Section 02330

EMBANKMENT

PART 1 GENERAL

1.01 SUMMARY

This Section includes construction of embankments with excess excavated material and borrow.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices.

1. No separate payment will be made for embankment under this section. Include payment in unit price for excavation or borrow.

2. Refer to Section 01270 – "Measurement and Payment" for unit price procedures.

B. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for Work in this Section is included in total Stipulated Price.

1.03 REFERENCES

A. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3).

B. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.

C. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.04 SUBMITTALS (NOT USED)

1.05 RELATED REQUIREMENTS

A. Section 01270 – "Measurement and Payment"

B. Section 01454 – "Testing Laboratory Services"

C. Section 01576 – "Waste Material Disposal"

D. Section 02315 – "Roadway Excavation"

E. Section 02316 – "Excavation and Backfill for Structures"

F. Section 02317 – "Excavation and Backfill for Utilities"

G. Section 02319 – "Borrow"

H. Section 02320 – "Utility Backfill Materials"

I. Section 02511 – "Water Lines"

1.06 – 1.13 NOT USED

PART 2 PRODUCTS

2.01 MANUFACTURER(S) (NOT USED)

2.02 MATERIALS AND/OR EQUIPMENT

A. Refer to Section 02315 – "Roadway Excavation" for acceptable excess materials from roadway excavation.

B. Refer to Section 02317 – "Excavation and Backfill for Utilities" for acceptable excess materials from utility excavation and trenching.

C. Refer to Section 02319 – "Borrow" for acceptable borrow materials.

2.03 – 2.04 NOT USED

PART 3 EXECUTION

3.01 GENERAL / MANUFACTURER(S) (NOT USED)

3.02 PREPARATION

A. Examination

1. Verify borrow and excess excavated materials to be reused are approved.

2. Verify removals and clearing and grubbing operations have been completed.

B. Backfill test pits, stump holes, small swales and other surface irregularities. Backfill and compact in designated lift depths to requirements for embankment compaction.

C. Record location and plug and fill inactive water and oil wells. Conform to Texas State Health Department, Texas Commission on Environmental Quality and Texas Railroad Commission requirements. Notify Project Manager prior to plugging wells.

D. Excavate and dispose of unsuitable soil and other unsuitable materials which will not consolidate. Backfill and compact to requirements for embankment. Unsuitable soil is defined in Section 02316 – "Excavation and Backfill for Structures" and Section 02320 – "Utility Backfill Materials".

E. Backfill new utilities below future grade. Conform to requirements of Sections 02317 – "Excavation and Backfill for Utilities", and 02511 – "Water Lines".

3.03 ERECTION/INSTALLATION APPLICATION AND/OR CONSTRUCTION

A. Placing Embankment

1. Do not conduct placement operations during inclement weather or when existing ground or fill materials exceed 3 percent of optimum moisture content. Contractor may manipulate wet material to facilitate drying, by disking or windrowing.

2. Do not place embankment fill until density and moisture content of previously placed material comply with specified requirements.

3. Scarify areas to be filled to minimum depth of 4 inches to bond existing and new materials. Mix with first fill layer.

4. Spread fill material evenly, from dumped piles or windrows, into horizontal layers approximately parallel to finished grade. Place to meet specified compacted thickness. Break clods and lumps and mix materials by blading, harrowing, disking or other approved method. Extend each layer across full width of fill.

5. Each layer shall be homogeneous and contain uniform moisture content before compaction. Mix dissimilar abutting materials to prevent abrupt changes in composition of fill.

6. Layers shall not exceed the following compacted thickness:

   a. Areas indicated to be under future paving or shoulders, to be constructed within 6 months: 6 inches when compacted with pneumatic rollers, or 8 inches when compacted with other rollers.

   b. Other areas: 12 inches

7. For steep slopes, cut benches into slope and scarify before placing fill. Place increasingly wider horizontal layers of specified depth to level of each bench.

8. Build embankment layers on back slopes, adjacent to existing roadbeds, to level of old roadbed. Scarify top of old roadbed to minimum depth of 4 inches and recompact with next fill layer.

9. Construct to lines and grades shown on Plans.

10. Remove unsuitable material and excess soil not being used for embankment from site in accordance with requirements of Section 01576 – "Waste Material Disposal".

11. Maintain moisture content of embankment materials to attain required density.

12. Compact to following minimum densities at moisture content of optimum to 3 percent above optimum as determined by ASTM D698, unless otherwise indicated on Plans:

    a. Areas under future paving and shoulders: Minimum density of 95 percent of maximum dry density.

    b. Other areas: Minimum density of 90 percent of maximum dry density.

B. Tolerances

Top of compacted surface: Plus or minus ½-inch in cross section or 16 foot length.

3.04 REPAIR/RESTORATION (NOT USED)

3.05 FIELD QUALITY CONTROL

A. Compaction Testing shall be performed in accordance with ASTM D1556/D1556M or ASTM D6938 under provisions of Section 01454 – "Testing Laboratory Services".

B. A minimum of three tests shall be taken for each 1000 linear feet per lane of roadway or 500 square yards of embankment per lift.

C. If tests indicate Work does not meet specified compaction requirements, recondition, recompact, and retest at no additional cost.

3.06 – 3.08 NOT USED

3.09 PROTECTION

A. Protect trees, shrubs, lawns, existing structures, and other features outside of embankment limits.

B. Protect utilities above and below grade, which are to remain.

C. Conform to protection requirements of Section 02315 – "Roadway Excavation".

3.10 SCHEDULES (NOT USED)

END OF SECTION