SECTION 312300

EXCAVATION AND FILL

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***NOTE TO SPECIFIER***

*Use this Specification Section for Mail Processing Facilities.*

***This is a Type 1 Specification with completely editable text; therefore, any portion of the text can be modified by the A/E preparing the Solicitation Package to suit the project.***

*For Design/Build projects, do not delete the Notes to Specifier in this Section so that they may be available to Design/Build entity when preparing the Construction Documents.*

*For the Design/Build entity, this specification is intended as a guide for the Architect/Engineer preparing the Construction Documents.*

*The MPF specifications may also be used for Design/Bid/Build projects. In either case, it is the responsibility of the design professional to edit the Specifications Sections as appropriate for the project.*

*Text shown in brackets must be modified as needed for project specific requirements.* *See the “Using the USPS Guide Specifications” document in Folder C for more information.*

*The last date that USPS revised this standard specification section occurs in two places, at the end of this section and in the Table of Contents. If the date in this section matches the date in the Table of Contents, then you are using the latest version. Do not delete or revise the “last revised” date at the end of the section during the development of the Project Manual.*

*The footer in this section should be edited to replace the text, “USPS MPF SPECIFICATION” with the project name, and the blank date in the center should be replaced with the submission date, for interim design reviews, or the issue date of the completed Project Manual.*

***Use this section where Excavation and Fill is part of the Work. Before editing this Section, obtain the "Report of Subsurface Investigation" prepared by the Geotechnical Engineer. Read the report and incorporate the recommendations included in the report into this Section.***

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1. GENERAL
	1. SUMMARY
		1. Section Includes:
			1. Excavating and backfilling for structures, utilities, and pavement.
			2. Pipe bedding.
			3. Compacting fill materials.
			4. Borings and casings under roads.
		2. Related Documents: The Contract Documents, as defined in Section 011000 - Summary of Work, apply to the Work of this Section. Additional requirements and information necessary to complete the Work of this Section may be found in other Documents.
		3. Related Sections:
			1. Section 312000 ‑ Earth Moving: Cutting, filling, and grading for proposed site improvements.
			2. Section 312317 ‑ Rock Excavation: Removal of rock during excavation.
			3. Section 313200 ‑ Soil Stabilization: Lime, cement, fly ash, and geotextile subgrade stabilizers.
	2. REFERENCES
		1. American Society for Testing and Materials (ASTM):
			1. ASTM D698 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.
			2. ASTM D1557 - Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort.
		2. American Association of State Highway and Transportation Officials (AASHTO):
			1. AASHTO T 180 - Moisture-Density relations of Soils Using a 10 Pound Rammer and an 18 Inch Drop.
		3. American Water Works Association (AWWA):
			1. AWWA C 200 - Steel Water Pipe, 6 Inch and Larger.
			2. AWWA C 206 - Field Welding of Steel Water Pipe.
		4. National Fire Protection Association (NFPA):
			1. NFPA 70 - National Electric code.
	3. DEFINITIONS
		1. Building Area Subgrade Pad: Portion of site directly beneath and within a line 10 feet beyond building and appurtenances including limits of any future building expansion areas indicated on Drawings.
	4. SUBMITTALS
		1. Section 013300 - Submittal Procedures: Procedures for submittals.
			1. Shop Drawings:
				1. Submit drawings or details indicating proposed alternate earthwork procedures or proposed procedures not indicated in Contract Documents.
				2. Shop Drawings or details pertaining to Site Utilities are not required unless required by regulatory authorities or unless use of materials, methods, equipment, or procedures are contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been approved by Contracting Officer.
			2. Assurance/Control Submittals:
				1. Material Source: Submit name of imported materials suppliers. Provide materials from same source throughout the work. Change of source requires Contracting Officer approval.
				2. Test Reports: Submit the following reports directly to Contracting Officer from Testing Laboratory, with copy to Contractor:

Test reports on borrow material.

Verification of each footing subgrade.

Field density test reports.

Optimum moisture-maximum density curve for each type of soil encountered.

Report of actual unconfined compressive strength and bearing tests/results for each strata tested. Give "three-dimensional" description of each test location.

* + - * 1. Certificates: Gradation and certification of aggregate material for Testing Laboratory review.
				2. Qualification Documentation: Submit earthwork company documentation of experience indicating compliance with specified qualification requirements.
		1. Section 017704 - Closeout Procedures and Training: Procedures for closeout submittals.
			1. Project Record Documents: Accurately record the following.
				1. Spot elevations for building area subgrade pad.
				2. Location of existing utilities remaining, re-routed utilities, new utilities by horizontal dimensions, elevations or inverts, and slope gradients.
	1. QUALITY ASSURANCE
		1. Qualifications: Earthwork company specializing in performing the Work of this Section with minimum 5 years documented experience.
		2. Regulatory Requirements: Perform earthwork in accordance with applicable requirements of governing authorities having jurisdiction.
	2. PROJECT CONDITIONS OR SITE CONDITIONS
		1. Existing Conditions: Requirements specified in Section 312000.
		2. Existing Utilities: Requirements specified in Section 312000.
1. PRODUCTS
	1. MATERIALS
		1. Stockpiled on-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Contracting Officer.
		2. Imported off-site fill and backfill material specified in Section 312000, tested by Testing Laboratory and approved by Contracting Officer.
		3. Pipe Bedding Material: Processed sand and gravel free from clay lumps, organic, or other deleterious material complying with the following gradation requirements:

SIEVE SIZE PERCENT PASSING

 1 Inch 100

 3/4 Inch 90 to 100

 3/8 Inch 20 to 55

 No. 4 0 to 10

 No. 8 0 to 5

* + 1. Steel Casing Pipe: AWWA C 200, minimum grade B; size and wall thickness as indicated on Drawings.
		2. Stabilization Fabrics and Geogrids:
			1. Mirafi 500X or 600X.
			2. Amoco Style #2002 Woven.
			3. Reemay Typar 3401 and 3601.
			4. Trevira S1114 and S1120.
			5. Tensar 1100 and 1200.
		3. Filter/Drainage Fabrics:
			1. Mirafi 140 N.
			2. Amoco Style #4546.
			3. Reemay Typar 3341.
			4. Carthage Mills, Carthage 6%.
1. EXECUTION
	1. EXAMINATION
		1. Section 017300 - Execution: Verification of existing conditions before starting work.
		2. Verification of Conditions: Verify that field measurements, surfaces, and conditions are as required, and ready to receive Work.
		3. Report in writing to Contracting Officer prevailing conditions that will adversely affect satisfactory execution of the Work of this Section. Do not proceed with Work until unsatisfactory conditions have been corrected.
		4. By beginning Work, Contractor accepts conditions and assumes responsibility for correcting unsuitable conditions encountered at no additional cost to United States Postal Service.
	2. PREPARATION
		1. Identify required lines, elevations, levels, contours, grades, and datum necessary to perform earthwork operations as indicated on Drawings.
		2. Verify that survey benchmark and intended elevations for the Work are as indicated on Drawings.
		3. Locate, identify, and protect existing utilities to remain and previously installed utilities that may be damaged by construction operations.
			1. The routing of existing underground utilities, conduit and piping shall be located using “Ground Penetrating Radar (GPR)” detection.
			2. Notify Contracting Officer, municipality, and utility company immediately of utilities, not indicated on Drawings, encountered.
			3. Maintain existing utilities, active utilities, and drainage systems in operating condition.
			4. Comply with utility company requirements and directions of Construction Manager to keep utilities in operation.
			5. Repair damage to utilities as directed by Contracting Officer.
		4. Protect plant life, lawns, fences, existing structures, sidewalks, paving and curbs from earthwork operations, excavating equipment, and vehicular traffic.
		5. Protect bench marks, property corners, and other survey monuments from damage or displacement. Where markers are required to be removed, provide removal and reinstallation by licensed land surveyor licensed in State where project is located.
		6. Overexcavate areas of building subgrade found consisting of unsuitable materials as determined by Testing Laboratory and Contracting Officer. Prepare, fill with suitable material, and compact as specified. Stabilize areas as specified in Section 313200.
	3. EXCAVATION
		1. Excavation for filling and grading specified in Section 312000.
		2. Rock excavation specified in Section 312317.
		3. Excavation for Structures:
			1. Excavate subbase for building foundations, slabs-on-grade and site structures to width and depth indicated on Drawings.
				1. Cut excavation banks vertically.
				2. Remove rocks, loose soil, and debris from bottom of excavation.
				3. Overexcavate wet or unsuitable soil from bottom of excavation.
				4. Provide stable base for concrete reinforcing installation and concrete placement.
				5. Hand trim to indicated lines and grades just prior to concrete reinforcing installation.
			2. Provide protection for workers within trench areas in accordance with local, state, and national Occupational Safety and Health requirements and regulations.
				1. Trenches minimum 4 feet in depth.
			3. During excavation, stockpile materials suitable for backfilling away from excavation to prevent overloading, slides, or cave-ins.
			4. Remove material encountered in excavating operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Contracting Officer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
			5. Prevent surface water from flowing into excavations by temporary grading or other approved methods.
				1. Do not allow water to accumulate in excavations.
				2. Remove accumulated water in excavations.
				3. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components required to remove water from excavations.
		4. Excavation for Utilities:
			1. Excavate trench width and depth required for laying pipe, conduit, or cable. Cut trench banks vertical. Remove stones from bottom of trench as required to avoid point‑bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as required to provide suitable base for continuous and uniform bedding.
			2. During excavation, stockpile materials suitable for backfilling away from trench bank to prevent overloading, slides, or cave‑ins.
			3. Remove material encountered in trenching operations that is unsuitable for backfilling, subgrade or foundation purposes as determined by Testing Laboratory and Contracting Officer. Dispose of materials off-site in an approved manner in accordance with requirements of authorities having jurisdiction.
			4. Prevent surface water from flowing into trenches or other excavations by temporary grading or other approved methods.
				1. Do not allow water to accumulate in excavations.
				2. Remove accumulated water in excavations.
				3. Provide and maintain pumps, well points, sumps, suction and discharge lines and other dewatering system components required to remove water from excavations.
			5. Open cut excavation using trenching machine or backhoe. Do not use dirt clods for backfill created by use of machines other than ladder or wheel‑type trenching machines.
			6. Grade trench bottom to provide uniform bearing and support for each section of pipe on bedding material along entire trench length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Do not excavate trench deeper, longer, or wider than required to make proper joint connection.
			7. Excavate trench width below the top of pipe minimum 300 mm wide and maximum 460 mm wider than outside surface of pipe or conduit installed to elevations and grades indicated on Drawings. Excavate trench width for other pipe, conduit, or cable to least practical width allowing for proper compaction of trench backfill.
			8. Excavate trench depth measured from finished grade or paved surface to the following requirements or applicable codes and ordinances:
				1. Water Mains: 30 inches to top of pipe barrel or 6 inches below frost line established by local building official, whichever is deeper.
				2. Sanitary Sewer: Elevations, and grades indicated on Drawings.
				3. Storm Sewer: Depths, elevations, and grades indicated on Drawings.
				4. Electrical Conduits: 24 inches minimum to top of conduit or as required by NFPA 70, or local utility company requirements, whichever is deeper.
				5. TV Conduits: 18 inches minimum to top of conduit or as required by local utility company, whichever is deeper.
				6. Telephone Conduits: 18 inches minimum to top of conduit, or as required by local utility company, whichever is deeper.
				7. Gas Mains and Service: 30 inches minimum to top of pipe, or as required by local utility company, whichever is deeper.
			9. Provide shoring, sheeting, and bracing, as required, in trenches and other excavations where protection of construction personnel is required. Sheeting may be removed after sufficient backfilling to protect against damaging or injurious caving.
		5. Excavation for Pavement:
			1. Excavate roadway and pavement areas to line and grade indicated on Drawings.
			2. Stockpile excavated material suitable for backfilling on-site.
			3. Remove excavated materials not required or not suitable for backfill from site.
			4. Overexcavate areas of pavement subgrade found to contain unsuitable material. Prepare, fill with suitable material, and compact as specified. Stabilize areas as specified in Section 313200.
	4. PIPE BEDDING
		1. Excavate trenches, for pipe or conduit installed to elevations indicated on Drawings, 4 inches below bottom of pipe and to width as specified. Place 4 inches of bedding material, compact in bottom of trench, and shape to conform to lower portion of pipe barrel. After pipe installation, backfill and compact to top of trench.
		2. Place geotextile fabric as indicated on Drawings.
	5. BACKFILLING AND SUBGRADE PREPARATION
		1. Backfilling:
			1. Verify that imported off-site fill and stockpiled on-site fill is tested and approved.
			2. Verify that foundation perimeter drainage installation is inspected and approved.
			3. Verify that foundation or below grade structure walls are braced to support surcharge forces imposed by backfilling operations.
			4. Verify that backfill areas are free of debris, snow, ice, or water, and that ground surfaces are not frozen.
		2. Prepare building area subgrade pad in accordance with foundation subsurface preparation information indicated on Drawings and specified herein. Do not use rock larger than 6 inches for building subgrade fill.

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**NOTE TO SPECIFIER**

Edit below for appropriate minimum depths, percentages, and moisture content in accordance with the "Report of Subsurface Investigation."

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* + 1. Areas Exposed by Excavation or Stripping:
			1. Scarify areas exposed by excavation or stripping on which building subgrade preparations are to be performed to minimum [8] [ \_\_\_\_ ] inch depth.
			2. Compact to minimum [95] [ \_\_\_\_ ] percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content [1] [ \_\_\_\_ ] percent below and maximum [3] [ \_\_\_\_ ] percent above optimum moisture content.
			3. Proofroll to detect any areas of insufficient compaction by making minimum of 2 complete passes with fully-loaded tandem-axle dump truck, or Contracting Officer approved equivalent, in each of two perpendicular directions under supervision and direction of Contracting Officer.
			4. Excavate and recompact areas failing to meet specified requirements.

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**NOTE TO SPECIFIER**

Edit below for appropriate minimum depths, percentages, moisture content, and plasticity index in accordance with the "Report of Subsurface Investigation."

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* + 1. Fill Material Placement:
			1. Place in [8] [ \_\_\_\_ ] inch maximum lifts compacted minimum [95] [ \_\_\_\_ ] percent optimum density in accordance with ASTM D1557 (Modified Proctor) at minimum moisture content of [1] [ \_\_\_\_ ] percent below and maximum moisture content [3] [ \_\_\_\_ ] percent above optimum moisture content.
			2. Maximum allowable values for plasticity index (PI) and liquid limit (LL) of suitable fill materials to be used as fill in the specified areas, unless indicated otherwise on Drawings:

LOCATION PI LL

Building area, below upper 4 feet of proposed subgrade elevation [30] [ \_\_\_ ] [40] [ \_\_\_ ]

Building area, upper 4 feet of proposed subgrade elevation [20] [ \_\_\_ ] [30] [ \_\_\_ ]

Paving area, below upper 4 feet of proposed subgrade elevation [30] [ \_\_\_ ] [40] [ \_\_\_ ]

Paving area, upper 4 feet of proposed subgrade elevation [20] [ \_\_\_ ] [30] [ \_\_\_ ]

* + 1. Provide material imported from off-site with CBR (California Bearing Ratio) or LBR (Limerock Bearing Ratio) value equal to or above pavement design subgrade CBR or LBR value indicated on Drawings.
	1. MAINTENANCE OF SUBGRADE
		1. Verify finished subgrades for elevations indicated on Drawings and specified conditions for construction above subgrade.
		2. Protect subgrade from excessive wheel loading during construction, including concrete trucks and dump trucks.
		3. Remove areas of finished subgrade found to have insufficient compaction density. Replace in a manner that will comply with compaction requirements as directed by Contracting Officer. Provide hard, uniform, smooth, stable surface, true to grade and cross‑section after completion of compaction.
	2. BORINGS AND CASINGS UNDER ROADS
		1. Install street, road, or highway crossings for utility mains by jacking and boring method in accordance with requirements of governing authorities having jurisdiction.
		2. Locate approach pits and trenches within right‑ of‑way of street, road, highway, or railroad distance from paving permitting traffic to pass without interference. Tamp backfill for approach pits and trenches within right‑ of‑way in layers not greater than 6 inches thick for entire length and depth of trench or pit. Compact backfill to 95 percent of maximum density obtained at optimum moisture as determined by AASHTO T 180, Method A (Modified Proctor). Mechanical tampers may be used after cover of 6 inches has been obtained over top of pipe barrel.
		3. Use commercial type boring rig providing hole bored to proper alignment and grade within 2 inches of same diameter as largest outside joint diameter of pipe installed. Install pipe in hole immediately after bore has been made, and in no instance shall hole be left open while unattended.
		4. Clean and prime interior and exterior of casing pipe; apply two coats of asphalt in accordance with requirements of governing authorities having jurisdiction.
		5. Butt weld steel casing. Weld using full penetration single butt‑welds in accordance with AWWA C 206.
		6. Install casing and utility pipe with end seals, vent pipe, and other special equipment in accordance with requirements of governing authorities having jurisdiction.
		7. Paving Damage Caused by Contractor Construction Operations:
			1. Repair paving where cracks occur on either side of line where pipe was installed by removing damaged paving between cracks, sawcutting paving in straight line at a point sufficiently beyond location of cracks for repair and placing new paving to match existing in areas where paving removed.
			2. Make repairs to the satisfaction of paving owner.
			3. Make repairs at no additional cost to United States Postal Service within one year from Date of Substantial Completion.
	3. FIELD QUALITY CONTROL
		1. Section 014000 - Quality Requirements: Field testing and inspection.
		2. Excavation: Notify Testing Laboratory and Contracting Officer for visual inspection of bearing surfaces, 48 hours prior to backfilling and other subsequent Work.

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**NOTE TO SPECIFIER**

Edit below for extent of earthwork testing accordance with the "Report of Subsurface Investigation." Engineer of Record will determine if Site Testing of earthwork is required based on conditions at Project Site and revise or delete Site Testing accordingly.

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* + 1. Site Tests:
			1. Specified in Section 312000.
			2. Tests for Building Area Subgrade Pad:
				1. Cut Areas: Minimum [one] [ \_\_\_\_ ] compaction test for every [2500] [ \_\_\_\_ ] square feet.
				2. Fill Areas: Minimum [one] [ \_\_\_\_ ] compaction test for every [2500] [ \_\_\_\_ ] square feet for each [8] [ \_\_\_\_ ] inch lift measured loose.
			3. Tests for areas outside building area subgrade pad specified in Section 312000.
		2. If tests indicate the Work does not meet specified requirements, remove Work, replace, compact and retest at no additional cost to United States Postal Service.
	1. PROTECTION
		1. Protect building subgrade pad and building related earthwork from damage by construction operations and erosion.
		2. Prohibit vehicles from entering building subgrade pad area. Vehicles not permitted.
		3. Scarify surface, reshape, and compact areas damaged by construction operations or weather erosion.

END OF SECTION

USPS MPF Specification Last Revised: 10/1/2022