

CITY OF WOODLAND PARK, COLORADO

TITLE 7

EXCAVATION IN THE PUBLIC RIGHT-OF-WAY

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7.1 PERMITS AND LICENSES REQUIRED

All contractors and sub-contractors must be licensed by the appropriate agencies. All excavation greater than one foot (1') in depth within existing or proposed rights-of-way and infrastructure easements shall be done by a contractor holding a "Full Excavator" License issued by the Teller County Building Department. All contractors and sub-contractors must have a City of Woodland Park Business License and Street Cut Permit prior to the start of work.

The Contractor shall also provide the City with a Performance Bond in the amount of \$5,000.00 per City Code 12.04.020.

7.2 TRAFFIC CONTROL AND PEDESTRIAN SAFETY

The Contractor shall obtain all applicable permits and an approved Traffic Control Plan prior to commencement of construction. The Contractor shall not interrupt the flow of traffic (vehicular, pedestrian or other) along, across, through or to any properties, private or public, without express written permission as provided by the required Traffic Control Plan. Traffic will be permitted to use the street at all times, unless a detour is specifically permitted by the City Engineer or appointed representative. It is the responsibility of the Contractor to provide prior notification to the City and to make satisfactory arrangements with any affected property owners.

Prior to the commencement of work, the Contractor shall provide the City Engineer or appointed representative a Traffic Control Plan for any work that will affect any public thoroughfare. The plan shall meet the requirements of the Manual on Uniform Traffic Control Devices (MUTCD), latest revision. The Traffic Control Plan shall be prepared by a person that is qualified to do so. All traffic control plans must be approved by the City prior to the commencement of any work.

The Traffic Control Plan shall include a map showing the location and type of advanced warning signs and barricades to be used. The Traffic Control Plan shall include installing, maintaining, and removing all advance signing at each end and along the construction zone to alert the public. The contractor shall notify adjacent property owners at least 24 hours in advance of beginning work. This notification may be verbal, written or by hanging door tags. The Plan shall also include all other signs, barricades, flagging personnel, lights, and other devices necessary for the protection of the work and safety of the public. All traffic control signing and devices shall be in accordance with the MUTCD.

The safety of all pedestrians in the vicinity of construction shall be provided for by the Contractor. If, in the opinion of the City Engineer or appointed representative, provisions for pedestrian safety are not adequate, work will cease until adequate safety precautions are in place.

7.2.1 BARRICADES REQUIRED

During the daytime, the barricades and temporary fencing shall be maintained and be kept in place, but warning lights shall not be required. During the nighttime, sufficient warning lights are to be placed with suitable barricades and temporary fencing around such excavation. Type IV barricades are required for construction areas within 10 feet of the roadway or as outlined in the latest OSHA guidelines. No excavation within a City right-of-way and easements shall be left open overnight except by written permission of the City Engineer or appointed representative.

7.3 EXCAVATION

7.3.1 GENERAL

The intent of this section is to specify materials, methods, and standards to be used in the construction of embankments or excavations in City rights-of-way and easements, or for other purposes, as indicated on the drawings or contract documents. The work shall include: excavation, embankment, grading, compacting, clearing and grubbing, and the removal of topsoil, trees, stumps, or other vegetation; removal and/or resetting of minor obstructions, subgrade preparations; and any other work incidental for the construction of excavations and embankments. All workmanship and materials shall be in accordance with the requirements of these Engineering Specifications and in conformity with the lines, grades, quantities, and the typical cross section shown on the plans, or as directed by the City Engineer or appointed representative.

7.3.2 CLEARING AND GRUBBING

Work shall consist of clearing, grubbing, removing and disposing of all vegetation and debris within the limits of the project as indicated on the plans. This work shall also include the preservation from injury or defacement of all vegetation and objects designated to remain.

All surface objects and trees, stumps, roots and other protruding obstructions not designated to remain shall be cleared and/or grubbed as required, to ensure complete removal.

Except in areas to be excavated, stump holes and other holes from which obstructions are removed shall be backfilled with suitable material and compacted in accordance with these Engineering Specifications. Materials and debris shall be disposed of in a manner acceptable to the City Engineer or appointed representative. Burning of any materials shall not be permitted without prior written approval of the City Engineer or appointed representative, Teller County Health Department, and Northeast Teller County Fire Protection District.

The Contractor shall make all necessary arrangements for obtaining suitable disposal locations. If disposal is to be at other than established disposal sites, the City Engineer or appointed representative may require the Contractor to furnish written permission from the owner of the property on whose property the materials and debris shall be placed.

Branches on trees or shrubs shall be removed as approved by the City Engineer or appointed representative. Branches of trees extending over the work zone shall be trimmed to give safe height above the work zone surface. All trimming shall be done in accordance with good tree pruning practices.

7.3.3 REMOVAL OF MISCELLANEOUS MATERIALS/STRUCTURES

A. GENERAL

The Contractor shall raze, remove, and dispose of all foundations, signs, structures, fences, pavements, utilities, traffic signal materials and other obstructions, which are designated for demolition within the project limits. Special care shall be given to protect materials, utilities and vegetation which are to be preserved.

Pedestals and bases from sign posts and similar structures shall be removed to a minimum of two (2') feet below the proposed subgrade.

Where portions of structures are to be removed, the remaining portions shall be prepared to fit new construction. All remaining structures are to be delineated on the "as-built" drawings.

B. BRIDGES, CULVERTS AND OTHER DRAINAGE STRUCTURES

Bridges, culverts, and other drainage structures in use by traffic shall not be removed until satisfactory arrangements have been made to accommodate traffic and storm drainage.

Unless otherwise directed, the substructures of existing structures shall be removed entirely. Where such portions of existing structures lie wholly or in part within the limits of a new structure, they shall be removed as necessary to accommodate the construction of the proposed structure.

C. MANHOLES

When removing manholes, catch basins and inlets, any live sewer connected with these items shall be properly reconnected, and satisfactory bypass service shall be maintained during such operation.

D. PAVEMENTS, SIDEWALKS, CURBS, AND OTHER CONCRETE STRUCTURES

Portland Cement Concrete or asphaltic concrete that is to remain shall be cut in a straight, true line with a vertical face. The sawing shall be done carefully, and all damages, which are caused by the Contractor's operations, shall be repaired by the Contractor at his expense. The minimum depth of saw cuts in concrete shall be $\frac{2}{3}$ of the thickness of the concrete section.

E. BACKFILL

Except in areas to be excavated, all cavities left by structure removal shall be backfilled with suitable material and compacted in accordance with these Engineering Specifications.

7.3.4 PROTECTION OF UTILITY LINES AND STRUCTURES

The Contractor shall be responsible for contacting the **Utility Notification Center of Colorado, 1-800-922-1987 or 811**, for underground utility location. A three (3) day notification shall be given before you dig, grade, or excavate for the marking of underground member utilities. The Contractor is also responsible for contacting any other utilities not covered by the Utility Notification Center of Colorado.

The Contractor shall take proper precautions at all times to protect utility lines, manholes, valve boxes, survey monuments, and other structures which are present or can be determined to be present by examination of the appropriate maps of the utility companies. Any damage to the facilities will be repaired immediately at the Contractor's expense and any claim for disruption of service will be settled by the Contractor.

The Contractor shall be held responsible for the repair or replacement of structures damaged. Hand excavation shall be used where necessary. All existing manholes and valve boxes shall be adjusted to final grade by the Contractor. Where riser rings are installed, they shall have a wide, slotted flange for support and be equal to Clay Bailey #3100, or as approved by the City Engineer or appointed representative. If any existing manhole rings and covers or valve boxes are found to be defective, they shall be reported to the City and replaced at the direction of the City Engineer or appointed representative. The City will pay the cost of replacement materials if it is determined that the damage is not due to the Contractor's neglect.

7.3.5 PROTECTION OF PUBLIC AND PRIVATE INSTALLATIONS

The Contractor shall take proper precautions at all times for the protection of and replacement or restoration of driveway culverts, street intersection culverts or aprons, storm drains or inlets, fences, irrigation ditches, crossings and diversion boxes, mail boxes, shrubbery, flowers, ornamental trees, driveway approaches, and all other public

and private installations that may be encountered during construction. The Contractor shall have the responsibility of providing each property with access to and from the property during the time of construction or have other arrangements in place prior to starting work. Existing driveways shall be cut, filled, and graded as required and as directed by the City Engineer or appointed representative to provide permanent access. Existing driveways shall be resurfaced with the presently existing type of surfacing whenever the existing surface is destroyed.

7.3.6 WIDTH OF TRENCH

The trench width at the top of the excavation may vary depending upon the depth of the trench and the nature of material encountered. However, the maximum allowable width of a trench at the level of one (1') foot above the top of pipe shall not be greater than either the outside diameter of the pipe plus 24 inches or 36 inches, whichever is greater. A wider trench is permitted if trench box shoring is larger than 36 inches or after approval by the City Engineer or appointed representative.

The trench bottom shall be brought to grade to provide a uniform and continuous bearing and support for the pipe on solid and undisturbed ground at every point between bell holes.

7.3.7 EXCAVATION IN POOR SOIL AND REFILLING TO GRADE

If, when dry, the bottom at sub-grade is soft and in the opinion of the City Engineer or appointed representative cannot support the pipe or structure, a further depth shall be excavated as directed by the City Engineer or appointed representative and refilled to foundation grade as required under the above paragraphs, or other approved methods shall be adopted to assure a firm foundation for the pipe or structure. The type of material, which is to be used for refilling up to the grade of the pipe or structure, shall be granular bedding material as defined in Section 7.4.2.

7.3.8 EXCAVATION AND EMBANKMENT

Excavation of whatever materials are encountered within the limits of the project shall be performed to the lines and grades indicated on approved plans. All excavated areas shall be graded in a manner that will permit adequate drainage. Whenever practicable, all suitable material removed from the excavations shall be used in the formation of embankments, for backfilling, and for other purposes. Where material encountered within the limits of the work is considered unsuitable, such material shall be excavated below the grade shown on the drawings or as directed by the City Engineer or appointed representative, and replaced with suitable material. All unsuitable excavated materials, and any surplus of excavated material, which is not required for embankments, shall be disposed of by the Contractor.

The construction of embankments by deposition, placing, and compacting materials of acceptable quality above the natural ground or other surface shall be in accordance with the lines, grades, and cross sections shown on the approved plans and/or as required by the City Engineer or appointed representative. The cleared surface upon which fill material is to be placed shall be completely broken-up by plowing, scarifying or stepping to a minimum depth of six (6”) inches. This scarified layer shall be compacted per Section 7.5. Each lift of the embankment material shall not exceed eight (8”) inches in loose depth. The Contractor shall thoroughly mix the backfill material to secure uniform moisture content and to insure uniform density and proper compaction. Each layer shall be thoroughly compacted by roller or vibratory equipment which is suitable for the type of embankment material, to the densities specified in these Engineering Specifications.

7.3.9 BORROW

In the event sufficient suitable fill material is not obtainable within the limits of the project to provide the entire embankment required, the Contractor shall furnish such additional fill material (borrow) to complete the designated embankment. Borrow material shall be an acceptable type of embankment material, verified by a soils report and approved by the City Engineer or appointed representative prior to placement.

7.3.10 BLASTING

The Contractor shall submit to the City Engineer or appointed representative a blasting plan for review and approval, addressing standard operating procedures and safety.

The Contractor shall comply with all laws, ordinances and applicable safety code requirements and regulations of the City of Woodland Park, the County of Teller and the State of Colorado relative to the handling, storage and use of explosives and the protection of life and property; and shall be responsible for all damage thereto caused by blasting operations.

Suitable weighted plank coverings or mattresses shall be provided by the Contractor to confine all materials lifted by blasting within the limits of the excavation or trench.

The Contractor shall notify all persons verbally, by written letter, or by use of door hangers within a minimum distance of 500 feet from any blasting area a minimum of 48 hours prior to any blasting operations. The City Engineer or appointed representative shall be notified a minimum of 48 hours in advance of any blasting within the City.

7.3.11 PIPE CLEARANCE IN ROCKS

Large rock, boulders and stones larger than six (6”) inches shall be removed to provide a clearance of at least 36 inches above, below and on each side of all pipe, fire hydrants, valves and fittings.

7.3.12 SUBGRADE

The bottom of the excavation for the pavement, or top of the fill, shall be known as the pavement subgrade and shall conform to the lines, grades, and cross sections shown on the approved plans.

After excavation and embankment is completed and the subgrade brought to final grade, it shall be rolled with a rubber tired or sheepsfoot roller to bring the subgrade to the required density and stability. All soils shall be compacted per Section 7.5. The minimum moisture content shall comply with the approved geotechnical report. Additional wetting may be required when the minimum water requirement is not sufficient to produce a stable condition in the subgrade soil.

No paving, subbase, or base shall be placed on soft, spongy, frozen, or unstable subgrade which is considered unsuitable by the City Engineer or appointed representative.

7.3.13 SUBBASE CONSTRUCTION

A. MATERIALS

Subbase material shall be composed of granular material consisting, essentially, of sand, gravel, rock, slag, or a combination of such materials. Supplied material shall be a well-graded mixture containing sufficient soil mortar, or other proper quality binding material which, when placed and compacted in the roadway structure, shall result in a firm, stable foundation. Material composed of uniform size particles, or which contains pockets of excessively fine or excessively coarse material, shall not be acceptable for use.

This material need not be crushed but shall be graded within the following limits:

Standard Size of Sieve	Percent By Weight Passing Sieve
2½ inch	100
2 inch	95 - 100
No.4	30 - 60
No.200	5 - 15
Liquid Limit	35 Maximum
Plasticity Index	6 Maximum

B. GENERAL

The specifications presented in this subsection are performance oriented. The objective in setting forth these specifications is to achieve an acceptable quality of roadway structures. All sources, mined or manufactured, must be annually approved by the City Engineer or appointed representative as having met the appropriate material performance specifications. This approval is a condition of using those material sources for public and private improvement construction.

C. VIOLATIONS OF APPROVAL CONDITIONS

The City Engineer or appointed representative may order random tests of materials used in the City to verify compliance with material specifications. All material used to construct public and private improvements that is not from a certified source, or that is from a certified source and fails one or more random material tests, shall be subject to complete removal. The extent of the material to be removed shall be at the discretion of the City Engineer or appointed representative.

D. USE OF MATERIALS NOT LISTED

Any additional public and private improvement materials such as manufactured paints and coatings, bonding agents, scalars, gaskets, insulating materials, etc., should be in compliance with CDOT material specifications for the appropriate materials employed. Alternative materials for construction may be proposed for use, except where expressly prohibited. Decisions on acceptability of alternative materials shall be made by the City Engineer or appointed representative.

E. CONSTRUCTION

The construction of subbase shall consist of furnishing and placing approved subbase material to form a stable foundation on which to construct base course, in conformity with the lines, grades and typical cross sections shown on the plans, and as staked by a Surveyor registered in the State of Colorado. In addition, subbase material shall be used to replace unsuitable foundation materials at locations shown on the plans, or as directed by the City Engineer or appointed representative.

Each layer of material shall be placed and spread so that after compaction it shall conform to the width and crown of the typical cross sections. The wetting of subbase layers shall be done with sprinkling equipment of a type, which insures uniform and controlled distribution of the water. All wetting shall be done by uniformly sprinkling each layer of

material being placed with only that amount of water needed to obtain maximum density of the material. Premixing of water and soil is acceptable for extremely dry materials rather than sprinkling.

Travel may be allowed over subbase to assist in compaction of the material. Mixing and blading of the subbase material on the street shall be required if the material is spotty and nonuniform. However, grading shall be held to a minimum in order to avoid the floating of the heavier rock particles to the surface.

Concurrently with the wetting operations, the material shall be uniformly compacted by rolling. Rolling equipment shall be consistent for the type of material being compacted and will usually be one (1) or more of the following: rubber tire roller, sheepfoot roller and flat wheel steel roller.

7.3.14 GRADING

Excavation shall be performed to the lines, grades and cross sections indicated on the drawings and/or staked out on the ground. Suitable material removed from the excavations shall be used as far as practicable for embankments and backfilling. Unsuitable material shall be excavated below the grade shown on the drawings or indicated by grade stakes as directed by the City Engineer or appointed representative and replaced with selected material. Excavated materials which are considered unsuitable and any surplus of excavated material not required for embankments or backfill shall be disposed of by the Contractor.

Embankments shall be constructed by depositing, placing and compacting materials of acceptable quality above the natural ground in accordance with lines, grades and cross sections shown on the plans and/or staked out on the ground. Clearing shall include removal and disposal of obstructions and rubbish to a depth that ensures complete removal. Each lift of embankment material, not to exceed eight (8") inches of loose depth, shall be thoroughly mixed and moistened to full depth and compacted to uniform minimum density of 95 percent of Modified Proctor density (ASTM D1557), and optimum moisture content \pm two (2) percent.

The subgrade under forms shall be compacted and shaped so that the forms, when set, will be uniformly supported for its entire length at the specified elevation. The finished grade shall be maintained in a smooth and compacted condition until concrete has been placed.

Before placing concrete, the subgrade shall be tested for conformity with the cross-section shown on the plans, using an approved template. If necessary, material shall be removed or added to bring all portions of the subgrade to the correct elevation. It shall then be thoroughly compacted and again tested with the template.

7.3.15 FINAL PROOF-ROLLING

Prior to asphalt placement, and after the subgrade has been compacted, tested and found to meet specifications, the entire subgrade shall be proof-rolled with a heavily loaded vehicle. The vehicle must have a certified loaded GVW of 50,000 pounds with a loaded single axle weight of at least 18,000 pounds and a tire pressure of 70 psi. Subgrade which is pumping or deforming must be reworked, replaced or otherwise modified to form a smooth, stable, non-yielding base for subsequent paving courses. Subgrade shall not be approved for base course construction until it is uniformly stable and unyielding. The City Engineer or appointed representative shall be notified at least 24 hours before final proof-rolling.

7.4 BEDDING

7.4.1 PREPARATION OF FOUNDATION FOR PIPE LAYING

When the excavation is in firm earth, care shall be taken to avoid excavations below the established grade. If this should occur, the area so excavated shall be backfilled in six (6") inch lifts and thoroughly compacted to the required density.

7.4.2 BEDDING TYPES

The type of bedding shall be determined by standard engineering methods or as directed by the City Engineer or appointed representative.

See Figure 7.8.1 for pipe bedding details.

- A. **CLASS A – CONCRETE CRADLE OR CONCRETE ARCH BEDDING.**
This class of bedding may take either of two forms:

See Figure 7.8.1

1. **Concrete Cradle.** The pipe shall be bedded in a monolithic cradle of plain or reinforced concrete having a minimum thickness of $\frac{1}{4}$ the inside pipe diameter or a minimum of four (4") inches under the barrel and extending up the sides for a height equal to $\frac{1}{4}$ the outside diameter. The cradle shall have a width at least equal to the outside diameter of the pipe barrel plus eight (8") inches. Backfill above the cradle and extending to 12 inches above the crown of the pipe shall be compacted carefully.
2. **Concrete Arch.** The pipe shall be embedded in carefully compacted granular material having a minimum thickness of $\frac{1}{4}$ the outside diameter between barrel and bottom of trench excavation and extending halfway up the sides of the pipe. The top half of the pipe shall be covered with a reinforced concrete arch having a minimum thickness of $\frac{1}{4}$ the inside diameter at the crown and

having a minimum width equal to the outside pipe diameter plus eight (8") inches.

- B. CLASS B – FIRST CLASS BEDDING. Class B bedding may be achieved by either of two (2) construction methods:

See Figure 7.8.1

1. Shaped Bottom with Tamped Backfill. The bottom of the trench excavation shall be shaped to conform to a cylindrical surface with a radius at least two (2") inches greater than the radius of the outside of the pipe and with a width sufficient to allow 6/10 of the width of the pipe barrel to be bedded in fine granular fill placed in the shaped excavation and to extend to the top of pipe. Carefully compacted backfill shall then be placed to a thickness of at least 12 inches above the top of the pipe.
2. Compact Granular Bedding with Tamped Backfill. The pipe shall be bedded in compacted granular material placed on a flat trench bottom. The granular bedding shall have a minimum thickness of $\frac{1}{4}$ the outside pipe diameter or a minimum of four (4") inches and shall extend to the top of the pipe barrel at the sides. The remainder of the fill to a minimum depth of 12 inches over the top of the pipe shall be filled with carefully compacted material.

- C. CLASS C – This is the City's standard bedding type and is shown in Figure 7.8.1.

See Section 7.3.13

- D. MATERIAL – The material may be squeegee non-fractured rounded and shall conform to the following limits when tested by means of laboratory sieves:

Sieve Size	Total Percent Passing by Weight
3/8-inch	100
No. 200	0.5

7.5 BACKFILLING AND COMPACTION

7.5.1 CAREFULLY PLACED

Granular material shall be carefully deposited in the trench simultaneously on both sides of the pipe for the full width of the trench to a height of six (6") inches for Class-C bedding type and 12 inches for Class-B bedding type above the crown of the pipe or shovel placed and hand tamped to fill completely all spaces under and adjacent to the pipe.

7.5.2 COMPACTION REQUIREMENTS

All backfill shall be compacted by tamping; vibrating or other means approved by the City Engineer or appointed representative. The density tests shall be performed during backfilling at specified depths in the trench to ensure that the required density and moisture is obtained throughout. For trenches less than 30 inches in depth, density tests shall be taken within 18 inches above the top of pipe or conduit and at the surface as a minimum. For trenches greater than 30 inches in depth, density tests shall be taken within 18 inches of the top of the pipe or conduit, and at two (2') foot vertical intervals to the top of the trench with the final test at the surface.

Horizontal & Vertical Frequency of Density Tests (*The number of density tests required may be increased if directed by either the design engineer or the City Engineer (or appointed representative)*):

1. **Utility Mains** – One set of tests per 250 feet of linear trench at specified depths
2. **Service Lines** – One test per every service per utility type at specified depths
3. **Open pit** – Minimum of one set of tests at two (2') foot vertical intervals from the bottom to the top of the pit (Open pit shall include, but not limited to, excavations associated with bore pits, manholes, water valves, storm inlets, vaults, etc.)

All tests shall be performed by an approved independent testing laboratory at random locations.

Backfill shall be suitable earth free from rocks, roots or other deleterious material. Backfilling and compacting shall be done as thoroughly as possible so as to prevent after-settlement. Depositing of the backfill shall be done so the impact of falling material will not injure the pipe or structures.

Backfilling shall be done in uniform lifts not to exceed eight (8") inches which shall be completely compacted over the full width of the excavated area. A minimum of one (1') foot of compacted material over the top of the pipe shall be required before a vibratory or sheepsfoot roller is operated over the pipe. Any pipe damaged during backfill operations shall be repaired or replaced by the Contractor.

All backfill shall be compacted to the following percentage of the Modified Proctor Density at optimum moisture (ASTM D-1557):

	<u>Beneath Improvements</u>	<u>Outside Improvements</u>
City Roadways, Easements & Rights-of-way	95% (a)	85% (b)

Notes:

- (a) Examples of “improvements” include, but are not limited to; pavement, sidewalks, parking lots, retaining walls, etc. Roadway improvements specifically include the area from the centerline of the road and extend six (6’) feet beyond the furthest improvement (e.g. sidewalk).
- (b) Testing is not required(outside improvements) if lifts do not exceed one (1’) foot maximum thickness and appropriate compaction equipment and procedures are used.

Succeeding layers of backfill may contain coarse materials, but shall be free from large pieces of rock, frozen material, concrete, roots, stumps, rubbish and other similar articles whose presence in the backfill, in the opinion of the City Engineer or appointed representative, would cause settlement of the trench or damage to the pipe. No stone larger than six (6”) inches in diameter shall be placed within three (3’) feet of the pipe.

Special compaction shall be done around all manholes, catch basins, valve boxes, curb boxes, services, other structures, and utilities by the use of pneumatic tampers, plate tampers, or plate vibrators with lifts not to exceed eight (8”) inches.

Service trenches must be compacted in the same manner as the main line trenches. All excavation in trenches shall be backfilled to the original ground surface or to such grades as specified or shown in the plans. The backfill shall begin as soon as practical after the pipe has been placed and shall thereafter be carried on as rapidly as the protection of the balance of the work shall permit.

As an option, utility trench backfill meeting the following requirements (flowable-fill) may be used in lieu of native backfill in any excavation regardless of width or depth. Conventional concrete will not be allowed within the public right-of-way as backfill. Compaction and testing of utility backfill will not be required if material meeting the flowable-fill specification is used.

FLOWABLE FILL	
INGREDIENTS	LBS/CY
Cement	42 (0.47 sack)
Water	325 (39 gallons or as needed)
Coarse Aggregate (Size No. 57)	1700
Sand (ASTM C-33)	1845
<i>The maximum desired 28 day strength is 60 psi</i>	

For street maintenance purposes, “flowable-fill” shall be prohibited as a permanent street surface within the top four (4”) inches of any utility trench. The permanent top four (4”) inches (minimum) of all utility trenches shall be properly compacted asphalt, or six (6”) inches (minimum) concrete pavement or gravel (for existing concrete or gravel streets).

Beneath pavements flowable-fill will be required as utility trench backfill for all trenches less than one (1’) foot in width.

When the trench excavation is within the rights-of-way of State, or County highways, the backfilling of the trench, compaction of materials, subgrade preparation and surfacing shall be done in strict accordance with the requirements and specifications of the State or County Highway Department. In all cases, the Contractor shall grade and compact the roadway after the trench has been backfilled, so that it shall be passable to traffic at all times. The Contractor shall maintain the roadway in a condition acceptable to the controlling agency at all times until final acceptance of the entire work by the controlling agency. The Contractor shall also grade and maintain all detours and by passes.

In addition to grading and maintenance requirements specified, the Contractor shall provide at least one (1) tank truck with pressurized spray bars for spraying water on the streets to control dust. Dust control shall be required, as necessary, on all streets after compaction and grading, and on all detours and bypasses.

The methods of compaction are the responsibility of the contractor/utility and shall be sufficient to attain the required density in accordance with these specifications. The method of testing the compacted material shall be the responsibility of the professional engineer certifying the results. Said engineer shall be responsible for the validity of all test results. The Contractor shall remedy at his own expense any defects that appear in the backfill following completion, and during the warranty period.

7.6 TRENCH SAFETY

7.6.1 GENERAL

- A. Safety standards relating to the shoring and stabilization of trench sidewalls shall be maintained as prescribed by appropriate safety regulatory agencies (OSHA, State of Colorado). No open excavations are to be left overnight or unattended within the right-of-way. Any trench outside the right-of-way left open overnight must be completely protected per OSHA standards.
- B. The trench for such construction shall not be opened for a distance of more than 300 feet at any one time, or a distance that can be safely backfilled and compacted during normal business hours, unless authorized by the City Engineer or appointed representative.

- C. All shoring, bracing, or sheet piling shall be consistent with OSHA regulations.

7.7 REMOVAL, RESTORATION AND MAINTENANCE OF PAVEMENT SURFACE

7.7.1 REMOVAL OF PAVEMENT

- A. All road surface cuts shall be a minimum of four (4') feet in width.
- B. Existing pavement shall be cut so the joint line between existing and replacement pavement is straight, neat, and free from horizontal irregularities. All vertical cuts shall be made by saw. The cut depth shall be full depth to permit pavement removal without damage to the existing pavement.
- C. Where trenching excavation occurs within the roadway surface, the minimum allowable remaining pavement section shall not be less than four (4') feet.

7.7.2 TEMPORARY ASPHALT REPLACEMENT

A temporary patch of cold-mix shall be placed on all pavement surface cuts immediately after backfilling has been completed and shall be removed at the time a permanent patch is made. Minimum requirements for temporary patch shall be well compacted surfacing material conforming to "Road Mixed Asphalt Surfacing Material" of the CDOT Standard Specifications and shall match the existing asphalt thickness, but shall not be less than four (4) inches in depth. All temporary patches shall be properly maintained until permanent patches are installed.

7.7.3 PERMANENT ASPHALT REPLACEMENT

- A. Asphalt replacement shall meet the criteria set forth in Section 5.2 of the City of Woodland Park Engineering Specifications.
- B. Where the original surface was asphalt cement; asphalt shall be compacted in layers not to exceed three (3") inches to a total compacted thickness of four (4") inches or the thickness of the existing asphalt plus one (1") inch, whichever is greater.
- C. In areas where several cuts are made or substandard asphalt surfaces exist, an overlay asphalt pavement of two (2") inches thick shall be placed across the entire lane disturbed.
- D. Where the original surface was Portland cement concrete, Portland cement concrete shall be placed to a thickness of six (6") inches or the thickness of the removed pavement, whichever is greater. (See Section 6.2 and 6.3 of the City of Woodland Park Engineering Specifications)

7.7.4 CLEAN UP

All surplus materials furnished by the contractor, tools and temporary structures shall be removed from the site by the contractor. All dirt, rubbish and excess earth from excavation shall be hauled to a dump provided by the contractor and the construction site left clean to the satisfaction of the City Engineer or appointed representative.

7.7.5 BACKFILL WARRANTY AND MAINTENANCE

For a period of one (1) year after initiation of the warranty period, the Responsible Party shall maintain and repair any trench settlement which may occur and shall make suitable repairs to any pipe, fitting, valve, valve box, pavement, sidewalks or other structures which may be damaged as a result of backfill settlement as determined by the City Engineer or appointed representative.