

Section 02318**EXCAVATION AND BACKFILL FOR UTILITIES****1.0 GENERAL****1.01 SECTION INCLUDES**

- A. Excavation, trenching, foundation, embedment, and backfill for installation of utilities, storm sewers including manholes, pipeline structures and other associated appurtenances.
- B. References to Technical Specifications:
 - 1. Section 01200 – Measurement and Payment Procedures
 - 2. Section 01350 – Submittals
 - 3. Section 01570 – Trench Safety System
 - 4. Section 01564 – Control of Ground Water and Surface Water
 - 5. Section 01760 – Project Record Documents
 - 6. Section 01450 – Testing Laboratory Services
 - 7. Section 01500 – Temporary Facilities and Controls
 - 8. Section 02255 – Bedding, Backfill, and Embankment Materials
 - 9. Section 02370 – Geotextile
 - 10. Section 02220 – Site Demolition
 - 11. Section 01140 – Contractor’s Use of Premises
- C. Referenced Standards:
 - 1. American Society for Testing and Materials (ASTM)
 - a. ASTM D 2321, “Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications”
 - b. ASTM D 698, “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort”
 - c. ASTM D 558, “Standard Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures”
 - d. ASTM D 4318, “Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils”
 - e. ASTM D 1556, “Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method”
 - f. ASTM D 2922, “Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)”
 - g. ASTM D 3017, “Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)”

2. Texas Department of Transportation (TxDOT)
 - a. Tex-101-E, Preparing Soil and Flexible Base Materials for Testing
 - b. Tex-110-E, Particle Size Analysis of Soils

D. Definitions:

1. Excavation - Any man-made cut, cavity, trench, or depression in an earth surface, formed by removal of material.
 - a. Extra Hand Excavation- excavation by manual labor at locations designated by the Engineer, which is not included in other Bid Items.
 - b. Extra Machine Excavation- excavation by machine at locations designated by the Engineer, which is not included in other Bid Items.
 - c. Special Excavation-excavation necessitated by obstruction of pipes, ducts, or other structures, not shown on Plans, which interfere with installation of utility piping by normal methods of excavation or augering. Contractor shall be responsible for locating such underground obstructions, sufficiently in advance of trench excavation or augering, to preclude damage to the obstructions.
2. Pipe Foundation - suitable and stable native soils that are exposed at the trench subgrade after excavation to depth of bottom of the bedding as shown on the Plans, or foundation backfill material placed and compacted in over-excavations.
3. Pipe Bedding - the portion of trench backfill that extends vertically from top of foundation up to a level line at bottom of pipe, and horizontally from one trench sidewall to opposite sidewall.
4. Haunching - the material placed on either side of pipe from top of bedding up to spring-line of pipe and horizontally from one trench sidewall to opposite sidewall.
5. Initial Backfill - the portion of trench backfill that extends vertically from spring-line of pipe (top of haunching) up to a level line 12 inches above top of pipe, and horizontally from one trench sidewall to opposite sidewall.
6. Pipe Embedment - the portion of trench backfill that consists of bedding, haunching, and initial backfill.
7. Trench Zone - the portion of trench backfill that extends vertically from top of pipe embedment up to pavement subgrade or up to final grade when not beneath pavement.

8. Trench Conditions - description of the stability of trench bottom and trench walls of pipe embedment zone. Maintain trench conditions that provide for effective placement and compaction of embedment material directly on or against undisturbed soils or foundation backfill, except where structural trench support is necessary.
 - a. Dry Stable Trench: Stable and substantially dry trench conditions exist in pipe embedment zone as a result of typically dry soils or achieved by ground water control (dewatering or depressurization) for trenches extending below ground water level.
 - b. Stable Trench with Seepage: Stable trench in which ground water seepage is controlled by excavation drainage.
 - 1) Stable Trench with Seepage in Clayey Soils: Excavation drainage is provided in lieu of or to supplement ground water control systems to control seepage and provide stable trench subgrade in predominately clayey soils prior to bedding placement.
 - 2) Stable Wet Trench in Sandy Soils: Excavation drainage is provided in the embedment zone in combination with ground water control in predominately sandy or silty soils.
 - c. Unstable Trench: Unstable trench conditions exist in the pipe embedment zone if ground water inflow or high water content causes soil disturbances, such as sloughing, sliding, boiling, heaving or loss of density.
9. Sub-trench - a special case of benched excavation. Sub-trench excavation below trench shields or shoring installations may be used to allow placement and compaction of foundation or embedment materials directly against undisturbed soils. Depth of a sub-trench depends upon trench stability and safety as determined by the Contractor.
10. Trench Dam - a placement of low permeability material in pipe embedment zone or foundation to prohibit ground water flow along the trench.
11. Over-Excavation and Backfill - excavation of subgrade soils with unsatisfactory bearing capacity or composed of otherwise unsuitable materials below top of foundation as shown on Plans, and backfilled with foundation backfill material.
12. Foundation Backfill Materials - natural soil or manufactured aggregate of controlled gradation, and geo-textile filter fabrics as required, to control

drainage and material separation. Foundation backfill material is placed and compacted as backfill to provide stable support for bedding. Foundation backfill materials may include concrete seal slabs.

13. Trench Shield (Trench Box) - a portable worker safety structure moved along the trench as work proceeds, used as a Protective System and designed to withstand forces imposed on it by cave-in, thereby protecting persons within the trench. Trench shields may be stacked if so designed or placed in a series depending on depth and length of excavation to be protected.

1.02 MEASUREMENT AND PAYMENT

- A. Unless indicated as a Bid Item, no separate payment will be made for trench excavation, embedment, and backfill under this Section. Include cost in Bid Items for all excavation and backfill associated with the placement and construction of: underground piping, boxes, manholes and associated appurtenances including conduit, or duct work.
- B. If Special Excavation is allowed, based on the Engineer's direction, and indicated in Section 00300 – Bid Proposal as an Extra Item, measurement will be on a cubic yard basis, measured in place, without deduction for space occupied by portions of pipes, ducts, or other structures left in place across trenches excavated under this item.
 1. Payment for Special Excavation shall include:
 - a. Dewatering and surface water control.
 - b. Protection of pipes, ducts, or other structures encountered including bracing, shoring, and sheeting necessary for support.
 - c. Replacement of pipes, ducts, or structures damaged by special excavation operations, except where payment for replacement is authorized by Engineer due to deteriorated condition of pipes, ducts, or structure.
 - d. Temporary disconnecting, plugging, and reconnecting of low volume water pipes, to allow machine excavation or augering, when approved by Engineer. Pipe for replacement shall be new and conform to specification requirements for type of existing pipe removed.
 - e. Placement of material from Special Excavation.
 - f. Geo-textile material and concrete trench dams required to complete the placement of material from Special Excavation.
 - g. Re-sodding required for surface restoration within designated limits of Special Excavation.
 - h. Disposal of excess excavated material not suitable for bedding or backfill, or not required for the Work.
 2. The items listed below will not be included in payment for Special Excavation. Include cost in Bid Items for which the Work is a component:

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- a. Trench safety system including sheeting and shoring.
 - b. Utility piping installed in trenches excavated under this item.
 - c. Removal and replacement of associated streets, driveways, and sidewalks.
- C. If Extra Hand Excavation is allowed, based on the Engineer's direction, and indicated in Section 00300 – Bid Proposal as an Extra Item, measurement will be on a cubic yard basis, measured in place.
1. Payment for Extra Hand Excavation shall include:
 - a. Dewatering and surface water control.
 - b. Disposal of excess excavated material not suitable for bedding or backfill, or not required for the Work.
 - c. Placement of material from Extra Hand Excavation.
 - d. Re-sodding required for surface restoration within designated limits of Extra Hand Excavation.
 2. The items listed below will not be included in payment for Special Excavation. Include cost in Bid Items for which the Work is a component.:
 - a. Trench safety system including sheeting and shoring.
 - b. Removal and replacement of associated streets, driveways, and sidewalks.
- D. If Extra Machine Excavation is allowed, based on the Engineer's direction, and indicated in Section 00300 – Bid Proposal as an Extra Item, measurement will be on a cubic yard basis, measured in place.
1. Payment for Extra Machine Excavation shall include:
 - a. Dewatering and surface water control.
 - b. Disposal of excess excavated material not suitable for bedding or backfill, or not required for the Work.
 - c. Placement of material from extra machine excavation.
 - d. Re-sodding required for surface restoration within designated limits of Extra Machine Excavation.
 2. The items listed below will not be included in payment for Special Excavation. Include cost in Bid Items for which the Work is a component:
 - a. Trench safety system including sheeting and shoring.
 - b. Removal and replacement of associated streets, driveways, and sidewalks.

- E. Refer to Section 01200 - Measurement and Payment Procedures. No payment will be made for delays in completion of Work resulting from Extra Item Work.

1.03 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01350 – Submittals.
- B. Submit a written description for information only of the planned typical method of excavation, backfill placement and compaction, including:
 - 1. Sequence of work and coordination of activities.
 - 2. Selected trench widths.
 - 3. Procedures for foundation and embedment placement, and compaction.
 - 4. Procedure for use of trench boxes and other pre-manufactured systems while assuring specified compaction against undisturbed soil.
 - 5. Procedure for installation of Special Shoring at locations identified on the Plans.
- C. Submit product quality, material sources, and field quality information in accordance with this Section.
- D. Submit field red lines documenting location of Utilities as installed, referenced to survey Control Points, under the provisions of Section 01760 – Project Record Documents, 1.04C. Include location of utilities and structures encountered or rerouted. Give horizontal dimensions, elevations, inverts and gradients.

1.04 TESTING

- A. Testing and analysis of product quality, material sources, or field quality shall be performed by an independent testing laboratory provided by the Owner under the provisions of Section 01450 – Testing Laboratory Services and as specified in this Section.

1.05 PROTECTION OF PEOPLE AND PROPERTY

- A. Contractor shall conduct all construction operations under this Contract in conformance with the practices described in Section 01500 – Temporary Facilities and Controls.

1.06 SPECIAL SHORING DESIGN REQUIREMENTS

- A. Special Shoring shall be, in accordance with Section 01570 – Trench Safety System, designed by a Professional Engineer, licensed by the State of Texas, At Contractor's expense.
- B. Special Shoring shall be designed to provide support for the sides of the excavations, including soils and hydrostatic ground water pressures as applicable, and to prevent ground movements affecting adjacent installations or improvements such as structures, pavements and utilities.
- C. Special Shoring may be a pre-manufactured system or a field fabricated system that meets the requirements of the Work.

2.0 PRODUCTS**2.01 MATERIALS**

- A. Contractor shall provide materials used as embedment, backfill, back-dressing, and embankment identified on the Plans in accordance with Section 02255 – Bedding, Backfill and Embankment Material.
- B. Manufactured materials, such as crushed concrete, may be substituted for natural soil or rock products where indicated in the product specification, and approved by the Engineer, provided that the physical property criteria are determined to be satisfactory by testing.
- C. Geotextile (Filter Fabric): Conform to requirements of Section 02370 – Geotextile.
- D. Concrete for Trench Dams: Concrete backfill or 3 sack premixed (bag) concrete.
- E. Timber Shoring Left in Place: Untreated oak.

2.02 EQUIPMENT

- A. Perform excavation with track mounted excavator or other equipment suitable for achieving the requirements of this Section.
- B. Use only hand-operated tamping equipment until a minimum cover of 12 inches is obtained over pipes, conduits, and ducts. Do not use heavy compacting equipment until adequate cover is attained to prevent damage to pipes, conduits, or ducts.
- C. Use trench shields or other Protective Systems or Shoring Systems which are designed and operated to achieve placement and compaction of backfill directly against undisturbed native soil.

- D. Use Special Shoring systems where required which may consist of braced sheeting, braced soldier piles and lagging, slide rail systems, or other systems meeting the Special Shoring design requirements.

3.0 EXECUTION

3.01 PREPARATION

- A. Employ a Trench Safety Program as specified in Section 01570 – Trench Safety Systems.
- B. Install and operate necessary dewatering and surface water control measures conform to Section 01564 – Control of Ground Water and Surface Water.
- C. Remove existing pavements and structures, including sidewalks and driveways, to conform with requirements of Section 02220 – Site Demolition, as applicable.
- D. Area shall be cleared and grubbed under the provisions of Section 02200 – Site Preparation prior to excavation.
- E. Strip and stockpile topsoil under the provisions of Section 02200 – Site Preparation
- F. Schedule work so that pipe embedment can be completed on the same day that acceptable foundation has been achieved for each section of pipe installation, manhole, or other structures.

3.02 EXCAVATION

- A. Except as otherwise specified or shown on the Plans, install underground utilities in open cut trenches with vertical sides.
- B. Perform excavation work so that pipe, conduit, and ducts can be installed to depths and alignments shown on the Plans. Avoid disturbing surrounding ground and existing facilities and improvements.
- C. Determine trench excavation widths using the following schedule as related to pipe outside diameter (O.D.). Maximum trench width shall be the minimum trench width plus 24 inches.

NOMINAL PIPE SIZE, INCHES	MINIMUM TRENCH WIDTH, INCHES
Less than 18	O.D. + 18
18 to 30	O.D. + 24
Greater than 30	O.D. + 36

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- D. Use sufficient trench width or benches above the embedment zone for installation of well point headers or manifolds and pumps where depth of trench makes it uneconomical or impractical to pump from the surface elevation. Provide sufficient space between shoring cross braces to permit equipment operations and handling of forms, pipe, embedment and backfill, and other materials.
- E. Upon discovery of unknown utilities, badly deteriorated utilities not designated for removal, or concealed conditions, discontinue work at that location. Notify the Engineer and obtain instructions before proceeding.
- F. Shoring of Trench Walls.
1. Install Special Shoring in advance of trench excavation or simultaneously with the trench excavation, so that the soils within the full height of the trench excavation walls will remain fully laterally supported at all times.
 2. For all types of shoring, support trench walls in the pipe embedment zone throughout the installation. Provide trench wall supports sufficiently tight to prevent washing the trench wall soil out from behind the trench wall support.
 3. Unless otherwise directed by the Engineer, leave sheeting driven into or below the pipe embedment zone in place to preclude loss of support of foundation and embedment materials. Leave rangers, walers, and braces in place as long as required to support sheeting, which has been cut off, and the trench wall in the vicinity of the pipe zone.
 4. Employ special methods for maintaining the integrity of embedment or foundation material. Before moving supports, place and compact embedment to sufficient depths to provide protection of pipe and stability of trench walls. As supports are moved, finish placing and compacting embedment.
 5. If sheeting or other shoring is used below top of the pipe embedment zone, do not disturb pipe foundation and embedment materials by subsequent removal. Maximum thickness of removable sheeting extending into the embedment zone 1 inch. Fill voids left on removal of supports with compacted backfill material.
- G. Use of Trench Shields. When a trench shield (trench box) is used as a worker safety device, the following requirements apply:
1. Make trench excavations of sufficient width to allow shield to be lifted or pulled freely, without damage to the trench sidewalls.
 2. Move trench shields so that pipe, and backfill materials, after placement and compaction, are not damaged nor disturbed, nor the degree of compaction reduced.

3. When required, place, spread, and compact pipe foundation and bedding materials beneath the shield. For backfill above bedding, move the shield as backfill is placed and ramped in. Place and compact backfill materials against undisturbed trench walls and foundation.
4. Maintain trench shield in position to allow sampling and testing to be performed in a safe manner.

3.03 TRENCH FOUNDATION

- A. Excavate bottom of trench to uniform grade to achieve stable trench conditions and satisfactory compaction of foundation or bedding materials.
- B. Place trench dams in Class I foundations in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.04 PIPE EMBEDMENT PLACEMENT AND COMPACTION

- A. Immediately prior to placement of embedment materials, the bottoms and sidewalls of trenches shall be free of loose, sloughing, caving, or otherwise unsuitable soil.
- B. Place Geotextile, if specified, to prevent particle migration from the in-situ into open-graded (Class I) embedment materials or drainage layers.
- C. Place embedment including bedding, haunching and initial backfill to meet requirements indicated on Plans. PVC & HDPE require cement stabilized sand bedding and backfill to one foot below subgrade or below grade if under pavement, or one foot above top of pipe if not under pavement.
- D. For pipe installation, manually spread embedment materials around the pipe to provide uniform bearing and side support when compacted. Do not allow materials to free-fall from heights greater than 24 inches above top of pipe. Perform placement and compaction directly against the undisturbed soils in the trench sidewalls, or against sheeting which is to remain in place.
- E. Do not place trench shields or shoring within height of the embedment zone unless means to maintain the density of compacted embedment material are used. If moveable supports are used in embedment zone, lift the supports incrementally to allow placement and compaction of the material against undisturbed soil.
- F. Do not damage coatings or wrappings of pipes during backfilling and compacting operations. When embedding coated or wrapped pipes, do not use crushed stone or other sharp, angular aggregates.

- G. Place haunching material manually around the pipe and compact it to provide uniform bearing and side support. If necessary, hold small-diameter or lightweight pipe in place during compaction of haunch areas and placement beside the pipe with sand bags or other suitable means.
- H. Place electrical conduit directly on foundation without bedding.
- I. Shovel pipe embedment material in place and compact it using pneumatic tampers in restricted spaces, and vibratory-plate compactors or engine-powered jumping jacks in unrestricted spaces. Compact each lift before proceeding with placement of the next lift.
 - 1. Class I embedment materials.
 - a. Maximum 6-inches compacted lift thickness.
 - b. Systematic compaction by at least two passes of vibrating equipment. Increase compaction effort as necessary to effectively embed the pipe to meet the deflection test criteria.
 - c. Moisture content as determined by Contractor for effective compaction without softening the soil of trench bottom, foundation or trench walls.
 - 2. Class II embedment and cement stabilized sand.
 - a. Maximum 6-inches compacted thickness.
 - b. Compaction by methods determined by Contractor to achieve a minimum of 95 percent of the maximum dry density as determined according to ASTM D 698 for Class II materials and according to ASTM D 558 for cement stabilized materials.
 - c. Moisture content of Class II materials within 3 percent of optimum as determined according to ASTM D 698. Moisture content of cement stabilized sands on the dry side of optimum as determined according to ASTM D 558 but sufficient for effective hydration.
- J. Place trench dams in Class I embedments in line segments longer than 100 feet between manholes, and not less than one in every 500 feet of pipe placed. Install additional dams as needed to achieve workable construction conditions. Do not place trench dams closer than 5 feet from manholes.

3.05 TRENCH ZONE BACKFILL PLACEMENT AND COMPACTION

- A. Place backfill for pipe or conduits and restore surface as soon as practicable. Leave only the minimum length of trench open as necessary for construction. Backfill placement and compaction shall apply to all soils excavated for the trench especially including any areas that were “benched” or over-excavated in place of trenched shoring. All disturbed soils generated during excavation, whether inside the trench or associated with it, shall be considered to fall under this requirement.

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- B. Where damage to completed pipe installation work is likely to result from withdrawal of sheeting, leave the sheeting in place. Cut off sheeting 1.5 feet or more above the crown of the pipe. Remove trench supports within 5 feet from the ground surface.
- C. For sewer pipes, use backfill materials described here as determined by trench limits. As trench zone backfill in paved areas for streets and to one foot back of curbs and pavements, use cement stabilized sand for pipe of nominal sizes less than 36 inches, or Bank Sand for pipe of nominal sizes 36 inches and larger as indicated on the Drawings. Uniformly backfill trenches unless specified otherwise according to the paved area criteria. Use select backfill within one foot below pavement subgrade for rigid pavement. For asphalt concrete, use flexible base material within one foot below pavement subgrade.
- D. For water lines, backfill in trench zone, including auger pits, with Bank Sand, Select Fill, or Random Fill material as specified in this Section.
- E. For trench excavations under pavement, place trench zone backfill in lifts and compact by methods indicated below. Fully compact each lift before placement of the next lift.
1. Bank Sand.
 - a. Maximum 9-inches compacted lift thickness.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 3 percent of optimum determined according to ASTM D 698
 2. Cement Stabilized Sand.
 - a. Maximum lift thickness determined by Contractor to achieve uniform placement and required compaction, but not exceeding 24 inches.
 - b. Compaction by vibratory equipment to a minimum of 95 percent of the maximum dry density determined according to ASTM D 558.
 - c. Moisture content on the dry side of optimum determined according to ASTM D 558 but sufficient for cement hydration.
 3. Select Fill.
 - a. Maximum 6-inches compacted thickness.
 - b. Compaction by equipment providing tamping or kneading impact to a minimum of 95 percent of the maximum dry density determined according to ASTM D 698.
 - c. Moisture content within 2 percent of optimum determined according to ASTM D 698.
- F. For trench excavations outside pavements, a Random Fill of suitable material may be used in the trench zone.

1. Fat clays (CH) may be used as trench zone backfill outside paved areas at the Contractor's option. If the required density is not achieved, the Contractor, at his option and at no additional cost to the Owner, may use lime stabilization to achieve compaction requirements or use a different suitable material.
2. Maximum 9-inch compacted lift thickness for clayey soils and maximum 12-inch lift thickness for granular soils.
3. Compact to a minimum of 90 percent of the maximum dry density determined according to ASTM D 698, or to same density as adjacent soils.
4. Moisture content as necessary to achieve density.

3.06 MANHOLES, JUNCTION BOXES AND OTHER PIPELINE STRUCTURES

- A. Meet the requirements of adjoining utility installations for backfill of pipeline structures, as shown on the Plans.

3.07 FIELD QUALITY CONTROL

- A. Quality Control
 1. The Engineer may sample and test backfill at:
 - a. Sources including borrow pits, production plants and Contractor's designated off-site stockpiles.
 - b. On-site stockpiles.
 - c. Materials placed in the Work.
 2. The Engineer may resample material at any stage of work or location if changes in characteristics are apparent.
- B. Production Verification Testing: The Owner's testing laboratory will provide verification testing on backfill materials, as directed by the Engineer. Samples may be taken at the source or at the production plant, as applicable.
- C. Provide excavation and Trench Safety Systems at locations and to depths required for testing and retesting during construction.
- D. Tests will be performed on a minimum of three different samples of each material type for plasticity characteristics, in accordance with ASTM D 4318, and for gradation characteristics, in accordance with Tex-101-E and Tex-110-E. Additional classification tests will be performed whenever there is a noticeable change in material gradation or plasticity.

- E. At least three tests for moisture-density relationships will be performed initially for backfill materials in accordance with ASTM D 698, and for cement stabilized sand in accordance with ASTM D 558. Additional moisture-density relationship tests will be performed whenever there is a noticeable change in material gradation or plasticity.
- F. In-place density tests of compacted pipe foundation, embedment and trench zone backfill soil materials will be performed according to ASTM D 1556, or ASTM D 2922 and ASTM D 3017, and at the following frequencies and conditions.
 - 1. A minimum of one test for every 100 linear feet measured along pipe for compacted embedment and for every 100 linear feet measured along pipe for compacted trench zone backfill material. Testing shall be performed for each lift thickness for different backfill material specified in Item 3.05.
 - 2. A minimum of three density tests for each full shift of Work when backfill is placed.
 - 3. Density tests will be distributed among the placement areas. Placement areas are: foundation, bedding, haunching, initial backfill and trench zone.
 - 4. The number of tests will be increased if inspection determines that soil type or moisture content are not uniform or if compacting effort is variable and not considered sufficient to attain uniform density, as specified.
 - 5. Density tests may be performed at various depths below the fill surface by pit excavation. Material in previously placed lifts may therefore be subject to acceptance/rejection.
 - 6. Two verification tests will be performed adjacent to in-place tests showing density less than the acceptance criteria. Placement will be rejected unless both verification tests show acceptable results.
 - 7. Re-compacted placement will be retested at the same frequency as the first test series, including verification tests.
- G. Recondition, re-compact, and retest at Contractor's expense if tests indicate Work does not meet specified compaction requirements. For Cement Stabilized Sand with nonconforming density, core and test for compressive strength at Contractor's expense.
- H. Acceptability of crushed rock compaction will be determined by inspection.

3.08 CLEAN-UP AND RESTORATION

- A. Perform clean-up and restoration in and around construction zone in accordance with Section 01140 – Contractor's Use of Premises.

3.09 PROTECTION OF THE WORK

- A. Maintain excavation and embankment areas until start of subsequent work. Repair and re-compact slides, washouts, settlements, or areas with loss of density at no cost to the Owner
- B. Prevent erosion at all times. Do not allow water to pond in excavations.
- C. Distribute construction traffic evenly over compacted areas, where practical, to aid in obtaining uniform compaction. Protect exposed areas having high moisture content from wheel loads that cause rutting.
- D. Coordinate excavation within 15 feet of existing utilities with utility representative. Excavate by hand to locate existing utility, support utility with methods agreed upon by utility representative. All work shall be subsidiary to bid items in Section 00300 Bid Proposal. No additional cost to City.

END OF SECTION