, Inlets, and Inspection Holes.

(2) D-752 Concrete Culverts, Headwalls, and Miscellaneous Drainage Structures.

(3) D-754 Concrete Gutters, Ditches, and Flumes.

b. Noteworthy Items. The following general comments apply in common to all three of these specifications:

(1) Check the backfill work, including required compaction, to assure compatibility with project conditions and requirements.

(2) If necessary, give special consideration to the disposal or wasting of surplus excavation, particularly for large drainage structures.

(3) Review the various pay items and bases of payment and, if necessary, modify them to conform with local preference or to better adapt to project conditions.

(4) As appropriate and at the engineer's discretion, specify the different structural materials to be obtained from approved manufacturers. These may include frames, covers, steps, grates, and similar fabricated metal materials.

(5) For minor concrete work, Item P-610 may be deleted and by special provision, the wording given in "special note" Table III, Appendix 2, may be substituted for the use of transit mix.

CHAPTER 8. TURFING ITEMS

40. GENERAL. The FAA turfing specifications, particularly for seeding, sprigging, and sodding, must be adapted to conform with the turfing methods and practice common to the geographical and climatic area in which the airport is located. The engineer can obtain useful guidance by checking local turfing projects, consulting with agronomists and other turfing specialists, or referring to the turfing specifications of local public agencies.

41. SEEDING AND SODDING (ITEMS T-901 and T-904). Refer to Tables VI and VII in Appendix 2 for the typical items that usually need to be specified, noted, or supplemented by the engineer to adapt these specifications to a specific geographic and climatic area.

42. SPRIGGING (ITEM T-903). In general, sprigging of airport areas is not as common as seeding and sodding. However, where sprigging is selected by the engineer, the following typical items in specification Item T-903 usually need to be covered or clarified in the contract documents:

a. Specify the types of grass species acceptable for sprigging and the sources where available and show on the plans the areas for sprigging, liming, and fertilizing.

b. Where required, specify the type and characteristics of lime and/or fertilizer with their application rates and depth ranges.

c. Furnish instructions regarding the harvesting of sprigs, including the storage and handling.

d. Specify the time periods for sprigging and the types of acceptable sprigging methods, along with pertinent details such as depth, spacing, etc. (Note special requirements where mulching is specified, as given in Paragraph 903-3.6.)

e. For turf establishment and maintenance requirements, refer to applicable comments under Item T-901, Seeding, in Table VI, Appendix 2.

43. TOPSOILING (ITEM T-905). The engineer may need to modify and/or clarify the following items of this specification, depending on the project factors:

a. Local conditions may indicate a need to modify topsoil requirements herein specified for pH range, organic content, and gradation.

b. The plans shall show the designated areas to be topsoiled and the locations of on-site or off-site topsoil sources, as appropriate and where required.

c. The minimum compacted depth of the topsoil after placement shall be specified.

d. In projects involving certain earthmoving and grading work, topsoiling is not specified as a separate pay item, but is sometimes included as incidental work under Item P-152, Excavation and Embankment, when this is possible and preferred.

44. TILLING (ITEM T-907). Specify the areas to be tilled and time periods for accomplishing the tilling work in the plans and/or special provisions. When appropriate, do not specify tilling as a separate pay item, but include it as incidental work under other turfing pay items in the contract.

45. MULCHING (ITEM T-908). Indicate in the plans and/or special provisions the areas to be mulched, including the rate and depth of application. When there is a preference or because of project conditions, the engineer shall designate the type of mulch desired and the preferred method for securing and anchoring mulched areas. (Refer to Paragraph 908-3.2.)

CHAPTER 9. AIRPORT LIGHTING INSTALLATION

46. GENERAL.

a. It is important for engineers to note the following paragraphs which are contained in most of the FAA specification items included under airport lighting (Division VI) and are quoted in their entirety:

(1) "Airport lighting equipment and materials covered by FAA specifications shall have the prior approval of the Federal Aviation Administration, Airports Service, Washington, D.C. 20590, and shall be listed in Advisory Circular 150/5345-1B, Approved Airport Lighting Equipment."

(2) "All other equipment and materials covered by other referenced specifications shall be subject to acceptance through manufacturer's certification of compliance with the applicable specification when requested by the engineer."

b. In addition, the engineer's attention is directed to the following items:

(1) Prior to installation, the contractor is required to submit a list of all proposed material for approval.

(2) Bid items, or portion of bid items, eligible for 75 percent Federal participation under the FAAP, should be listed separately from items eligible for normal participation.

47. AIRPORT ROTATING BEACON AND HAZARD BEACON (ITEM L-101 and L-102). The following comments apply in common to both specification Items L-101 and L-102:

a. The engineer shall determine the requirements for wiring and appropriately specify the type, size, number of conductors, and voltage.

b. The engineer shall determine whether a booster transformer and photoelectric control are necessary for the beacon installation. When either or both are necessary, the engineer shall specify the appropriate details.

48. AIRPORT BEACON TOWERS (ITEM L-103). From the options given in Paragraph 103-2.2, the engineer shall select the type of beacon tower required for the project and provide whatever other installation details may be appropriate in the plans.

49. AIRPORT 8-FOOT AND 12-FOOT WIND CONES (ITEM L-107). From the options given in Paragraph 107-2.2, select the particular type of wind cone (8-foot or 12-foot) and specify appropriate requirements for wiring including type, size, number of conductors, and voltage. The engineer shall specify whether or not a booster transformer is necessary.

50. UNDERGROUND CABLE FOR AIRPORTS (ITEM L-108). The engineer shall note and/or clarify the following items in this specification:

    a. Cable type, size, number of conductors, strand and service voltage shall be specified in the plans and/or contract documents.

    b. From the options given in Paragraph 108-2.4, the engineer shall specify the type(s) of cable splice. If options are permitted, the contractor shall be required to indicate in the bid the type of splice proposed.

    c. Paragraph 108-3.3 requires that cable trenches be excavated to the various minimum depths therein stated, unless otherwise specified.

    d. Amount of slack cable for certain connections needs to be stipulated by the engineer (Paragraph 108-3.4).

    e. Special design treatment or modification may be needed for backfill requirements in deep frost or cold climatic areas.

    f. The engineer shall specify the applicable pay items from Paragraph 108-5.1, after giving special attention to the bases of measurement (Paragraphs 108-4.1 through 4.3).

51. AIRPORT TRANSFORMER VAULT AND VAULT EQUIPMENT (ITEM L-109). As appropriate, clearly indicate in the plans and contract documents the particular equipment and construction required for the vault installation, and all necessary wiring and electrical connection requirements. The engineer shall specify the applicable pay items for the work to be covered by this specification, as given in Paragraph 109-5.1.

52. AIRPORT UNDERGROUND ELECTRICAL DUCT (ITEM L-110). Indicate in the plans the locations, dimensions, and design details for the particular type(s) and size(s) of the electrical duct work including direct burial and those to be encased in concrete. Note that all ducts installed under pavement shall be encased in a concrete envelope, except steel conduit (Paragraph 110-3.1), and that special reinforcement and/or structural supports may be needed in soft ground and possibly elsewhere (Paragraph 110-3.2). Special design treatment or modification of backfill requirements also may be needed

in deep frost or cold climatic areas. The engineer shall specify the applicable pay items from those given in Paragraph 110-5.1.

53. AIRPORT WIND TEE (ITEM L-112). The engineer shall appropriately clarify the following items:

    a. The requirements for wiring, including type, size, number of conductors, and voltage.

    b. Furnishing a booster transformer when this transformer is deemed necessary.

54. AIRPORT OBSTRUCTION LIGHTS (ITEM L-119). The engineer shall appropriately clarify the following items:

    a. The requirements for wiring, including type, size, number of conductors, and voltage.

    b. The required type(s) of mounting supports for the lights with necessary details.

    c. The particular type of lamps (Paragraph 119-3.7) for each unit, and indicate if single or double-type obstruction light units are required.

    d. The furnishing or inclusion of insulating transformers and transformer housings where applicable.

55. AIRPORT LIGHTING SYSTEMS (ITEM L-125). Provide in the plans the design layout, location, dimensions, and other details for the particular type of lighting system(s) to be installed in the project. Designate the applicable project pay items to be covered under this specification in the contract documents from the 11 different pay items included in Paragraph 125-5.1.

APPENDIX I. CONTROL TESTING FREQUENCY

The following tabulation of the frequency of testing for job control is recommended for basic guidance only. Rigid conformity with this frequency pattern for every project is not expected. Testing frequency may vary for individual projects or particular phases of projects in accordance with project magnitude and job conditions, such as uniformity of materials at the source; the methods and equipment used; and weather conditions. The number of test samples and the various locations from which they are taken should be such as to verify reasonably that the materials to be incorporated and the end-product are acceptable and in accordance with the plans and specifications. Supplement the sampling and testing by other appropriate analyses and investigations to assure that the test results can be considered representative of the entire mass of materials. In addition, provide adequate observation and inspection of the actual construction operations and processes to ascertain whether satisfactory results can be obtained during construction with an acceptable degree of consistency. Due to the speed in which bituminous layers are placed and the financial investment in these layers, it is recommended that a small test area be placed the first day in order to establish rolling patterns and determine quality of the material and acceptability of the mixture.

TABLE I. TABULATION OF CONTROL TESTS AND FREQUENCY

MATERIALS	TYPE OF TESTS	FREQUENCY
Subgrade (excavation, embankments, borrow)	Density and Moisture Content Soil Classification (Grain Size Analysis, LL and PI)	One per layer for each 1,000 c.y. See Note 1 below.
Subbase and Base Courses (Quality-Preliminary)	Gradation, LL, and PI, Soundness -- Abrasion	Six samples from each source.
(Quality-Construction)	Gradation, LL, and PI	One for each 500 c.y.
(In-Place Subbase/Base)	Density and Moisture Content Layer Thickness	One per layer for each 500 c.y.
Bituminous Surface Courses (Aggregates-Preliminary)	Gradation, LL, and PI, Soundness, Stripping Abrasion	Six samples from each source.
(Aggregates-Construction)	Gradation, LL, and PI	One for each 500 tons.
(Bituminous Concrete-Construction)	Stability (ASTMD-1559 or D-1560) and Extraction Tests (Gradation and Bituminous Content)	Twice daily.
(Pavement In-Place)	Density Layer Thickness	Twice daily.

Note 1. For each color and texture change and at least one test each 10,000 square yards for top 2 feet of subgrade.

TABLE I. TABULATION OF CONTROL TESTS AND FREQUENCY (CONT'D)

MATERIALS	TYPE OF TESTS	FREQUENCY
Portland Cement Concrete (Aggregates-Preliminary)	Soundness/Gradation/ Abrasion	Six samples from each source.
(Water-Preliminary)	AASHO T-26	One sample from each source.
(Aggregates-Construction)	Gradation	One for each 500 c.y.
(Structural Concrete-Construction)	Compressive Strength	One set two cylinders per 100 c.y.
(Concrete Pavement-Construction)	Flexural Strength	One set two beams per 150 c.y. (Initially) (See note).
(All Concrete-Construction)	Slump, Yield, Air Content	Four per day.
Manufactured Materials (Cement, Asphalt, Steel, Pipe, etc.)	Applicable AASHO, ASTM, or Federal test requirements	Vendor's certificate or Engineer's discretion.

Note: After initial tests prove the mix satisfactory, the frequency of tests may be extended at the engineer's descretion to one set of beams for not more than 1,000 c.y.

APPENDIX 2. CHECKLIST AND MODEL SPECIAL PROVISION FORMAT

TABLE I. ITEM P-152- EXCAVATION AND EMBANKMENT

Paragraph	Item to be Specified, Clarified, or Supplemented
152-1.1:	Plans and/or special provisions may need to designate the special airport areas where excess excavation shall be utilized or wasted, and where approved borrow sources exist on the airport, if applicable.
152-1.2:	When "Rock Excavation" is specified, provide plans and/or special provisions which give sufficient information and clarification to enable obtaining realistic contract bid prices for rockwork.
152-2.1-2.7:	At the discretion of the enginner and/or where required by project authorities, provide further clarification by special provisions and/or plan details of the following items covered by this specification: a. Treatment of existing utilities, structures, and facilities affected by earthwork operations. b. Selective on-site grading procedures and requirements for the project, including haul diagrams where required. c. Required depths for undercutting of the various unsatisfactory materials below designated plan grades to be clearly specified for under paved and outside of paved areas. Special attention should be paid to soils which are dark gray to black in color, as these soils are apt to be organic. When practical, organic soils should be removed. d. Applicable tolerances for overbreak, especially in rock cuts. e. Any special procedures covering blasting operations under this item. f. Location of borrow pits (on-site, off-site, etc.). g. Ditch excavation, especially when it is desired that this be a separate pay item, apart from those listed under this specification.

Paragraph	Item to be Specified, Clarified, or Supplemented
	h. Applicable stripping requirements (minimum specified depth, particular limits or areas, etc.). Stripping can often be eliminated in areas of deep fill and can often be confined to the paved area only in shallow fills. Topsoil stripped should be used for turf establishment.
	i. Temporary drains and ditches during construction.
Special Note:	Depending on local design requirements and/or the particular soil and construction conditions, the minimum compaction requirements herein specified for cut and embankment areas may be upgraded to provide for greater depth and degree of subgrade densification. Different compaction requirements or special subgrade treatment may also be required for certain problem soils, such as silts that become "quick" or clays that lose strength when remolded, and expansive type soils.
152-2.9:	For final preparation and compaction of the top of the subgrade under paved areas, local practice may require addition of proof-rolling by a large roller of designated size for a specified minimum amount of coverages to obtain additional densification and to detect unstable areas.
152-2.12:	Clarification may be needed by special provisions of the top-soiling requirements herein given.
152-4.1-4.4:	Specify particular pay items applicable to the project which will be covered by this specification.

TABLE II. ITEM P-501- PORTLAND CEMENT CONCRETE PAVEMENT

Paragraph	Item to be Specified, Clarified, or Supplemented
501-2.2:	Designate one of the allowable gradations for the coarse aggregate, either Table 2 or Table 3.
501-2.3:	Specify particular type of portland cement to be required and the applicable AASHO specification.
501-2.4 thru -2.10:	Whenever applicable or appropriate, specify preferred type(s) and controlling specifications for the following: Premolded Joint Filler, Joint Sealer, Steel Reinforcement, Dowels and Tie Bars, Curing Materials, and Admixtures.
501-3.1(c):	Vibratory finishing of pavements is recommended and should be made mandatory especially for all aircraft usage areas.
501-3.5:	Note that two methods are permitted for concrete mix design and proportioning. Designate whether the concrete mix control shall be based on the specified flexural strength or on predetermined cement content, selecting either Class A, B, or C paving concrete. For large paving projects, preferably base quality control on the flexural strength requirements for the concrete mixture, as herein given and especially at jet airports.
501-3.10:	By plans and/or special provisions, indicate which joints shall be sawed and any special sawing requirements and procedures, when this method of joint construction is desired.
501-3.11(g):	Note that runways may be finished with either a broom finish or belt finish. Drag finish is only permitted for pavements other than runways. Use a transverse broom finish for runways whenever possible for jet airports.
501-3.13:	Specify the particular preliminary and final methods of concrete curing, on the basis of locally proven practices. Note the various options given herein.
Special Note:	In hot climatic areas, special requirements covering hot weather concrete curing and protection may need to be added by special provisions.

Special Note: The finished surface shall be within 1/4 of an inch of the grade shown on the plans. Paragraph 501-3.2 requires that the forms shall not deviate from the true line by more than 1/4 of an inch at any point and is construed to apply to true grade.

TABLE III. ITEM P-610- STRUCTURAL PORTLAND CEMENT CONCRETE

Paragraph	Item to be Specified, Clarified, or Supplemented
610-2.1:	Note that naturally mixed aggregate shall be screened and washed, and all fine and coarse aggregate shall be stored separately and kept clean; do not use pit-run aggregate.
610-2.2:	Specify the particular gradation for coarse aggregate, based on Table 1.
610-2.4:	Specify the particular type of portland cement, and the applicable AASHO specification.
610-2.6 thru -2.11:	As appropriate, specify the preferred types and particular controlling specifications for the following: Admixtures, Premolded Joint Material, Joint Filler, Steel Reinforcement, Calcium Chloride, and Curing Material.
610-3.3:	This paragraph, which covers the responsibility for preparation, storing, and testing of concrete test cylinders and beams, may need modification when not compatible with local practice or the engineering procedures established for the project.
Special Note:	The engineer may elect to provide for additional concrete testing requirements and also the use of transit mix with minimum compressive or flexural strength requirements. Where relatively small amounts of concrete are to be used, the following is suggested; concrete produced by a reputable supplier of ready-mix or transit-mix concrete, designed for a minimum compressive strength of 3,000 p.s.i. at 28 days, may be used when approved by the engineer.
610-5.1:	Concrete and steel reinforcement may sometimes be included as incidental work under the pay items for the particular concrete structures required in the contract; thus, precluding the need for separate pay items for concrete and steel reinforcement.

TABLE IV. ITEM D-701- PIPE FOR STORM SEWERS AND CULVERTS

Paragraph	Item to be Specified, Clarified, or Supplemented
701-1.1:	Indicate in the plans the location and alignment of the various types, classes, sizes, and dimensions of drainage pipe required along with invert and ground surface grades/profiles of all pipelines.
Special Note:	The scope of work stated for this pay item in this paragraph may require modification, if project conditions indicate different pay item scope.
701-2.1 thru 2.9	Specify the preferred types and classes of pipe and appropriate material specifications (AASHO, ASTM, Federal, etc.). (Note special pipe requirements where petroleum fuels are wasted in the sewer system.)
701-3.2(b):	With reference to blasting in rock excavation, provide special instructions, if necessary, regarding the use of explosives and blasting on most airport sites.
701-3.2(c):	Excavation and disposal of unstable soil and its replacement with suitable backfill may require special treatment and/or separate pay items, if significant quantities are anticipated.
Special Note:	A 6-inch tolerance is specified herein for depth of sewer excavation, and any tolerance change greater than 6 inches will require a supplemental agreement for adjusting contract price according to this paragraph.
701-3.3:	Include design details for concrete pipe cradles in the plans wherever a cradling requirement may possibly exist.
701-3.4:	Since pipe shall not be laid on frozen ground, indicate in the plans and/or special provisions the design details and procedures to follow in deep frost areas or cold climatic regions.
701-3.6:	Specify type of pipe joints and jointing method, depending on local preference.

Paragraph	Item to be Specified, Clarified, or Supplemented
701-3.7:	Compaction requirements and type of acceptable backfill may need clarification by special provisions to be compatible with project design requirements.
701-3.9:	If necessary, clarify the methods of disposal or wasting of surplus excavation on certain projects.
701-4.3:	Note that for rock excavation, no payment is specified for additional backfill material. This may be a significant item requiring special treatment.
701-5.1:	Specify size, type, and class of pipe for payment items, and include any other pay items applicable to the project sewer work covered by this specification.

TABLE V. ITEM D-705- PIPE UNDERDRAINS FOR AIRPORTS

Paragraph	Item to be Specified, Clarified, or Supplemented
General Note:	Most of the items included in Table IV of this appendix for D-701, Pipe for Storm Sewers and Culverts, also apply to this specification, Item D-705. The following items, however, pertain only to D-705.
705-3.5:	The engineer shall specify the type of joints in clay or concrete pipe (open or partly open) and applicable requirements for granular backfill for these underdrains.
705-3.6(a):	Compaction requirements may need further clarification in plans and/or special provisions.
705-3.6(b):	Note that details on placement of granular backfill in the trench and around the pipe shall be delineated on plans.
705-5.1:	Specify the size, type, and class of pipe underdrains. Note that separate pay items are stipulated for porous backfill No. 1 and No. 2, and also note that rock excavation is not a separate pay item under this D-705 specification.

TABLE VI. ITEM T-901- SEEDING

Paragraph	Item to be Specified, Clarified, or Supplemented
901-1.1:	Specify on the plans and/or in special provisions the areas to be seeded, limed, or fertilized and the acceptable dates for starting and completion of work.
901-2.1:	Designate the type of seed mixture giving the minimum percentage by weight of pure live seed, the maximum percentage of weed seed, and other details as necessary. Specify application rate of seed mixture and planting depth.
901-2.2 and -2.3:	As appropriate, specify the type and characteristics of lime and/or fertilizer, and the application rates and depths of incorporation for each.
901-3.1:	Clarify advance preparation and cleanup requirements as needed to fit project site conditions.
901-3.2 and -3.3:	Local practices may indicate a need to designate a preference for either dry or wet application.
901-3.4:	As appropriate, clarify the contractor's turfing maintenance responsibilities, such as the required time period, mowing frequency, nature, and frequency of watering, and other special maintenance requirements for seeded areas.
Special Note:	Where necessary, designate a fixed time period for establishment of an acceptable stand of grass for approval and acceptance of work.

TABLE VII. ITEM P-904- SODDING

Paragraph	Item to be Specified, Clarified, or Supplemented
904-2.1:	Specify the type of plant species desired for sodding and, when necessary, stipulate the approved sources of sod and the starting and completion dates for sodding.
904-2.2 and -2.3:	As appropriate, specify the type and characteristics of lime and/or fertilizer, and their respective application rates and depth ranges.
904-3.1:	Designate the areas to be solid, strip, or spot-sodded; the areas requiring special surface preparation (tilling), and those areas to remain undisturbed. (This may be done in the plans and/or special provisions.)
904-3.4:	Specify minimum thickness of sod and dimensions of cut sections or strips in accordance with local practice.
904-3.5:	Note the requirements for anchoring sod on steep slopes. When other means of sod anchorage are preferred, then specify them when they differ from those given herein.
904-3.6 and -3.7:	For turf establishment and maintenance requirements, refer to the comments under Item T-901, Seeding, Paragraph 901-3.4, in Table VI of this appendix.

APPENDIX 3. SUGGESTED SPECIAL PROVISION FOR PROTECTION OF CABLES, CONTROLS, NAVAIDS AND WEATHER BUREAU FACILITIES

The contractor is hereby informed that there are installed on the airport FAA NAVAIDS; including, without limitation, ASR, UHF and VHF Receivers and Transmitters; U.S. Weather Bureau facilities; electric cables and controls relating to such NAVAIDS and facilities, and other electric power cables serving other facilities. Such NAVAIDS, Weather Bureau and other facilities, and electric cables must be fully protected during the entire construction time. Work under this contract can be accomplished in the vicinity of these facilities and cables only at approved periods of time. Approval is subject to withdrawal at any time because of changes in the weather, emergency conditions on the existing airfield areas, anticipation of emergency conditions, and for any other reason determined by the engineers acting under the orders and instructions of the airport management and/or the designated FAA representative. Any instructions to this contractor to clear any given area, at any time, by the engineers, the airport management or the FAA control tower (by radio or other means) shall be immediately executed. Construction work will be commenced in the cleared area only when additional instructions are issued by the proper authorities.

Power and control cables leading to and from any FAA NAVAIDS, Weather Bureau and other facilities, will be marked in the field by the engineers for the information of the contractor, before any work in their general vicinity is started. Thereafter, through the entire time of this construction they shall be protected from any possible damage, including crossing with unauthorized equipment, etc.

These special provisions intend to make perfectly clear the need for protection of FAA NAVAIDS, Weather Bureau and other facilities, and cables by this contractor at all times.

The contractor shall immediately repair, with identical material by skilled workmen, any underground cables serving FAA NAVAIDS, Weather Bureau and other airport facilities, which are damaged by his workmen, equipment, or work. Prior approval of the FAA must be obtained for the materials, workmen, time of day or night, method of repairs, and for any temporary or permanent repairs the contractor proposes to make to any FAA NAVAIDS and facilities damaged by the contractor. Prior approval of the engineer or of the representative designated by the airport management must be obtained for the materials, workmen, time of day or night, and for the method of repairs for any temporary or permanent repairs the contractor proposes to make to any other airport facilities and cables damaged by this contractor.

It is recognized that the (Sponsor) will incur costs for employees' salaries, engineering fees, and otherwise in connection with the damage and inspection and repair of any such damage, caused by the contractor; and consequently that the (Sponsor) may incur loss of income by reason of the diversion of aircraft traffic from the airport resulting from interruption of the use of airport facilities; and that such expenses and loss of income are not measurable now and may not be reasonably ascertainable at the time of any incident caused by this contractor. The (Sponsor) and the contractor hereby agree to the assessment of liquidated damages in lieu of such expenses of other damages incurred by the (Sponsor). In addition to the obligation of this contractor to immediately repair any cables or facilities damaged by the contractor within three feet of the location on the ground defined by the Engineer, as set forth above, the sum of $ * shall be deducted from any money due the contractor, or if no money is due the contractor, the (Sponsor) shall have the right to recover said sum or sums from the contractor, from the surety, or from both. The amount of these deductions are to cover liquidated damages to the sponsor incurred by additional and other expenses and damages arising from the incident or incidents caused by the contractor, and such deductions are not considered penalties.

* Insert $500.00 for smaller airports, $1,000.00 for medium hub airports, and $2,000.00 for large hub airports.

☆U. S. GOVERNMENT PRINTING OFFICE : 1969 O - 354-635