SECTION 11

UTILITY EXCAVATION AND BACKFILL

11.1 DESCRIPTION

A. General:

This work consists of excavation, backfill and compaction of trenches for installation of underground ~~utilities~~utilities, which includes Private Utility Installations, Water Piping Systems, Sanitary Sewers, and Storm Sewers and Pipe Culverts. This includes, but is not limited to, dewatering, rock and/or muck excavation and disposal, bedding, and shoring and bracing.

B. Related Work:

Section 7	General Conditions
Section 8	Water Piping Systems
Section 9	Sanitary Sewer
Section 10	Clearing and Grubbing
Section 13	Removal Items
Section 14	Embankment
Section 15	Disposal of Surplus Excavation and Waste
Section 17	Salvaging, Stockpiling, and Placing Topsoil
Section 18	Erosion and Water Pollution Control
Section 19	Incidental Work
Section 41	~~Resurfacing~~ Utility Trench Resurfacing
Section 54	Pipe Culverts
Section 90	Traffic Control
Section 112	Select Granular Backfill
Section 120	Reinforced Concrete Pipe
Section 121	Corrugated Metal Pipe
Section 117	Aggregates for Granular Bases and Surfacing
Section 200	Controlled Low Strength Material~~s~~

C. License and Permit Requirements

1. Any person or Contractor engaging in the business of excavating in the public right-of-way (ROW) shall comply with the provisions of the Rapid City Municipal Code, Chapter 13.10, “Trenching Contractor’s Licenses”. The Contractor shall refer to Chapter 13.10 for the actual definition of work covered under the code.

2. Any person or Contractor engaging in the business of excavating in the public ROW for such purposes of constructing, altering, repairing or improving water and sewer mains; appurtenances and/or service lines and storm sewers shall comply with the provisions of the Rapid City Municipal Code, Chapter 13.10,

"Trenching Contractor's Licenses". The Contractor shall refer to Chapter 13.10 for the actual definition of work covered under the code.

3. Dirt/dust control shall be as specified in Section 7.28.

4. City of Rapid City, South Dakota Department of Transportation (SDDOT) and Railroad Right-to-Work Permits are required from the same when working within their ROW.

5. A Right to Work permit, if applicable, is required from the City of Rapid City Utility Maintenance Group (Utility Maintenance).

6. Tapping fees for the taps themselves shall be paid for at the time the Right to Work permit is obtained from Utility Maintenance.

7. New Account Set-up inspection permits (tapping permits), if applicable, are required from Utility Maintenance.

8. Blasting and the use of explosives

    a. The Contractor shall comply with all Federal Regulations and OSHA provisions.
    b. The Contractor shall comply with Section 7.43 – General Conditions, “Use of Explosives”.
    c. A permit for use of explosives shall be obtained from the Rapid City Fire Department.

D. Submittals/Test Samples

1. Soil tests

    The Contractor shall provide the Engineer with the results of a modified proctor soil compaction test, as determined by the AASHTO T180 test, for those locations and depths determined by the Engineer. When requested, the Contractor shall provide the Engineer with no less than 25 pounds of each sample appropriately labeled with the project title, the location from which the sample was obtained and the date of sample collection. A City Construction Observer~~Inspector~~ shall be present during sample collection. Soil samples shall be submitted to a certified soils testing lab within 24 hours of the Engineer’s request. Failure to do so will cause the City to submit the samples and charge the Contractor at one and a half (1½) times the cost incurred. Results shall be delivered to the City directly from the testing Laboratory.

2. The Contractor shall submit to the Engineer a Traffic Control Plan for the proposed construction activity unless waived by the Engineer. The Traffic Control Plan shall conform to Standard Specifications.

3. The Contractor shall provide a submittal to the Engineer for the materials proposed for use under Section 112 - Select Granular Backfill unless waived by the Engineer.

4. The Contractor shall provide a submittal to the Engineer for the materials proposed for use under Section 200 - Controlled Low Strength Material unless waived by the Engineer.

11.2 MATERIALS

A. Select granular backfill and bedding shall be in accordance with Section 112 - Select Granular Backfill.

B. Controlled low strength material used for bedding or backfill shall be in accordance with Section 200 - Controlled Low Strength Material.

11.3 CONSTRUCTION REQUIREMENTS

A. The Contractor shall contact SD One Call for the locations of public and private utilities prior to any excavation. Underground utilities shown on the plans are not necessarily exact and, therefore, must be located by the individual utility company prior to excavation activities. The Contractor shall attempt to contact the local residents/owners whenever any excavation may affect their property.

B. Trenching

1. Methods

Under ordinary conditions and where the depth of excavation and soil conditions will allow, excavation shall be by open cut from the surface. Tunneling or boring may be required under sidewalks, curb and gutter, or other surface structures. However, no additional compensation will be allowed for such tunneling or boring.

Where surface conditions allow, the Contractor will be permitted to slope or bench the trench sidewalls from a point three inches above the top of the pipe barrel. Below this point, the trench walls shall be vertical. Contractor shall shore as necessary. This requirement does not relieve the Contractor of the responsibility of meeting all applicable OSHA requirements.

Excavated material suitable for backfill shall be deposited sufficiently distant along the sides of the trench to limit the potential for cave-in and shall be so deposited that the public shall be inconvenienced as little as possible.

All excavated material not required for backfill shall be removed from the project by and at the expense of the Contractor as directed by the Engineer.

All rock, including excavated bedrock and large loose rock such as boulders or fieldstone, muck or other unsuitable material, which cannot be used as backfill,

shall be segregated from the rest of the excavated material and removed from the project by and at the expense of the Contractor. Unsuitable material, which cannot be used for backfill, shall be determined by the Engineer. Established drainage in the street, alley, or drainage ditch, must be maintained by the Contractor during his construction operations to limit further damage and unnecessary removals.

Streets that utilize an engineering fabric underlayment shall be excavated down to the underlayment by hand, or other method that will prevent damage to the fabric. The first pavement saw cuts shall be a minimum width of six feet centered over the utility (see Standard Detail). Care shall be taken to leave the fabric undamaged. The fabric shall be slit lengthwise centered over the utility, the fabric laid back, and the trench excavated and backfilled in normal fashion. When the backfill is completed to the elevation of the original fabric, the slit fabric ends shall be placed back on the backfilled material; a minimum six foot wide piece of similar material shall be placed centered over the top of the existing slit fabric; and a minimum geogrid/fabric overlap of three feet shall be maintained. The geogrid/fabric repair shall be inspected by the Engineer prior to placing base course or cushion. After inspection of the geogrid/fabric, it may be covered with base course to the existing paving base grade. The base course can then be compacted and readied for pavement. Just prior to pavement replacement, a second saw cut shall be completed at a minimum of 12 inches away from the first saw cut (see Standard Detail).

Where the proposed trench intersects a sub drain or an edge drain, the sub or edge drain shall be repaired with a like drain material to a width one foot on either side of the trench width. The joints shall utilize a factory repair joint or shall be properly over lapped, wrapped with fabric and repair tape. New clean rock drainage material shall be placed across the trench intersection and backfilled with appropriate material out side of the sub or edge drain limits. The drain repair shall be inspected by the Engineer prior to placing the clean rock.

When either engineering fabric or sub or edge drains are inadvertently encountered and damaged, the Contractor is responsible to notify the Engineer as soon as practical. No further excavation or repairs of the area shall be effected without the knowledge of the Engineer.

Damage to the property of others, such as engineering fabric, edge or sub drains, private or public utilities, fences, trees, shrubs, lawns, sidewalks, etc. shall be repaired or replaced the Contractor's expense unless removal of such is shown on the plans or written permission was first obtained from the Engineer.

2. Protection of the excavation

The Contractor shall be solely responsible for providing a safe trenching operation and shall, as a minimum, comply with all OSHA regulations, regardless of limits of trench width imposed by project plans work limits, site constraints or the direction of the Engineer.

The Contractor shall employ qualified, properly trained personnel to design, place and maintain shoring during progress of work until the trench is backfilled.

Failure to properly shore and/or brace excavations shall be at the risk of the Contractor and any damage to pipes, curb and gutter, street pavement, grassed areas, storm sewer and appurtenances, gas mains, and/or other public or private property occurring through settlements, heaving, water or earth pressures, slides, caving, or other causes due to failure of shoring, improper shoring, or lack of shoring, or due to negligence on the part of the Contractor, shall be repaired by the Contractor at his own expense and to the satisfaction of the Engineer.

When utilized, the shoring shall be arranged so as not to place any stress on portions of the completed work until the general construction thereof has progressed far enough to provide adequate strength. Unless left in place by written order of the Engineer, shoring shall be removed as work progresses. Shoring devices and methods of construction utilizing shoring devises are the sole responsibility of the Contractor.

3. Dewatering

The Contractor shall be responsible for evaluating soil and groundwater conditions and for furnishing and maintaining necessary and suitable dewatering devices and equipment.

The Contractor shall provide for positive drainage away from the excavation or otherwise take steps to protect the excavation and backfill from becoming excessively wet prior to placing the finished surface.

If the Engineer determines that any portion of the backfill or trench has become excessively wet during excavation and/or backfill operations, the Contractor shall, at his own expense, remove the material to the satisfaction of the Engineer and furnish an approved backfill and/or bedding material that meets specifications.

At all times, the Contractor shall provide and maintain ample means and devices, with which to remove promptly and properly dispose of all water that enters the excavation.

The Contractor shall dispose of water in a suitable manner without damage to adjacent property or without creating a health hazard or nuisance condition. Water may not be discharged to private property or to irrigation ditches without prior approval from the affected property owner or ditch company. No water shall be drained into work built or under construction without prior consent of the Engineer.

Dewatering shall be accomplished by placing well points, sumps or any other acceptable method, which will insure a dewatered trench. Any proposed dewatering method shall be subject to the approval of the Engineer. The

Contractor will not be permitted to allow groundwater to drain through completed sewers. The Contractor will be required to thoroughly clean all debris and sediment from newly installed sewers as directed by the Engineer.

The Contractor shall provide for positive drainage of water away from the excavation and take the necessary action to protect the excavation and backfill from becoming excessively wet prior to placing the finished surface. If the Engineer determines that any portion of the backfill or trench has become excessively wet due to actions or inactions of the Contractor after the initial excavation, the Contractor shall remove the soil and/or pipe or appurtenance(s) to the satisfaction of the Engineer and furnish an approved backfill material that meets specifications and reinstall the pipe and/or appurtenance(s) as specified herein, all at no expense to the City.

4. Trench Dimensions

The following table shall be used to determine the acceptable minimum trench widths for the City. The table in general is a compilation of AWWA criteria and Uni-Bell criteria. The criteria used in compiling this table are presented in Paragraphs a. and b. For purposes of establishing acceptable minimum trench widths, the dimensions in the table shall govern unless specifically indicated otherwise on the drawings.

TABLE 11-1

MINIMUM TRENCH WIDTH TABLE

Pipe Diameter	**Minimum Width**
<8 in	24 in
8 in -12 in	30 in
14 in –18 in	36 in
20 in -21 in	42 in
24 in –36 in	1.25(Pipe OD) plus 12 in
>36 in	Per plans

The Contractor shall adhere as closely as possible to the minimum trench widths.

The Contractor will not be allowed to excavate excessive trench width in lieu of adequate dewatering or shoring.

a. Pressure Pipe Installation (Water and Force Main)
For reference, only Table 11-1 will be enforced.

Minimum Trench Width: The minimum clear trench width measured at a point three inches above the top of the pipe barrel shall not be less than 18

inches or the outside pipe diameter, plus 12 inches, whichever is greater or such width as approved by the Engineer.

b. Non-Pressure Pipe Installation (Gravity Sewer Main)
For reference, only Table 11-1 will be enforced.

1) Minimum Trench Width: The minimum clear trench width measured at a point three (3) inches above the top of the pipe barrel shall not be less than the greater of:
   a) Minimum of eighteen (18) inches, or
   b) The outside pipe diameter, plus sixteen (16) inches, or
   c) The outside pipe diameter multiplied by 1.25, plus (12) inches, or
   d) Such width as approved by the Engineer.

c. Maximum Trench Length: Not more than 300 linear feet of trench shall be open at any one time in the public Right-of-Way, in easements that contain City owned utilities, or near roadways..

~~b.Non-Pressure Pipe Installation (Gravity Sewer Main)~~
~~For reference, only Table 11-1 will be enforced.~~

~~1) Minimum Trench Width: The minimum clear trench width measured at a point three (3) inches above the top of the pipe barrel shall not be less than the greater of:~~
   ~~a)Minimum of eighteen (18) inches, or~~
   ~~b)The outside pipe diameter, plus sixteen (16) inches, or~~
   ~~c)The outside pipe diameter multiplied by 1.25, plus (12) inches, or~~
   ~~d)Such width as approved by the Engineer.~~

~~2) Maximum Trench Length: Not more than 300 linear feet of trench shall be open at any one time in the public Right-of-Way, in easements that contain City owned utilities, or near roadways. unless otherwise specified or permitted by the Engineer.~~

5. Foundations: Foundations shall be considered as that material which is neither bedding nor backfill, but is used under the pipe or conduit for support in the bottom of the trench.

a. Normal Trench Bottom: The bottom of the normal trench where the undisturbed soil is of a supportive nature for the pipe or conduit laid, as determined by the Engineer, shall be accurate for line and grade to provide uniform bearing and support for each section of pipe or conduit. Bell holes and depressions for joints shall be dug after the trench bottom is graded, and shall be no greater in length, depth, and width than required for making the joint. The undisturbed trench bottom shall be at least 3 inches below the pipe invert, to allow for the placement of Type 1 Bedding material.

b. Rock Trench Bottom: When solid rock, large loose rock, such as field stone, very coarse gravel, or any other material of a similar nature that is stable but

will not allow a proper foundation for the pipe or conduit, is encountered at the trench bottom, it shall be excavated to a sufficient depth to allow refilling under the body and joints of pipe or conduit. The undisturbed trench bottom shall be at least 3 inches below the pipe invert, to allow for the placement of Type 1 Bedding material.

c. Unstable Trench Bottom: When the trench bottom is earth that will not support the pipe or conduit, the earth shall be considered an unstable foundation and shall be excavated below grade as directed by the Engineer. A solid foundation shall be built with select granular backfill material or with controlled low strength material.

The amount and type of foundation material required will vary depending upon the soil encountered. Generally, foundation material shall be Type 1 Bedding Material or Type 2 Foundation Material, per Section 112 or Controlled Low Strength Material per Section 200.

In some circumstances, larger foundation material may be necessary and in these cases Type 3 or 4 Foundation Material or Stabilization Rock maybe used per Section 112. If Type 3 or 4 Foundation Material or Stabilization Rock is used, then a minimum 6 inches of Type 2 Foundation Material shall be placed directly above the material and prior to the placement of the Type 1 Bedding Material. This helps to minimize the potential for the Type 1 Bedding material to migrate into the larger foundation material and result in loss of pipe support. The Engineer shall determine the use of Controlled Low Strength Material or Foundation materials, in cases of unstable trench bottom.

Foundation material shall be compacted and placed in separate lifts from the trench bottom up to three inches below the pipe invert. Foundation material lifts shall not exceed eight inches and each lift shall be compacted separately.

6. Rock Excavation: Rock excavation shall include solid rock in ledges, bedded deposits, un-stratified masses and conglomerate deposits so firmly cemented as to present the characteristics of solid rock, which must be removed by drilling, blasting, jack hammering, hydraulic ripper, or similar methods. Shale, regardless of the nature of deposit, or loose boulders or large fieldstone will not be considered rock excavation unless so designated on the plans. The responsibility and cost of satisfactorily demonstrating to the Engineer that the material being considered for rock excavation cannot be removed by means other than drilling, blasting, jack hammering, hydraulic ripper, or similar methods shall be the obligation of the Contractor.

At a minimum, it shall be demonstrated that a normal excavating machine being skillfully operated cannot effectively remove said material. “Effectively removed” shall be defined as, the normal production rate being reduced to 25% of normal. A normal excavating machine will be considered to be a +230 HP hydraulic

excavator, crawler weighing +78,000 pounds with a – 1 CY bucket equipped with rock or ripper teeth.

The Contractor shall dispose of all unsuitable excavated material. The Contractor shall provide a disposal site for unsuitable backfill materials. The disposal site shall be approved by the Engineer.

The Contractor shall furnish an approved backfill material to fill the void left by rock excavation. He shall also provide the results of a modified proctor (AASHTO T-180) test for the furnished backfill.

The Contractor shall keep accurate daily records of the quantity of rock removed so a comparison can be made with the Inspector's records. The Contractor shall deliver his records of Rock Excavation to the Engineer or his representative within 48 hours. Records of Rock Excavation delivered after this period shall be declared invalid and no payment for Rock Excavation will be made.

7. Blasting and the Use of Explosives

   All materials removed by blasting which cannot be shoveled as earth shall be deemed unsuitable and shall be handled and disposed of separately from other suitable backfill materials as directed by the Engineer. The Contractor shall provide a disposal site for unsuitable backfill materials. The disposal site shall be approved by the Engineer.

   Where blasting is necessary, the Contractor shall comply with the laws, ordinances, and applicable safety code requirements relative to the handling, storage and use of explosives and the protection of life and property. Suitable covering or shielding shall be provided to confine all materials lifted by blasting, within the limits of the trench of excavation, and prevent injury to property or life. The Contractor shall be responsible for all damages caused by his blasting operations. The Contractor will demonstrate that he is in compliance with applicable laws, rules, and regulations, and that he has the required expertise in advance of any blasting work. The Contractor shall notify all governmental agencies, property owners and utility owners that may be affected by the blast 48 hours in advance.

   The Contractor shall receive "approval", in writing, for any proposed blasting in the public Right of Way, an easement, or that is within 100 feet of an underground public utility. The Contractor shall refer to the sub-section titled "Use of Explosives" in Section 7 - General Conditions, for additional requirements when blasting. The Contractor shall request the "approval" at least 48 hours prior to blasting. The Contractor shall be responsible for any safeguards or monitoring required by the Engineer for the blasting operations and shall be responsible for any and all damages resulting from the blasting operations.

8. Unsuitable Backfill Material Excavation: Unsuitable Backfill Material Excavation shall consist of the removal and disposal of unsuitable material, which in the

opinion of the Engineer is not suitable as backfill material. The Contractor shall provide an approved disposal site for unsuitable material. The Contractor shall provide and use any necessary shoring devices necessary to maintain trench walls.

The shortage of backfill material created by the removal of the unsuitable material shall be replaced by the Contractor with an approved imported backfill material meeting specifications. Payment for imported backfill will be considered if the Contractor has not wasted suitable material from the project. The Contractor shall provide the results of a modified proctor analysis (AASHTO T-180) for all furnished imported backfill material, except Controlled Low Strength Material.

C. Pipe Bedding

Water and Sewer pipe, appurtenances, and service lines shall be installed as per Sections 8 and 9 and as described below:

1. All water and sanitary sewer pipe, appurtenances, and service lines; except copper water services shall be bedded with Type 1 Bedding material from 3 inches below the pipe invert to 3 inches above the pipe crown over the full width of the trench. Type 1 Bedding Material shall meet the requirements of Section 112.

   Copper water services shall be bedded from three inches below the pipe invert to three inches above the pipe crown over the full width of the trench. The bedding shall be Type 1 Bedding Material, or in lieu of Type 1 Bedding Material, washed sand or crusher fines may be used.

   a. Type 1 Bedding shall be compacted and placed as a separate lift from the trench bottom, or top of Foundation material, to the pipe invert and shall be placed and compacted prior to the pipe or appurtenance being placed in the trench.

   b. Type 1 Bedding shall be hand tamped and placed as a separate lift from the pipe invert to the pipe spring line. The Type 1 Bedding shall be placed in lifts and the maximum lift shall not exceed 6 inches.

   c. Type 1 Bedding shall be hand tamped and placed as a separate lift from the pipe spring line to 3 inches above the pipe crown. The Type 1 Bedding shall be placed in lifts and the maximum lift shall not exceed 6 inches.

   d. Type 1 bedding material shall be incidental to water and sewer pipe per sections 8 and 9. Prior to commencing installation of water and sewer pipes, the Contractor and Engineer shall determine the rates of material to be used for each diameter of pipe being installed, in conjunction with the Contractor's proposed excavator bucket width (maximum trench width). These rates of material use shall be used as a method of quantifying the minimum amount of bedding material required for the project. The Contractor and Engineer shall, on a daily basis, quantify the amount of Type 1 bedding material installed, along with the corresponding quantity of water and sewer pipe. The Contractor shall submit weigh tickets for Type 1 bedding material to the Engineer daily. The weigh tickets shall clearly state, "Type 1 bedding material, incidental." All stockpiled bedding material used for water and sewer pipe installation shall be clearly identified on the project.

2. Bedding material from 3 inches above the pipe crown to 12 inches above the pipe crown shall be Select Bedding Material. Select Bedding Material may include loam, clay, sand, and gravel, but shall be free of cinder, ashes, refuse, organic matter, rock or material determined unsuitable by the Engineer. No

material larger than one (1) inch in size shall be permitted. Frozen material shall not be used.

Select Bedding Material maybe native excavated material or material brought from offsite. Select Bedding Material shall be hand-tamped in the trench for its full width on each side of the pipe, simultaneously. Mechanical tampers may be used if pipe damage will not occur.

3. Controlled Low Strength Material maybe used in lieu of Type 1 Bedding or Select Bedding Material as approved by the Engineer or as required on the drawings or specifications. Controlled Low Strength Material shall be installed in accordance with Section 200.

4. –Check Dam Installation – Check dam installation shall be as indicated on the drawings or in the detailed specifications. However, at a minimum, check dams shall be installed every 450 feet of water and sewer main installed, at all laterals (tees and crosses), and at service lines, where they connect to the main.

   The check dams shall extend vertically from the bottom of the excavation through the bedding material to the "normal backfill" zone and shall extend horizontally from trench sidewall to trench sidewall. The check dam shall seal the bedding material to prevent ground water movement in the bedding material along the trench. Check dam material shall be on site cohesive material compacted to the density of surrounding soil of the trench. Check dam installation and material shall be considered to be incidental to the installation of the main or service.

D. Backfilling and Compaction - Backfill shall start one (1) foot above the pipe or conduit crown and continue to the surface of the trench. The Contractor shall take precautions to backfill trenches in a manner that installed pipe or conduit will not be disturbed.

   All backfill material shall be free from cinders, ashes, refuse, vegetable or organic material, boulders, rocks, or stones, or other material, which the Engineer determines to be unsuitable. From one foot above the pipe or conduit crown to two feet above the pipe or conduit crown, the maximum stone size shall be limited to three inches in diameter. From two feet above the top of the pipe, stones up to twelve inches along their longest dimension may be included in the backfill, unless otherwise specified.

   When the type of backfill material is not specified, the Contractor may backfill with the excavated material provided that the Engineer determines that it is suitable. Where excavated material is deemed unsuitable, or where there is a shortage of backfill material, the Contractor shall furnish an approved Imported Backfill unless otherwise specified. Controlled Low Strength Material will be considered acceptable as backfill material when installed in accordance with Section 200 or as directed by the Engineer.

Should the Contractor cause the trench to be excavated to a greater depth or width than that designated of the drawings, herein, or as directed by the Engineer, the Contractor shall refill to grade, at his own expense, with an approved material, not-with-standing that it may be necessary to bring such material from other localities or to purchase suitable material with which to form a solid bed for the pipe.

Frozen material shall not be permitted as trench backfill.

Prior to backfilling, the Contractor shall not sell, remove, or permit to be removed, suitable backfill material required to complete the project, provided a designated stockpile location is provided. If suitable backfill material is removed, the Contractor shall document the quantity of material removed and provide this information to the Engineer within 24 hours of its removal.

E. Embankment

Where embankment is necessary to support pipe or to cover or protect it in any way, it shall be placed to the dimensions shown on the plans or as directed by the Engineer. The surface of the ground receiving the embankment shall be cleared of all unsuitable material and scarified, or loosened with a disc or multi-toothed hydraulic ripper; moisture adjusted and re-compacted as directed by the Engineer. Embankment shall then be formed of an approved material and compacted to the densities specified herein unless otherwise specified. Embankment shall be placed prior to laying pipe. Unless otherwise approved, pipe laid in embankment shall be trenched in.

F. Compaction

The Contractor shall compact all backfill to the following densities, unless modified by the Detailed Specifications or by the direction of the Engineer:

SOIL TYPE	BACKFILL MOISTURE CONTENT	% OF MAXIMUM DRY DENSITY
Cohesive	3% Below to 8% Above Optimum	92% Minimum
Non-cohesive	Workable	95% Minimum

Maximum dry density and optimum moisture content shall be determined by the AASHTO T-180, Modified Proctor Test.

Backfill moisture and density shall be determined at least every 200 feet horizontally and every three (3) feet vertically in pipe line trenches. However, the Engineer may take moisture and density tests at any location and depth he desires. The Contractor shall, at his own expense, excavate the backfill at those locations and to those depths required by the Engineer to conduct moisture/density tests.

When specified moisture contents are not met, the Contractor has the options of drying wet soil, furnishing approved materials meeting specifications, or adding water as necessary, to soils that are too dry to meet specifications. If water is added to dry soil, it must be thoroughly mixed with the soil to provide uniform moisture content prior to backfilling.

Backfill material not meeting specified densities shall receive additional compaction or shall be removed and replaced at the Contractor's expense as necessary to meet specified densities. Wet soils that otherwise meet the requirements for backfill do not necessarily constitute unsuitable material. It is the contractor's responsibility to either dry the material or furnish other approved material at his expense, unless otherwise specified herein. When the Contractor furnishes backfill material, he shall also furnish the results of the AASHTO T-180 test for the furnished material.

Controlled Low Strength Material installed in accordance with Section 200 or as directed by the Engineer will not require compaction testing.

The Contractor shall not place the finished surface (asphalt, curb and gutter, grass, etc.) until the specified densities are met at each test location and the Engineer gives his approval for placement.

Trench flooding, with water, as a method of compaction is prohibited.

G. Frost

When frost in the ground becomes deep enough to inhibit excavation, the Contractor may request a stop work order. However, it shall be the Contractor's responsibility to prove to the Engineer that the cost of excavation due to the frost is excessive and a stop work order is justified. The request for the stop work order shall be made in writing. Regardless of when the request is made, contract time will not stop until the stop work order is issued, i.e. the order will not be retroactive. Stop work orders shall be made in accordance with Section 7 unless otherwise modified herein.

As a prerequisite to issuance of the stop work order, the Contractor shall backfill and compact all open excavations and clean up the project to the satisfaction of the Engineer.

The Engineer may issue a Notice to Proceed when conditions improve to the point where frost does not inhibit excavation and a resumption of work is possible. The resumption of work and Notice to Proceed shall be made in accordance with Section 7 unless otherwise modified herein.

H. Cleanup

Trenches located in public right-of-way shall be backfilled, compacted, and restored to original condition as soon as practicable. In cases where the permanent surfacing will not be placed within 24 hours of backfill, the Engineer may require temporary surfacing. Temporary surfacing shall be considered as incidental to the bid item for

the pipe or conduit for which it pertains unless a bid item is specifically provided for Temporary Surfacing.

Temporary Surfacing shall consist of materials as specified in Section 112, Section 117, or asphalt millings.

I. Bedding Boxes and other similar devices

If bedding material is a unit price pay item ~~T~~the contractor shall use a bedding box or other similar device for the storage of Type 1 Bedding Material and Select Granular Backfill Materials. The bedding box shall follow the progression of work and shall be used to store the materials prior to their placement in the trench. The use of such devices will minimize contamination and waste of the material. The Engineer may make a deduction in the quantity, for payment purposes, of Type 1 Bedding Material and/or Select Granular Backfill Material if the material is being contaminated or wasted.

J. Underground Obstructions

The location of underground public or private utilities may be shown on the plans, as reported by the various utility companies and the City, but this does not relieve the Contractor of the responsibility of determining the accuracy or completeness of said locations. The Contractor shall determine the location of all underground ducts, conduits, pipes, cables or structures that will be affected by the work, and shall take steps necessary to support and protect said structures by any means suitable to the owners of the structure involved and the Engineer. When necessary, the Contractor shall conduct operations as to permit access to the work site and provide time for utility work to be accomplished during the progress of the work.

Portions of existing utilities, which are found to interfere with the line and / or grade of the proposed utility, will be relocated, altered or reconstructed by the utility companies, or the Engineer may order changes in the work to avoid interference. Such changes will be considered to be extra work and will be paid for through a change order. When the plans or specifications provide for the Contractor to alter, relocate, or reconstruct an existing utility, all costs for such work shall be included in the bid for the items of work necessitating such work unless a separate bid item is provided. Temporary or permanent relocation or alteration of existing utilities requested by the Contractor for the Contractor's convenience shall be the Contractor's responsibility, and the Contractor shall make all arrangements and bear all costs. In those instances where existing utility relocation or reconstruction is impractical, the Engineer may order a deviation from line and grade.

The Contractor shall be responsible for notifying the various utility companies if the Contractor's work will expose, affect or endanger any existing utility. All cost of investigation and any necessary protection, support, removal or relocation of said structures shall be included in the contract bid price for installing pipe manholes, etc. The Contractor shall not begin construction until all utility companies have been contacted and their respective underground utilities have been located and marked.

All costs for exploratory investigation/excavation necessary for determining the location and depth of utilities shall be included in the contract bid price for installing the proposed utility.

11.4 METHOD OF MEASUREMENT

A. Protection of the Excavation

No measurement will be made, as these items are considered to be incidental to utility being installed, unless specifically indicated otherwise.

B. Dewatering

No measurement will be made, as this item is considered to be incidental to utility being installed, unless specifically indicated otherwise.

C. Rock Excavation

Measurement will be based on the measured and/or calculated volume of the open trench to the nearest whole cubic yard and will be limited to a maximum trench width of six (6) feet. At Manholes the allowable trench width for computation will be increased from 6 ft. to 10 ft. wide for a distance 7 ft. each side of the manhole center.

D. Select Granular Backfill Materials

Measurement for Select Granular Backfill materials will be in accordance with Section 112 except as further defined below.

Type 1 bedding material for water and sewer pipe installations described in specification sections 8 and 9 shall be considered to be incidental to the pipe being installed. The Contractor and Engineer shall, on a daily basis, quantify the amount of Type 1 bedding material installed, along with the corresponding quantity of water and sewer pipe. The Contractor shall submit weigh ticket for the Type 1 bedding material daily to the Engineer. The weigh tickets shall clearly state, “Type 1 bedding material, incidental.” All stockpiled bedding material to be used for water and sewer pipe installation on the project shall be clearly identified.

Type 1 bedding material used as foundation material or for uses other than water and sewer pipe installation shall be measured in accordance with section 112..

E. Imported Backfill

When unsuitable material is encountered during trench excavation, the unsuitable material shall be removed and disposed as previously specified. If the unsuitable material removal and disposal creates a shortage of material, and the Contractor has not wasted suitable material from the project, Imported Backfill will be used to eliminate the shortage of available suitable backfill material. Measurement of the Imported Backfill,

unless otherwise stated in the Detailed Specifications will be to the nearest compacted cubic yard as placed in the trench. If suitable material was wasted from the project prior to encountering unsuitable material, measurement and payment for Imported Backfill will not be considered provided a designated stockpile location was identified.

F. AASHTO T-180 Soil Test

This item will be measured per each as submitted to a certified lab and approved by the Engineer.

11.5 BASIS OF PAYMENT

A. Protection of the Excavation

No payment will be made, as these items are considered to be incidental to utility being installed, unless specifically indicated otherwise.

B. Dewatering

No payment will be made, as this item is considered to be incidental to utility being installed, unless specifically indicated otherwise.

C. Rock Excavation

Payment for rock excavation will be made under the bid item Rock Excavation. When no bid item exists and the Engineer agrees to pay for rock excavation, a unit price shall be negotiated.

D. Select Granular Backfill Materials

Payment for Select Granular Backfill materials will be in accordance with Section 112 except as further defined below.

Type 1 bedding material for water and sewer pipe installations described in sections 8 and 9 shall be considered incidental to the pipe being installed. And no direct payment for Type 1 bedding material will be made. Type 1 bedding material used as foundation material or for some use other than bedding for water or sewer pipes shall be paid for in accordance to section 112.

E. Imported Backfill

Payment for Imported Backfill will be made under the appropriate bid item for the material furnished and installed. Payment for Imported Backfill shall include all associated costs of excavation and disposal of excavated material unless otherwise called for in the Plans or Detailed Specifications. If suitable material was wasted from the project prior to encountering unsuitable material, measurement and payment for

imported backfill material will not be considered, provided a designated stockpile location was identified.

F. AASHTO T-180 Soil Test

Payment for providing the results of the AASHTO T-180 test shall be made under the bid item Modified Proctor Soil Test, Each and shall be full compensation for obtaining the soil sample, delivering it to the certified lab, conducting the test, and providing the Engineer with the results. Payment will be made for only those Proctor tests required by the Engineer.

END OF SECTION