SECTION 15

BACKFILLING

15.01 SCOPE:

These Specifications form a part of the Contract Documents and shall govern the backfilling requirements for water mains, sanitary sewers and sewage pumping stations.

15.02 MATERIALS:

Materials of this Section shall be as specified herein.

15.03 BACKFILLING:

A. Examination Prior to Backfilling: Before backfilling any trench, the Contractor's foreman shall examine the completed line and all joints and shall correct any deficiencies that exist.

B. Curing of Concrete: No trenches or excavations shall be backfilled until concrete in the structures placed therein has acquired a suitable degree of hardness, and the Work shall be prosecuted expeditiously after it has commenced.

C. Overcutting: Overcutting of trench bottom shall be backfilled at the Contractor's expense with select material from the excavations and compacted to not less than 95 percent maximum density as determined by AASHTO T99 prior to placing of pipe. Select material shall be granular soil free from rock, grass, wood or other deleterious material. If in the opinion of the Owner or the Owner's representative, the material from the excavation is not considered to be satisfactory for backfill, the overcut shall be backfilled with crushed slag, crushed stone, or reef shell and separate payment will be made therefor, except where overcut is caused by the Contractor's operations or for his convenience. Crushed slag, crushed stone or reef shell shall be as specified in Section 16 entitled "Erosion Control."

D. Overcutting of Sanitary Sewer Manholes: Overcut in depths of manholes shall be backfilled with concrete. The minimum compressive strength of the concrete required at 28 days is 3,000 pounds per square inch.

E. Initial Backfill: After the pipe has been installed, select material from the excavation shall be placed along side the pipe in layers not exceeding 4 inches in depth to a depth of at least 2 feet above the top of the pipe. Select material shall be as specified above for filling overcut. Care shall be taken to insure thorough compaction of the fill under the haunches of the pipe. Each layer shall be thoroughly compacted by hand tamping with iron tampers, the tamping face area of which shall not exceed 50 square inches, to not less than 90 percent maximum density as determined by AASHTO T99. All material shall be deposited carefully in the trench to avoid damaging the pipeline. The operation of heavy equipment shall be conducted so that no damage to water or sewer lines will result.

F. Final Backfill: The remainder of the trench above an elevation of 2 feet higher than the top of pipe shall be backfilled with material from the excavation. Mechanical backfilling will be permitted providing material being placed with dragline or crane has a free fall of not greater than one foot from the bucket. The manner of placing and the degree of compaction shall be as specified hereinafter:

1. **Fields and Open Country** - The backfill above a point 2 feet above the top of the pipe shall be placed in the trench until full. The remaining earth shall be placed on top of the trench and dressed by the Contractor until it settles. At the completion of the job, all excess dirt shall be leveled and disposed of by the Contractor.

2. **Backfill Under Pavement Other Than State Highways, Mobile County Road Right-Of-Way or City of Mobile Right-Of-Way** - Backfill under all existing or

proposed pavement for streets, sidewalks, or roadways, except pavement under the jurisdiction of the State Highway Department, State Department of Transportation, the County of Mobile or the City of Mobile shall be backfilled as hereinafter specified. After the pipe has been backfilled to a point 2 feet above the top of the pipe, the remainder of the trench shall be backfilled to the ground surface with material from the excavation. Backfill shall be placed in uniform layers not exceeding 6 inches in thickness except that material may be placed in thicker layers where the Contractor can demonstrate that the procedures used can produce the required compaction results.

The trench from 2 feet above the top of the pipe to within 2 feet of the top of the trench shall be compacted to not less than 90 percent maximum density as determined by AASHTO T99. The remainder of the trench to within 8 inches of the finish grade shall be compacted to not less than 95 percent maximum density as determined by AASHTO T99. The top 8 inches of the trench shall be compacted to not less than 100 percent maximum density as determined by AASHTO T99. Where pavement is not replaced, the top 6 inches of backfill shall be of a select granular material from the excavation.

3. **Backfill Under Pavement of State Highways** - Backfill under all existing or proposed pavement under the jurisdiction of the State Highway Department or State Department of Transportation shall be backfilled with material from the excavation. The backfill procedures and degree of compaction shall be in accordance with applicable portions of the latest edition of the SAHD Specifications or State Department of Transportation having jurisdiction, except for compensation which shall be as specified herein. Where pavement is not to be replaced, the top 6 inches of backfill shall be of a select granular material from the excavation.

4. **Backfill Within Mobile County Road Right-Of-Way** - Backfill for all work within Mobile County Road right-of-way shall be placed in accordance with all applicable provisions of the SAHD Specifications, latest edition. Backfill for all excavation performed within 8 feet or less from the edge of pavement or edge of traveled way, in the case of unpaved roads, shall be placed at not less than 95 percent maximum density as determined by AASHTO T99. Fill shall be placed in lifts not exceeding 12 inches in depth, compacted to the required density. The Contractor shall obtain density tests for all work done within the 8 foot dimension. Density tests shall be performed by a testing laboratory approved by the Owner and the County Engineer. The Owner will pay for initial density testing. In the event of inadequate compaction, the Contractor will pay for subsequent density testing. Density requirements for backfill outside the 8 foot dimension shall not be less than 90 percent maximum density as determined by AASHTO T99. Testing in these areas may be waived if the County Engineer's representative determines that the backfill is being placed properly and approves waiving the testing requirements.

5. **Backfill Within City of Mobile Right-Of-Way** - All trenches shall be backfilled with select, stable material which can be compacted to the specified density. The backfill material shall be compacted at near optimum moisture content, in layers not exceeding 24-inches compacted thickness, to a density of not less than 95 percent maximum density as determined by AASHTO T99. Mechanical tampers shall be used unless another method is approved. Flooding or jetting will not be permitted. The backfill shall be brought up evenly on both sides of the pipe to the top of the subgrade elevation. A crusher run stone or sand-shell base course, 6 inches minimum compacted thickness, in accordance with "Soil, Soil Aggregate, and Aggregate, Base and Sub-bases" of the SAHD Specifications, latest edition, shall then be constructed. The top 1-1/2 inches of the

trench shall then be filled with bituminous wearing surface mixed flush with the road surface, and maintained continuously until the applicable pavement replacement procedure has begun. Compaction tests will be required by a certified testing lab at 2 foot increments vertically and at sufficient intervals along the trench to verify that density requirements have been met. A copy of the laboratory reports and compaction test shall be given to the Owner and the City Engineer. The compaction tests will be performed by a laboratory selected by the Owner and payment for such tests will be made by the Owner.

6. **Flowable Backfill:** This shall be used as a backfill material in cases where traffic can only be closed for a short period of time. It will only be used when directed by the Engineer. Flowable backfill shall be made from a mixture of cement (ASTM C150, Type II), fly ash (ASTM C618, Class C), sand (ASTM C33) and water having a compressive strength of not more than 500 psi. The strength of the material shall be tested by following the procedures given in ASTM D4832-88. A penetration resistance test (ASTM C403) can assess the setting and early strength development of the backfill. This test will be used to determine if the fill is ready to be covered with a patch or strong enough to support equipment, traffic or construction loads. Tests will be required by a certified testing lab at sufficient intervals along the trench to verify that all requirements have been met. A copy of the laboratory reports and tests will be given to the Engineer.

G. Sand: Flooding or jetting will be permitted, unless specified otherwise, where the clay and silt content of the backfill material is low enough to permit this method of consolidation. When allowed, this method will be used from a point 2 feet above the top of pipe to the original ground line except under state highways, county roads or within City of Mobile streets and right-of-way.

H. Muck: In fields and open country, flooding or jetting will be permitted or required where the clay and silt content or water content is so high as to make tamping ineffective. Flooding or jetting will be confined to that portion of the trench starting 2 feet above the top of pipe and ending 2 feet below the original ground surface. The last 2 feet shall be backfilled with selected earth and shall be mechanically rolled or tamped to the degree of compaction of the surrounding ground.

I. Deficiency of Backfill, by Whom Supplied: Any deficiency in the quantity of material for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the Contractor at no cost to the Owner.

15.04 BACKFILLING FOR SEWAGE PUMPING STATIONS:

A. General: Backfill over, under and around pipes and structures shall be of selected material placed and tamped and compacted in a manner and by methods that will avoid unbalanced loading, and that will not cause movement or undue strain on any pipe or structure. The fill placed against or immediately adjacent to pipes, or structures shall be built in horizontal layers not exceeding 6 inches loose and must be compacted by approved mechanical tampers. The density of each layer of material composing the backfill shall be not less than 95 percent of the relative maximum density as determined by the AASHTO Compacting Test T99. Each layer of backfill material which does not contain sufficient moisture to compact thoroughly shall be sprinkled and mixed with water as directed. Material containing excess moisture shall be permitted to dry out to proper consistency before compacting is attempted. No muck or unsuitable material shall be used in the backfill.

B. Deficiency of Backfill or Fill: In the event that existing material from the excavation is insufficient to bring the pumping station site to the lines and grades shown on the Plans, additional select material shall be provided by

the Contractor from his own source. The select material shall be granular soil containing not more than 15 percent passing the 200 mesh sieve, except that the top 4 inches shall be topsoil as specified in Section 16 entitled "Erosion Control." No separate payment will be made for the additional backfill or fill required.

C. <u>Excess Material</u>: After backfilling, excess material shall be removed and disposed of by the Contractor off the site.

END OF SECTION