SECTION 58 – MANHOLES, CATCH BASINS, INLETS AND MISCELLANEOUS UTILITY SYSTEM WORK (FAA ITEMS D-751, D-752 AND D-754)

58-1 GENERAL

The Contractor shall perform all work required by the plans and specifications for construction of manholes, catch basins, concrete collars, modifying catch basins, and adjusting miscellaneous utility structures to grade for storm drain systems in accordance with the Standard Specifications, except as specified otherwise in FAA Specification Item D-751, Manholes, Catch Basins, Inlets and Miscellaneous Utility System Work; Item D-752 Concrete Culverts, Headwalls, and Miscellaneous Drainage Structures; and Item D-754, Concrete Gutters, Ditches, And Flumes, as included and modified hereafter, and as shown on the Plans.

[Some drainage and utility system structures and work installation may be in areas of limited-time night construction as shown on the phasing sheets in the plans. The Contractor is responsible for determining the difficulties associated with this work under these conditions, shall plan his construction approach accordingly, and shall make the necessary allowances for associated additional costs in his bid items.]

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

DESCRIPTION

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

MATERIALS

751-2.1 BRICK. *Section not used.*

751-2.2 MORTAR/GROUT. *Mortar shall consist of one part portland cement and two parts sand. The portland cement shall conform to the requirements of ASTM C 150, Type I. The sand shall conform to the requirements of ASTM C 144.*

Grout shall have a compressive strength of 2,000 psi at 28 days unless otherwise indicated. The grout shall be installed in one continuous operation at a time as allowed by the Engineer. Care shall be taken to prevent grout from leaking out of the ends of the casing pipe during the curing period.

751-2.3 CONCRETE. *Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Section 54 (FAA Item P-610).*

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

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

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

- ***a.*** *Gray iron castings shall meet the requirements of ASTM A 48, Class 30B and 35B.*
- ***b.*** *Malleable iron castings shall meet the requirements of ASTM A 47.*
- ***c.*** *Steel castings shall meet the requirements of ASTM A 27.*
- ***d.*** *Structural steel for grates and frames shall conform to the requirements of ASTM A 283, Grade D.*
- ***e.*** *Ductile iron castings shall conform to the requirements of ASTM A 536.*
- ***f.*** *Austempered ductile iron castings shall conform to the requirements of ASTM A 897.*

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

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

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A 123.

All castings shall be capable of supporting the loads in paragraph 751-2.8.

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

751-2.8 LOAD RATING. *Load calculations shall be submitted confirming the ability of all structures, frames, grates and covers to provide support for the following aircraft:*

(1) Dual-wheel, 48,800# per wheel gear assembly of the Boeing 727; 34 inch center-to-center wheel spacing;

(2) Dual-Tandem (four-wheel), 57,900# per wheel, gear assembly of the Boeing 747-800; 46.8 inch transverse and 56.5 inch longitudinal center-to-center wheel spacing; and

(3) Tridem (six-wheel), 58,900# per wheel, gear assembly of the Airbus A380, 53 inch transverse and 67 inch longitudinal center-to-center wheel spacing.

Contact tire pressure should be assumed to be 221 psi.

CONSTRUCTION METHODS

751-3.1 UNCLASSIFIED EXCAVATION.

a. *The Contractor shall do all excavation for structures and structure footings to the lines and grades or elevations, shown on the plans, or as staked by the Engineer. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. All soft and unsuitable material shall be removed and replaced with suitable approved material. A layer of Processed Miscellaneous Base, conforming to Section 200-2.5 of the 2009 Standard Specifications for Public Works Construction (Greenbook) shall be placed and compacted to the thickness indicated on the plans, to form a subbase Compaction shall be to 90% of D1557. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.*

b. *Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing is to be placed.*

c. *The Contractor shall do all bracing, sheathing, or shoring necessary to*

implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. *Unless otherwise provided, bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished masonry. The cost of removal shall be included in the unit price bid for the structure.*

e. *After each excavation is completed, the Contractor shall notify the Engineer to that effect; and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.*

751-3.2 BRICK STRUCTURES. *Section not used.*

751-3.3 CONCRETE STRUCTURES. *Concrete structures shall be built on prepared foundations, conforming to the dimensions and form indicated on the plans. The construction shall conform to the requirements specified in Section54 (FAA Item P-610). Any reinforcement required shall be placed as indicated on the plans and shall be approved by the Engineer before the concrete is poured.*

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

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

751-3.5 CORRUGATED METAL STRUCTURES. *Corrugated metal structures shall be constructed on prepared foundations, conforming to the dimensions and locations as shown on the plans. The structures shall be prefabricated. standard or special fittings shall be furnished to provide pipe connections or branches of correct dimensions. The connections or branches shall be of sufficient length to*

accommodate connecting bands. The fittings shall be welded in place to the metal structures. When indicated, the structures shall be placed on a reinforced concrete base. The top of the metal structure shall be designed so that either a concrete slab or metal collar may be attached to which can be fastened a standard metal frame and grate or cover. Steps or ladders shall be furnished as shown on the plans.

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

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

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

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

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

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

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

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

751-3.9 BACKFILLING.

a. *After a structure has been completed, the area around it shall be filled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Section 23 Earthwork (FAA Item P-152). Each layer shall be deposited all around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the Engineer.*

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

c. *Backfill shall not be measured for direct payment. Performance of this work shall be considered on obligation of the Contractor covered under the contract unit price for the structure involved.*

751-3.10 CLEANING AND RESTORATION OF SITE. *After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.*

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

751-4.1 *See Section 58-**[4][5]***

BASIS OF PAYMENT

751-5.1 *See Section 58-**[5][6]***

MATERIAL REQUIREMENT

ASTM A 27	*Steel Castings, Carbon, for General Application*
ASTM A 47	*Ferritic Malleable Iron Castings*
ASTM A 48	*Gray Iron Castings*
ASTM A 123	*Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
ASTM A 283	*Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes, and Bars*
ASTM A 536	*Ductile Iron Castings*
ASTM A 897	*Austempered Ductile Iron Castings*
ASTM C 32	*Sewer and Manhole Brick (Made from Clay or Shale)*
ASTM C 144	*Aggregate for Masonry Mortar*
ASTM C 150	*Portland Cement*
ASTM C 478	*Precast Reinforced Concrete Manhole Sections*
AASHTO M 36	*Zinc Coated (Galvanized) Corrugated Iron or Steel Culverts and Underdrains*

END OF ITEM D-751

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

DESCRIPTION

752-1.1 *This item shall consist of [plain][reinforced] concrete culverts, headwalls, and miscellaneous drainage structures constructed in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the Engineer.*

MATERIALS

752-2.1 CONCRETE. *Plain or reinforced concrete shall meet the requirements of Section 54..*

CONSTRUCTION METHODS

752-3.1 UNCLASSIFIED EXCAVATION.

a. *Trenches and foundation pits for structures or structure footings shall be excavated to the lines and grades or elevations shown on the plans. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. All soft and unsuitable material shall be removed and replaced with suitable approved material. A layer of Processed Miscellaneous Base, conforming to Section 200-2.5 of the 2009 Standard Specifications for Public Works Construction (Greenbook) shall be placed and compacted to the thickness indicated on the plans, to form a subbase Compaction shall be to 90% of D1557. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximate only; and the Engineer may order, in writing, changes in dimensions or elevations of footings necessary to secure a satisfactory foundation.*

b. *Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. When concrete is to rest on a surface other than rock, special care shall be taken not to disturb the bottom of the excavation, and excavation to final grade shall not be made until just before the concrete or reinforcing steel is to be placed.*

c. *The Contractor shall do all bracing, sheathing, or shoring necessary to perform and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for excavation.*

d. *Unless otherwise provided, bracing, sheathing, or shoring involved therewith shall be removed by the Contractor after the completion of the structure. Removal shall be effected in a manner that will not disturb or mar finished concrete. The cost of removal shall be included in the unit price bid for excavation.*

e. *After each excavation is completed, the Contractor shall notify the Engineer to that effect, and concrete or reinforcing steel shall be placed after the Engineer has approved the depth of the excavation and the character of the foundation material.*

752-3.2 BACKFILLING.

a. *After a structure has been completed, backfilling with approved material shall be accomplished by applying the fill in horizontal layers not to exceed 8 inches in loose depth, and compacted. The field density of the compacted material shall be at least 90 percent of the maximum density for cohesive soils and 95 percent of the maximum density for noncohesive soils. The maximum density shall be determined in accordance with ASTM D 1557. The field density shall be determined in accordance with ASTM D 1556.*

b. *No backfilling shall be placed against any structure until permission is given by the Engineer. In the case of concrete, such permission shall not be given until the concrete has been in place 7 days, or until tests made by the laboratory under the supervision of the Engineer establish that the concrete has attained sufficient strength to provide a factor of safety against damage or strain in withstanding any pressure created by the backfill or the methods used in placing it.*

c. *Fill placed around concrete culverts shall be deposited on both sides at the same time and to approximately the same elevation. Care shall be taken to prevent any wedging action against the structure, and all slopes bounding or within the areas to be backfilled shall be stepped or serrated to prevent wedge action.*

d. *Backfill will not be measured for direct payment. Performance of this work under the contract is not payable directly but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for ``unclassified excavation for structures.''*

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

752-3.4 CLEANING AND RESTORATION OF SITE. *After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankment, shoulders, or as*

ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

METHOD OF MEASUREMENT

752-4.1 *See Section 58-**[4][5]***

BASIS OF PAYMENT

752-5.1 *See Section 58-**[5][6]***

TESTING REQUIREMENTS

ASTM D 1557	*Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12-in (305 mm) Drop*
ASTM D 1556	*Density of Soil in Place by the Sand-Cone Method*

END OF ITEM D-752

ITEM D-754 CONCRETE GUTTERS, DITCHES, AND FLUMES

DESCRIPTION

754-1.1 *This item shall consist of portland cement concrete gutters, ditches, and flumes constructed in accordance with these specifications at the specified locations in accordance with the dimensions, lines, and grades as shown on the plans.*

MATERIALS

754-2.1 *Concrete, plain and reinforced concrete shall meet the requirements of Section 54 of these specifications.*

754-2.2 JOINTS. *Joint filler materials and premolded joint material shall conform to Section 42 of these specifications.*

CONSTRUCTION METHODS

754-3.1 PREPARING SUBGRADE. *Excavation shall be made to the required width and depth, and the subgrade upon which the item is to be built shall be compacted to a firm uniform grade. All soft and unsuitable material shall be removed and replaced with suitable approved material. All soft and unsuitable material shall be removed and replaced with suitable approved material. A layer of Processed Miscellaneous Base, conforming to Section 200-2.5 of the 2009 Standard Specifications for Public Works Construction (Greenbook) shall be placed and compacted to the thickness indicated on the plans, to form a subbase Compaction shall be to 90% of D1557. The underlying course shall be checked and accepted by the Engineer before placing and spreading operations are started.*

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

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

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

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

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

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

754-3.3 BACKFILLING. *After the concrete has set sufficiently, the spaces adjacent to the structure shall be refilled to the required elevation with material specified on the plans and compacted by mechanical equipment to at least 90% of the maximum density as determined by ASTM D 1557. The in-place density shall be determined in accordance with ASTM D 1556.*

754-3.4 CLEANING AND RESTORATION OF SITE. *After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as ordered by the Engineer. The Contractor shall restore all disturbed areas to their original condition.*

After all work is completed, the Contractor shall remove all tools and equipment, leaving the entire site free, clear and in good condition.

Performance of the work described in this section is not payable directly but shall be considered as a subsidiary obligation of the Contractor, covered under the contract unit price for the structure.

METHOD OF MEASUREMENT

754-4.1 *See Section 58-**[4][5]***

BASIS OF PAYMENT

754-5.1 *See Section 58-[5][6]*

TESTING REQUIREMENTS

ASTM D 1557	*Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 5.5 lb (2.49 kg) Rammer and 12-inch (300 mm) Drop*
ASTM D 1556	*Density of Soil in Place by the Sand-Cone Method*

END OF ITEM D-754

58-2 ADJUST MISCELLANEOUS STRUCTURES TO GRADE.

Manholes, inlets, outlets, handholes, and other structures and other utilities identified on the plans to be adjusted to grade shall be done in accordance with the details and standard specification references shown on the plans. Where no specific details are called out, the Contractor's method of adjusting the grade of the structure shall be submitted to, and approved by, the Engineer prior to proceeding with the work. All adjustments shall be capable of supporting the aircraft load in Section 751-2.8.

Utility systems on lines where manholes, handholes and other structures to be modified or adjusted to grade will be required to be tested after the completion of the work. No modification or adjustment will be accepted for payment until such testing is completed and approved by the Engineer.

The Contractor shall be solely responsible for all coordination with affected utility or owner agencies where adjustments to access structures are required. This shall include FAA, fuel companies, telephone and other utility companies. No modifications to the schedule will be allowed for delays due to the failure on the part.

58-3 [OTHER DRAINAGE SYSTEM WORK]

[Description]

58-[4][5] METHOD OF MEASUREMENT

Manholes, catch basins, inlets, **[ ]** and other utility structures shall be measured by the unit, completed and accepted by the Engineer.

58-[5][6] BASIS OF PAYMENT

The accepted quantities of manholes, catch basins, inlets, **[ ]** and inspection holes will be paid for at the contract unit price per each in place when completed. This price shall be full compensation for furnishing all materials and for all preparation, excavation, backfilling and

placing of the materials; furnishing and installation of such specials and connections to pipes and other structures as may be required to complete the item as shown on the plans; and for all labor equipment, tools and incidentals necessary to complete the structure.

No separate payment will be made for constructing the items under construction sequencing restrictions, including limited access or nighttime work areas.

Payment will be made under:

Item 58.1	**[Manhole] [Catch Basin] [Other]**	per each
Item 58.2	Adjust **[ ]** to Grade	per each
Item 58.3	[Other]	per [each][linear foot][lump sum]

END OF SECTION 58