

PART 300
EARTHWORK

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SECTION 301 GENERAL INFORMATION FOR EXCAVATION

301.1 STRIPPING

When stripping is indicated on the plans or specified in the special provisions, the Contractor shall strip the soil from the designated areas to a minimum depth of 6" unless noted otherwise.

The material obtained from stripping operations shall be disposed of away from the site unless otherwise specified or shown on the plans.

Soil loosened below the stripping depth specified, shall be compacted. Soil removed below stripping depth shall be replaced with approved material and compacted up to the designated grade. All such filling and compacting shall be done by the Contractor at no additional cost to the City. All work described in this subsection is subsidiary to other items of work.

301.2 UNSUITABLE MATERIAL

Material shall be considered unsuitable for fill, subgrade, shoulders and other uses if it contains organic matter, soft spongy earth, or other matter of such nature that compaction to the specified density is unobtainable.

Material that is unsuitable for the intended use shall be excavated and removed from the site. The location of the unsuitable material will be restored to grade with an approved compacted backfill material. All work described in this subsection will be incidental to the bid item, and measured in-place by the cubic yard, C.Y.

301.3 SLOPE

Excavation and Embankment slopes shall be finished in conformance with the lines and grades shown on the plans. Debris and loose material shall be removed. When completed, the average plane of the slopes shall conform to the slopes indicated on the plans and no point on the completed slopes shall vary from the designated plane by more than six inches measured at right angles to the slope, except where excavation is in rock; no point shall vary more than two feet from the designated plane of the slope. In no case shall any portion of the slope encroach on the roadbed.

Tops of excavation slopes and ends of excavations shall be rounded as shown on the plans and these quantities will not be included in the quantities of excavation to be paid for. This work will be considered as part of finishing slopes and no additional compensation will be allowed therefore.

301.4 SURPLUS MATERIAL

Unless otherwise shown on the plans, no surplus excavated material shall be disposed of within the right-of-way. The Contractor shall make all arrangements for disposal of the material at off-site locations and shall obtain the written consent of the owner of the property upon which he intends to dispose of such material.

If the quantity of surplus material is shown on the plans or specified in the special provisions, the quantity shown or specified is approximate only. The Contractor shall satisfy himself that there is sufficient material available for the completion of the embankment before disposing of any indicated surplus material inside or outside the right-of-way. Any shortage of material caused by premature disposal of surplus material by the Contractor, shall be replaced by him and no compensation will be allowed the Contractor for such replacement.

301.5 BORROW EXCAVATION

The Contractor shall be required to furnish additional suitable excavated material as required.

Excavation in excess of the planned or authorized cross-section will not be paid for. The Contractor shall backfill and compact unauthorized excavated areas to the original ground elevation of authorized section at no additional cost to the City.

Material resulting from excavating ditches or channels may be used to construct roadway embankments, dikes, or for other purposes.

Care shall be exercised to prevent excavating below the grade for the bottom of the ditch and areas excavated below grade shall be filled with suitable material and compacted by the contractor at no additional cost to the City.

The quantities of earthwork (excavation and embankment) for which payment will be made shall be the quantities shown on the plans, provided the project is constructed essentially to the lines and grades shown on the plans.

SECTION 302

GENERAL INFORMATION FOR FILL CONSTRUCTION

302.1 DESCRIPTION

Fill construction shall consist of constructing embankments except as may otherwise be specified, including the preparation of the areas upon which they are to be placed; and compacting approved material within areas where unsuitable material has been removed (refer. subsection 301.2); and placing and compacting material in holes, pits and other depressions. All work described in Section 302 (unless noted otherwise) will be incidental to the Compaction, Embankment or earthwork bid item, and measured in-place by the cubic yard, C.Y.

302.2 PLACING

Rocks, broken concrete, or other solid material, which are larger than four inches (4") in greatest dimension, shall not be placed in fill areas where piles are to be placed or driven, or within 2' of the finished grade of the fill.

When fill is to be made and compacted on hillsides or where new fill is to be compacted against existing fill or where embankment is built one-half width at a time, the slopes of original hillsides and old or new fills shall be benched a minimum of five feet (5') horizontally as the fill is placed. A new bench shall be started wherever the vertical cut of the next lower bench intersects the existing ground.

Clods or hard lumps of earth of six inches (6") in greatest dimension shall be broken up before compacting the material in embankment, except as provided in the following paragraph:

When the fill material includes large rock material, or hard lumps (such as hardpan or cemented gravel which cannot be broken readily) such material shall be well distributed throughout the fill. Sufficient earth or other fine material shall be placed around the larger material as it is deposited so as to fill the interstices and produce a dense, compact fill. However, such material shall not be placed within two feet (2') of the finished grade of the fill.

302.3 COMPACTING

Fill shall be constructed in compacted layers of uniform thickness and each layer shall be compacted in accordance with the requirements herein specified with the following exceptions.

Where fills are to be constructed across low, swampy ground which will not support the weight of hauling equipment, the lower part of the embankment may be constructed by dumping excessive loads of suitable materials in a uniformly distributed layer of thickness not greater than that necessary to support the equipment while placing subsequent layers, after which the remainder of the embankment shall be constructed in layers and compacted as specified.

Unless specified herein, or in the special provisions, the construction of dikes, the placing and compacting of approved material within the right-of-way where unsuitable material has been removed, and the filling of holes, pits and other depressions within the right-of-way, shall conform to all of the requirements herein specified for compacting fills. Trenches, holes, depressions and pits outside of areas where fills are to be constructed shall be graded to provide a presentable and well-drained area. Areas over which fills are to be placed shall be cleared and scarified to a depth of six inches to provide a bond between the existing ground and the material to be deposited thereon. Unless otherwise specified, the original ground area upon which fills are to be constructed shall be compacted to a uniform density of not less than ninety-five percent (95%).

The loose thickness of each layer of fill material before compacting shall not exceed eight inches (8"), except as provided in the following paragraph for rocky material. Each layer shall be compacted in accordance with the following requirements to a uniform density of not less than ninety percent (90%), except that where a new or widened roadway and appurtenances are

required, density of the upper two feet (2') and when the fill is within two feet (2') of the above shall be not less than ninety- five percent (95%).

When fill material contains by volume over twenty-five percent (25%) of rock larger than six inches (6") in greatest dimension the fill below a plane three feet (3') below finished grade may be constructed in layers of a loose thickness before compaction not exceeding the maximum size of rock in the material, but not exceeding three feet (3') in thickness.

The interstices around the rock in each layer shall be filled with earth or other fine material and compacted. Broken Portland Cement concrete and bituminous-type pavement obtained from the project excavations will be permitted in the fill, upon approval of the Engineer, with the following limitation:

- a.) The maximum dimension of any piece used shall be six inches (6").
- b.) Pieces larger than four inches (4") shall not be placed within twelve inches (12") of any structure.
- c.) Pieces larger than two and one-half inches (2-1/2") shall not be placed within twelve inches (12") of the subgrade for paving.
- d.) Nesting of pieces will not be permitted.

Unless otherwise shown on the plans at the time of compaction, the moisture content of fill material shall be within 2% of optimum moisture such that the specified relative compaction will be obtained and the fill be firm and unyielding. Fill material which contains excessive moisture shall not be compacted until the material is dry enough to obtain the required relative compaction. Full compensation for any additional work involved in drying fill material to the required moisture content shall be considered as included in the contract price paid and no additional compensation will be allowed therefore.

Embankments shall be constructed so that each layer shall have a cross fall of at least two percent (2%) but no more than five percent (5%).

302.4 TESTS

Unless otherwise provided in the Plans or special provisions the fill shall be thoroughly compacted to not less than the stated densities when tested and determined by ASTM D-698, and ASTM D-1556 or ASTM D-2922, and D-3017 or D-2216.

Unless otherwise shown on the plans, compaction and moisture content test frequency will be a minimum of 4 per day per equipment spread, or 1,000 ft. and (1) per structure (each side) for each 8" loose lift.

Pond liners shall have one (1) Proctor test completed per soil type encountered, as well as one (1) field density test per lift per 1,000 SY.

All testing will be completed by an Independent Testing Laboratory on behalf of the Contractor, and is subsidiary to other earthwork bid items. Copies of all test results will be made available immediately to the City and Engineer.

302.5 LOOSE FILL

When indicated on the Plans, fill in the right-of-way behind the curb and above the subgrade line. Utility easements shall be built up with loose fill.

Loose fill need not be placed in lifts and shall not be compacted. Loose fill material shall not have any rocks or debris over one and one-half inches (1-1/2") in size. The top six inches (6") of material shall be soil, which is suitable for growth of vegetation.

SECTION 306 FLOWABLE FILL

306.1 DESCRIPTION

This work shall consist of an excavatable flowable mortar fill material in sewer, water and utility trenches under the pavement or at other locations as shown on the plans or as specified. The work shall be done in accordance with this specification. Refer: ACI 229R-94 Concrete Low Strength Material (Flowable Fill).

306.2 MATERIALS

The mix design for flowable fill mortar shall be preapproved and meet the following requirements:

- a.) Cement shall be Type I.
- b.) Fly Ash shall meet requirements of ASTM C618, Class C.
- c.) Fine Aggregate for flowable mortar shall be natural sand consisting of mineral aggregate particles. The gradation of this material shall be as follows:

<u>Sieve Size</u>	<u>% Passing</u>
3/4	100
200	0-10

- d.) Physical Properties. The required physical properties for flowable mortar is as follows:

- 1. Self-leveling
- 2. 15% Minimum air content
- 3. Unit weight less than 120 lbs/cf

It is intended that the flowable fill produce a minimum 75 psi and a maximum 250 pi compressive strength at 28 days. Set accelerator may be required when flowable fill is placed at temperatures below 85°F to obtain the necessary support required for traffic and subsequent work at the end of the specified 72-hour period.

306.3 PROPORTIONING AND MIXING EQUIPMENT

Sufficient mixing capacity or mixers shall be provided to permit the intended pour to be placed without interruption.

306.4 PLACEMENT OF FLOWABLE FILL

The flowable fill shall be placed in an area defined as the length of the trench line under the pavement plus two feet (2') beyond either side of the pavement by the trench width. The fill shall be brought up uniformly to an elevation 12 inches above the top of the pipe or two feet below the bottom of proposed pavement, whichever is higher. Placement of fill shall then cease and the fill protected from traffic for a period of 72 hours.

306.5 LIMITATION OF OPERATIONS

- a.) Flowable Fill shall not be placed on frozen ground.
- b.) Flowable Fill batching, mixing, and placing may be started, if weather conditions are favorable. The cold weather operation shall conform to the same conditions as specified in the City Standard Specifications Section 400, Pavement.
- c.) Each filling stage shall be as continuous an operation as is practicable.

306.6 QUANTITY OF FLOWABLE FILL REQUIRED

The Contractor shall provide and place a sufficient volumetric quantity of flowable fill material to meet the requirement of this specification regardless of trench depth and/or pipe sizes, unless otherwise indicated by the project plans or special provisions.

All work described in this subsection will be incidental to the bid item, and measured in-place by the cubic yard, C.Y.