# SECTION 101 - TRENCH AND BACKFILL

1. GENERAL

Work under this section consists of trenching and backfilling for sanitary sewer, storm sewer and water pipelines. The work includes disposal of excess excavated materials, waste materials, and all debris necessary to permit construction of the various items in the project; and all miscellaneous and incidental work in connection with trenching and backfilling to the lines and grades shown on the drawings and in accordance with these specifications.

2. SITE PREPARATION

Trees, shrubs, heavy growth of weeds or other vegetation, sod, and other debris shall be removed from the area where trenching is shown; such removal may be by stripping, or other satisfactory methods. Strippings, large roots, and other debris shall be transported off the site of construction and not incorporated in, or covered by, backfills.

3. SURFACE DRAINAGE

Surface drainage shall be diverted away from open trenches prior to completion of the work therein. The Contractor shall remove surface water which accumulates in trenches and shall restore the pipe bedding to original bearing values at no additional expense to the Owner.

4. SHORING AND BRACING

The Contractor shall furnish and install all shoring, bracing, and blocking required to preserve and maintain trench walls in a stable condition, to protect existing pipelines, and to provide for the safety of his workers and the general public. All items of shoring and bracing shall be progressively removed as backfilling proceeds.

5. TRENCH EXCAVATION

Trench excavation shall be "open cut," except as otherwise permitted under obstructions. Banks shall be kept as nearly vertical as possible. Trenches shall not be less than twelve (12) inches, nor more than sixteen (16) inches, wider than the outside diameter of the pipe to be laid therein; and shall be excavated true to line and grade, with bell holes to accommodate joints or couplings and insure the pipe resting for its entire length upon the pipe bed. Except where material unsuitable for pipe bedding is ordered removed, care shall be taken to avoid excavating below the designated depth. Removal and replacement of street surfacing shall be included in the trenching item, except when removal and replacement of street surfacing is designated as a bid item.

6. TRENCH BACKFILL

All trenches and excavation shall be backfilled with suitable material, in a manner that will not disturb the pipe, and in such a manner as to completely fill the void below the spring line of the pipe. The material shall be carefully deposited and satisfactorily tamped in uniform layers not greater than six (6) inches thickness until the backfill reaches the top of the pipe. The remainder of the trench shall be backfilled either in uniform layers not exceeding twelve (12) inches in thickness and satisfactorily tamped, or in the case of clay pipe, by filling the trench and settling by satisfactory methods of jetting or flushing. Jetting

or flushing shall continue until no further settlement occurs. **Jetting or flushing will not be allowed with PVC pipe.** The final three (3) feet may be compacted in one lift if a "hydra hammer" is used where the depth of the trench is such that less than three (3) feet remains from the top of the pipe to the normal ground, the compaction after jetting or flushing shall begin at the top of the pipe. Excess material shall be rounded over the center line of trench in a neat crown. No separate payment shall be made for backfilling trenches in this manner.

Trench backfill material for PVC pipe shall include select material from four inches (4") below the pipe, up the sides of the pipe and covering the full width of the trench to a point twelve (12) inches above the pipe. The select material shall be approved native or select material approved by Engineer. No rocks greater than 1 ½" will be allowed in backfill material.

7. SPECIAL TRENCH COMPACTION

Trench backfill which is in a street or proposed street, or as directed by the Engineer, shall be placed in layers and compacted by means of suitable equipment. Each layer shall be compacted to a density equal to or greater than 95 percent of the maximum density of the soil obtained by testing method of A.S.T.M. Designation, D-698-66T or latest revision. Each layer shall contain only that amount which will insure proper compaction, but in no case shall any layer be greater than eight (8) inches, (loose measurement) in depth. The moisture content of soil to be used shall be uniform and shall be such that a density of 95 percent of maximum density can be obtained. The Engineer may order compaction test by an authorized laboratory at any location or depth as he feels necessary. The compaction test may be conducted by the sand cone method or nuclear density gauge at the discretion of the Engineer. When the percent of compaction does not fall in the required range the material shall be removed, moisture content adjusted, and the compaction process shall be repeated until compaction requirements are obtained. All cost for testing shall be at the Contractors expense.

The Contractor at his option may use the following special compaction method for all pipe materials except PVC pipelines. Trenches within the limits of streets or proposed streets shall be entirely backfilled with sand having a maximum size of 1/2 inch. Trenches shall then be thoroughly flushed or jetted until all the sand is completely inundated by the use of approved internal vibrators. Backfilling, inundating, and vibrating shall be repeated until the trench has been completely backfilled to subgrade elevation and no further settlement occurs.

The top surface of inundated sand backfill shall be maintained undisturbed until covered by the pavement. The Engineer may order compaction test by an authorized laboratory at any location or depth as he feels necessary.

8. CLASSIFICATION

All trenching shall be unclassified and shall include any and all materials, including ground water, encountered during construction. The Contractor shall obtain additional information to satisfy himself that his proposal includes all costs which may be incurred in the trenching of the project.