SECTION 31 23 23.19 – TRENCH BEDDING AND BACKFILL FOR WATER AND SEWER LINES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes materials and work required for placing bedding and backfilling of water and sewer pipelines and appurtenances.

B. Related sections:
1. Section 31 23 16.16 – Trenching for Water Lines
2. Section 33 39 17 – Polymer Concrete Manholes
3. Section 33 34 13 – Ductile Iron Pipe and Fittings
4. Section 33 41 19 – Pipe Laying

1.2 GENERAL

A. General Requirements: See Division 01, GENERAL REQUIREMENTS, which contains information and requirements that apply to the work specified herein and are mandatory for this project.

1.3 DEFINITIONS

A. Base Rock: Granular material upon which manhole bases and other structures are placed.

B. Bedding Material: Granular material which is used as fill material in the pipe zone of the trench.

C. Backfill Material: Material used to fill pipe trench from the upper surface of the pipe zone to existing grade or bottom of prosed pavement section.

D. Imported Material: Material obtained by the Contractor from source(s) offsite.

E. Lift: Loose (uncompacted) layer of material.

F. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe or bedding material.

G. Prepared Trench Bottom: Graded trench bottom after stabilization and installation of bedding material.

H. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D698, Corrections for oversize material may be applied to either the as-compacted field dry density or the maximum dry density, as determined by the Engineer.

I. Relative Density: As defined by ASTM D4253 and ASTM D4254.

J. Selected Backfill Material: Material available that the Engineer determines to be suitable for a specific use.

K. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively incompressible soil mass free from detrimental voids. Well-Graded does not define any

numerical value that must be placed on the coefficient of uniformity, coefficient of curvature, or other specific grain size distribution parameters.

1.4 SUBMITTALS

A. Quality Control Submittals
   1. Catalog and manufacturer's data sheets for compaction equipment.
   2. Certified test results from independent testing agency.
   3. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to site.

1.5 QUALITY ASSURANCE

A. Notify Engineer when:
   1. Soft or loose subgrade materials are encountered wherever pipe bedding is to be placed.
   2. Fill material appears to be deviating from Specifications.

PART 2 - PRODUCTS

2.1 GENERAL

A. Backfill materials shall be obtained from excavated materials or approved borrow sources.

B. Backfill material shall be free of trash, debris, cinders, organic matter or other deleterious materials.

C. All backfill materials shall be subject to the Engineer's approval.

2.2 TRENCH STABILIZATION MATERIAL

A. Clean, hard, durable 3-inch minus crushed rock gravel, or pit run, free from clay balls, other organic materials, or debris.

B. Uniformly graded from coarse to fine, less than 8 percent by weight passing the 1/4-inch sieve.

2.3 BEDDING MATERIAL AND PIPE ZONE MATERIAL

A. Unfrozen, friable, and no clay balls, roots, or other organic material.

B. Pipe bedding shall be in accordance with ASTM D2321, Class IA, manufactured aggregates, open-graded, clean, non-plastic. The gradation shall be as follows:

ASTM D2321, Class IA	
Sieve Size	Percent Passing
1 ½ in.	100
No. 4	≤10%
No. 200	<5%

C. Alternative bedding materials may be considered at the discretion of the Engineer. Alternate bedding materials shall be crushed rock classified as GP as specified in ASTM D2487 with 15% sand or less, a maximum of 25% passing 3/8-inch sieve, and a maximum of 5% fines.

2.4 TRENCH BACKFILL - GENERAL

A. Excavated material from required excavations, free from rocks larger than 3 inches, from roots and other organic matter, ashes, cinders, trash, debris, and other deleterious materials.

2.5 TRENCH BACKFILL – GRANULAR

A. Granular backfill shall be placed under all existing or proposed driving surfaces and/or as specified on the Plans.

B. Granular backfill shall be Type A, Grade 3 or better crushed limestone base material meeting all the requirements of Item 247 of the Texas Department of Transportation Standard Specifications.

2.6 TOPSOIL

A. Topsoil removed and stockpiled from onsite excavation.

B. Should the Contractor dispose of existing topsoil the Contractor shall acquire and place topsoil to a minimum 6-inch depth at no additional cost to the Owner.

PART 3 - EXECUTION

3.1 GENERAL

A. All bedding material shall be placed in accordance with Section 31 23 16.16, TRENCHING FOR WATER LINES and Section 33 41 19, PIPE LAYING.

B. Process excavated material to meet specified gradation requirements.

C. Adjust moisture content as necessary to obtain specified compaction.

D. Do not allow backfill to free fall into the trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over the top of pipe.

E. Do not use power driven impact type compactors for compaction until at least 4 feet of backfill is placed over top of pipe.

F. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.

G. Backfill around structures with same class backfill as specified for adjacent trench unless otherwise shown or specified.

3.2 TRENCH BACKFILL-GENERAL

A. Trench backfill shall be placed in in lift not exceeding 9-inch thickness.

B. Each lift shall be mechanically compacted to a minimum of 95 percent relative compaction prior to placing succeeding lifts.

3.3 TRENCH BACKFILL-GRANULAR

A. Granular backfill shall be used under all existing or prosed driving surfaces and at locations specified on the Plans.

B. Granular backfill shall be placed in lifts not exceeding 8-inch thickness.

C. Each lift shall be mechanically compacted to 95 percent relative compaction prior to placing succeeding lifts.

3.4 REPLACEMENT OF TOPSOIL

A. Replace topsoil in top 6 inches of backfilled trench.

B. Maintain the finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.5 MAINTENANCE OF TRENCH BACKFILL

A. After each section of trench is backfilled, maintain the surface of the backfilled trench even with the adjacent ground surface until final surface restoration is completed.

B. Gravel Surfacing Rock: Add gravel surfacing rock where applicable and as necessary to keep the surface of the backfilled trench even with the adjacent ground surface, and grade and compact as necessary to keep the surface of backfilled trenches smooth, free from ruts and potholes, and suitable for normal traffic flow.

C. Topsoil: Add topsoil where applicable and as necessary to maintain the surface of the backfilled trench level with the adjacent ground surface.

D. Other Areas: Add excavated material where applicable and keep the surface of the backfilled trench level with the adjacent ground surface.

3.6 SETTLEMENT OF BACKFILL

A. Settlement of trench backfill, or of fill or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

- END OF SECTION -