

ARTICLE 7

EARTHWORK

7.1 GENERAL

7.1.1 DESCRIPTION

The work to be performed under this section of the specifications shall consist of excavation and disposal of all materials taken within limits of work, construction of embankment, shaping and compaction of street sections, and other sections within the public rights-of-way and public easements as necessary to prepare the subgrade for subsequent construction, as specified herein, and as directed by the Engineer.

7.2 MATERIALS

7.2.1 EMBANKMENT MATERIALS

Embankment material shall consist of earth, sand, or gravel. Embankment materials shall be free from organic matter, frozen soil, ice, snow, mud or other deleterious material. All fill material shall be approved by the Engineer prior to placement.

7.3 CONSTRUCTION REQUIREMENTS

7.3.1 PERMITS

- (a) Any excavation within the public right-of-way, including new subdivisions, shall require an excavation permit. This permit shall be obtained from the City of Pueblo Public Works Department office or online at www.pueblo.us/PLACE. Permit fees shall be in accordance with the latest fee schedule, adopted by the City Council. Permits will only be issued to Contractors licensed under the Provisions of Chapter 4, Title XII, of the Code of Ordinances to do excavation work, and who post bonding and insurance certificates as required by sections 12-6-10 and 12-6-11 of the Code of Ordinances. Permits (“no fee”) may be issues for publicly funded projects, state funded projects and/or the Board of Water Works and school districts; however, contractors working for either agency are not exempted from the permit fees.
- (b) If the work involves removal and replacement of existing concrete features (curb & gutter, sidewalk, crossspan, etc.), then a concrete permit must be obtained from the City of Pueblo Public Works Department office. Permits will only be issued to licensed concrete contractors.
- (c) Where pavement removal is associated with an excavation permit, the applicant shall pay all Pavement Impact Fees as required by Section 12-6-4.1 Pavement Impact Fee of the Pueblo Municipal Code of Ordinances, unless otherwise waived by the Director of Public Works.

7.3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph 7.3.17 FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill and unsatisfactory excavated material as specified in paragraph 7.3.5 DISPOSAL OF MATERIAL. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times.

7.3.2.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on Construction Drawings. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material to be deposited a maximum 4' from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

7.3.2.2 Drainage Structures

Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata. Do not disturb the bottom of the excavation when concrete or masonry is to be placed in an excavated area. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

7.3.2.3 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Completely drain construction site during periods of construction to keep soil materials sufficiently dry. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and/or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed.

7.3.2.4 Dewatering

Dewatering is subject to permitting by the State and shall be conducted according to an approved City of Pueblo dewatering plan through the Stormwater Utility Department.

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches are not permitted within 3' of the foundation of any structure, except with written approval by the City Engineer. Control measures shall be established prior to the time that the excavation reaches the water level in order to maintain the integrity of the in-situ material. While the excavation is open, maintain the water level continuously, at least 2' below the working level. Operate dewatering system continuously until construction work below existing water levels is complete. In the event of minor ground water conditions being present, it is the contractor's responsibility to dewater prior to compaction.

7.3.2.5 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Provide vertical trench walls where no manufacturer's printed installation manual is available. Shore trench walls, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in, as determined by the Contractor's Safety Engineer or other competent person. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24" plus pipe outside diameter (O.D.) for pipes of less than 24" inside diameter, and do not exceed 36" plus pipe outside diameter for sizes larger than 24" inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the cost of redesign, stronger pipe, or special installation procedures without any additional cost to the City.

- (a) Bottom Preparation. Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing.
- (b) Removal of Unyielding Material. Where unyielding material is encountered in the bottom of the trench, remove such materials below the required grade and replace with suitable materials as provided in paragraph 7.3.12 FILLING, BACKFILLING AND COMPACTION.
- (c) Removal of Unstable Material. Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular material as provided in paragraph 7.3.12 FILLING, BACKFILLING AND COMPACTION. When removal of unstable material is required due to the Contractor's fault or neglect in performing work, the Contractor is responsible for excavating the resulting material and replacing it without additional

cost to the City.

- (d) Excavation for Appurtenances. Provide excavation for manholes, catch-basins, inlets, or similar structures sufficient to leave at least 12" clear between the outer structure surfaces and the face of the excavation or support members. Clear rock or loose debris and cut to a firm surface either level, stepped, or serrated, as directed by the Engineer. Remove loose disintegrated rock and thin strata. When concrete or masonry is to be placed in the excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.
- (e) Jacking, Boring, and Tunneling. Unless otherwise indicated, provide excavation by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Engineer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections. The utility shall be at a cover depth of not less than 48" unless approved by City Engineer. Equipment to be used and method of installation shall be presented to the City Engineer for approval prior to any installation.
- (f) Underground Utilities. The contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Work performed adjacent to non-City utilities shall be in accordance with procedures outlined by the utility owner. For work immediately adjacent to or for excavations exposing a utility or other buried obstruction, excavate by hand. Start hand excavation on each side of the indicated obstruction and continue until the obstruction is uncovered or until clearance for the new grade is assured. Support uncovered lines or other existing work affected by the excavation until approval for backfill is granted by the Engineer. Report damage to utility lines or subsurface construction to Engineer immediately.
- (g) Asphalt Patch. If the distance from the lip line of the curb & gutter to the trench is less than 4', all asphalt shall be removed from lip to the trench line. Asphalt shall have a sawcut edge 12" on either side of the trench.

7.3.3 STRIPPING OF TOPSOIL

Where indicated or as directed, strip topsoil to a depth as prescribed in the construction plans or to a depth of 4". Spread topsoil on areas already graded and prepared for topsoil, or transported and deposited in stockpiles convenient to the areas that are to receive application of the topsoil later, or at locations indicated or specified by the Engineer. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2" in diameter, and other materials that would interfere with planting and maintenance operations.

7.3.4 CLEARING AND GRUBBING

Keep roads and walks free of dirt and debris at all times.

7.3.4.1 Clearing

Clearing consists of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing also includes removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Cut off flush with or below the original ground surface trees, stumps, roots, brush, and other vegetation in areas to be cleared, except such trees and vegetation as may be indicated or directed to be left standing. Trim dead branches that are 1-1/2" or more in diameter on trees designated to be left standing within the cleared areas and trim all branches to the heights indicated or directed. Neatly cut close to the bole of the tree or main branches, limbs and branches to be trimmed. Paint, with an approved tree-wound paint, cuts more than 1-1/2" in diameter.

- (a) Tree Removal. Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work includes the felling of such trees and the removal of their stumps and roots. Dispose of trees as specified in this Section.
- (b) Pruning. Prune/trim trees designated to be left standing within the cleared areas of dead branches 1-1/2" or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1-1/4" in diameter with an approved wound paint.

7.3.4.2 Grubbing

Grubbing consists of the removal and disposal of stumps, roots larger than 3" in diameter, and matted roots from the designated grubbing areas. Remove material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, to a depth of not less than 18" below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas, such as areas for buildings, and areas to be paved. Fill depressions made by grubbing with suitable material and compact to make the surface conform with the original adjacent surface of the ground.

After clearing and grubbing is complete, the Contractor shall notify the Engineer for his approval of the clearing and grubbing prior to subsequent earthwork operations.

7.3.5 DISPOSAL OF MATERIALS

Dispose of excess materials in accordance with the approved solid waste management permit and all local and state requirements.

All wood or wood like materials, remaining from clearing, pruning or grubbing such as limbs, treetops, roots, stumps, logs, rotten wood, and other similar materials shall become the property of the Contractor and disposed of as specified. If stated on the drawings, the Contractor shall stockpile the stripped materials at a location designated by the Engineer for future use. When a site is not designated, the Contractor must dispose of the material off site.

7.3.6 BURNING

Burning to remove or dispose of materials will not be permitted.

7.3.7 REMOVAL OF STRUCTURES AND OBSTRUCTIONS

All existing physical features which conflict with the new construction shall be removed by the Contractor and disposed of properly at a site acceptable to the Engineer. These shall include but not be limited to; asphalt or concrete paving, base course, miscellaneous concrete flatwork, curb and gutter, sidewalk, foundations, culverts and headwalls, fences, abandoned utilities, and any other items not intended to remain. Where required to obtain a straight line without jagged edges, the removal shall require sawcutting. Sawcuts shall be a minimum of one-fourth the thickness of material (or deeper) to obtain a clean straight face.

Unless specifically noted otherwise on the drawings or in the Special Provisions, sawcuts shall be considered subsidiary to the removal item and will not be paid for separately. If any items are removed or damaged by the Contractor beyond the limits of demolition shown on the drawings or as marked in the field, they shall be replaced by the Contractor at no expense to the City.

7.3.8 ROCK OR MAN-MADE OBSTRUCTION EXCAVATION

Rock will be defined as any naturally occurring or man-made material in such a form that it cannot be readily removed using the equivalent of a 165 hp/40,000 lb operating weight track-type tractor (bulldozer) with a ripper or a 188 hp/63,000 lb operating weight hydraulic excavator (crawler mounted backhoe) with "rock teeth" without a significant loss of production. It also includes boulders exceeding 1/2 CY in volume.

Whenever rock material is encountered in an excavation, the Contractor shall immediately notify the Engineer for field verification. The Engineer shall measure and document the limits of the rock prior to excavation. Any rock removed prior to notification will not be considered for payment.

Blasting for rock excavation will only be allowed with the written permission from the City Engineer and Fire Chief. The Contractor shall exercise the utmost care to protect the public from harm and to avoid property damage. Blasting shall be done by a State licensed blaster. The Contractor shall comply with all laws, ordinances, insurance, bonding, and applicable safety code requirements and regulations and shall be responsible for all damage caused by the blasting operations.

7.3.9 SHORING

For excavations exceeding 20' depth, submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations to City Engineer 15 days prior to start of work. Finish shoring, including sheet piling, and install as necessary workers, banks, adjacent paving, structures, and utilities. Remove shoring, bracing, and sheeting as excavations are backfilled, in a manner to prevent caving.

Shoring shall be used for all excavations greater than 5' in depth or where it is known that in-situ soils lack the stability to hold near vertical faces. Sloping back trench walls rather than shoring shall only be permitted when all of the following conditions are met:

- (a) The excavation is less than 20' in depth,
- (b) There are no adjacent structures, roads, or pavements that will affect the excavation,
- (c) No equipment, stored material, or overlying material will affect the excavation,
- (d) Vibration from equipment, traffic, or blasting will not affect the excavation,
- (e) There will be no ground water problems,
- (f) Surcharges will not affect the excavation, and
- (g) Site conditions permit laying back the slopes of the excavation.

7.3.10 GRADING AREAS

Divide work into grading areas within which satisfactory excavated material will be placed in embankments, fills, and required backfills. Do not haul satisfactory material excavated in one grading area to another grading area except where directed in writing by the Engineer. Place and grade stockpiles of satisfactory and unsatisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. If the contractor fails to protect the stockpiles, and any material becomes unsatisfactory, the Contractor shall be required to remove and replace such material with satisfactory material from approved sources at no additional cost to the City.

7.3.11 SUBSURFACE PREPARATION

- (a) General Requirements. Remove and replace unsatisfactory material with satisfactory materials, as directed by the Engineer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6" before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6", pulverizing, and compacting to the specified density. When the subgrade has been previously disturbed by construction activity, scarify the excavated or natural ground portion to a depth of 12" and compact it as specified for the adjacent fill.
- (b) Frozen Material. Do not place material on surfaces that are muddy, frozen, or contain frost.
- (c) Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten

material as necessary to 95% of optimum moisture.

7.3.12 FILLING, BACKFILLING AND COMPACTION

Place fill and backfill beneath and adjacent to any and all type of structures, in successive horizontal layers of loose material not more than 8" in depth, or in loose layers not more than 5" in depth when using hand-operated compaction equipment. Compact to at least 95% of a Standard Proctor laboratory maximum density, except as otherwise specified. Perform compaction in such a manner as to prevent wedging action or eccentric loading upon or against the structure. Moisture condition fill and backfill material to within range of $\pm 2\%$ of optimum moisture content at the time of compaction. Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of paragraphs 7.3.11 SUBSURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

If requested by the Contractor and/or Developer, and written permission is granted by the Director of Public Works, backfill for utility trenches may be consolidated using water induced settlement techniques (i.e., jetting/puddling/ponding). This method of trench backfill consolidation shall only be allowed in those special locations where a failure history exists for trenches using conventional engineered controlled fill. As a condition of permission to use jetting/puddling, the Contractor and/or Developer must agree in writing to provide a full and complete three (3) year warranty from the final acceptance date, that shall include repair of any surface amenities to the complete satisfaction of the City which may include a full width asphaltic overlay if warranted.

Where backfill for utility trenches within the roadway section are consolidated using jetting/puddling, the moisture and density requirements within the trench compaction limits stated above shall not apply; however, the compaction limits for the finished roadway subgrade as outlined within this Article shall apply

Specific requirements and guidance for Sanitary Sewer and Storm Sewer can be found in ARTICLES 11 & 12.

7.3.13 EMBANKMENTS

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3". Place the material in successive horizontal layers of loose material not more than 8" in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise break up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 95% of a Standard Proctor laboratory maximum density. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph 7.3.15 SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

7.3.14 BORROW

When the quantity of suitable excavated material required for the embankment and subgrade preparation is greater than the quantity that can be obtained from the excavation in the project, the Contractor shall make-up the deficiency from borrow pits. The borrow material shall be obtained from sources selected by the Contractor subject to approval of the Engineer. All material shall be clean and free from any environmental hazards. The Contractor shall obtain the written permission from the owner to procure borrow material, shall pay all royalty and other charges involved and shall bear all the expenses of developing the sources, including right-of-way for hauling.

7.3.15 SUBGRADE PREPARATION

7.3.15.1 Proof Rolling

Unsuitable materials encountered in the subgrade, roadway, or embankment foundation that are determined to be detrimental to the roadway or embankment shall be removed to the depth and extents directed by the Engineer. The excavated area shall be backfilled to the finished graded section with approved material. Materials that contain organics or that cannot be dried or moisture conditioned, then compacted to the required density shall be disposed of and shall not be reused as embankment fill. Materials that do not contain organics and that can be dried or moisture conditioned and compacted to the required density may be reused as embankment fill as approved by the Engineer.

Proof rolling with pneumatic tire equipment shall be performed using a minimum axle load of 18 kips per axle and at speeds between 2 to 6 mph. A weigh ticket from an approved scale shall be furnished by the Contractor to substantiate this weight.

The subgrade shall be proof rolled after the required compaction has been obtained and the subgrade has been shaped to the required cross section.

The proof roller shall be operated in a systematic manner so that a record may be readily kept of the area tested and the working time required for the testing. Areas that are observed to have soft spots in the subgrade, where deflection is not uniform or is excessive as determined by the Engineer, shall be ripped, scarified, dried or wetted as necessary, and recompacted to the requirements for density and moisture at the Contractor's expense. After re-compaction, these areas shall be proof rolled again and all failures again corrected at the Contractor's expense.

Upon approval of the proof rolling, the subbase, base course, or initial pavement course shall be placed within 48 hours. If the Contractor fails to place the subbase, base course, or initial pavement course within 48 hours or the condition of the subgrade changes due to weather or other conditions, proof rolling and correction shall be performed again at the Contractor's expense.

7.3.15.2 Construction

Shape subgrade to line, grade, and cross section, and compact as specified. Include plowing, discing, and any moistening or aerating required to obtain specified compaction for this operation. Remove soft or otherwise unsatisfactory material and replace with satisfactory excavated material or other approved material as directed. Excavate rock encountered in the cut section to a depth of 6" below finished grade for the subgrade. Bring

up low areas resulting from removal of unsatisfactory material or excavation of rock to required grade with satisfactory materials, and shape the entire subgrade to line, grade, and cross section and compact as specified. After rolling, the surface of the subgrade for roadways shall not show deviations greater than 1/2" when tested with a 10' straightedge applied both parallel and at right angles to the centerline of the area. Do not vary the elevation of the finish subgrade more than 0.05' (3/5") from the established grade and cross section.

7.3.15.3 Compaction

Finish compaction by sheepfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment. Compact each layer of the embankment to at least 95% of a Standard Proctor laboratory maximum density.

7.3.16 EXCAVATION AND DIRECTIONAL BORING

No excavation or directional bore shall be made without prior notification of **ALL** utility companies and the City Public Works Department. All excavations shall be done by open cut from the surface by an approved method of trenchless technology.

In open cut excavations, all excavated material determined to be saturated shall be removed from the site daily.

The width of all trenches shall be kept to a minimum but provide adequate space for workers and safety devices. All Federal, State, and Local regulations pertaining to worker safety and health shall be followed.

In existing paved areas, all telecommunications and cablevision installations shall be done using directional boring unless otherwise approved by the City Engineer. See 7.3.2.5 (e) Trench Excavation Requirements for jacking, boring, and tunneling.

7.3.17 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1' of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph 7.3.15 SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

7.3.18 DUST PREVENTION

During construction and until final acceptance by the Engineer, the Contractor shall be responsible for controlling dust emissions in the construction area. No earthwork activities shall be performed when the wind speed exceeds 30 MPH. Whenever conditions exist that

create airborne soil particles, at the Contractors expense, wet all disturbed areas as often as necessary to control the dust. All fill areas shall be compacted daily to the specified compaction. Any mud or dirt carry out onto paved surfaces shall be cleaned up daily and when directed by the Engineer. Failure by the Contractor to comply with the above may result in the Engineer issuing a stop-work order until the problems are corrected. Any dust control or clean-up done by City crews will be back charged to the Contractor.

When a building permit is issued for a structure and the site disturbance is greater than 1,000 square feet but less than or equal to 1 acre, a sign-off at Pueblo Regional Building Department is required. Areas of land disturbance greater than 1 acre but less than 25 acres require an **Emission Permit Application: Land Development/Construction Activity**. The permits are available at the Pueblo City and County Health Department and are to be secured by the Contractor. Dust Prevention will not be paid for as a separate bid item.

7.3.19 EROSION AND SEDIMENT CONTROL

All construction activities disturbing more than 1 acre will require a *General Permit for Stormwater Discharges Associated With: Construction Activity* issued by the "Colorado Dept of Health, Water Quality Control Division, Permits and Enforcement Section". A Stormwater Management Plan (SWMP) is required as a condition of obtaining said permit. A copy of the Construction Activity Permit and the Stormwater Management Plan shall be submitted to the City of Pueblo Stormwater Management Department for review.

In addition to the SWMP, an erosion control plan stating "Best Management Practices" (BMPS) to control erosion, sediment, and stormwater quality during and after the construction activity shall be submitted to the City of Pueblo for review. The erosion control plan shall be prepared in accordance with the provisions set forth in The City of Pueblo's *Storm Drainage Design Criteria and Drainage Policies Manual*.

Guidance for engineers, contractors, and developers in the selection, design, and maintenance of "Best Management Practices" to improve stormwater run-off quality can be found in Volume 3 of the *Urban Storm Drainage Criteria Manual* or most current edition.

7.3.20 QUALITY CONTROL

The contractor/developer shall provide the City Engineer with a soil classification, including a sieve analysis, plasticity index and a Proctor curve for each of the different soils to be encountered at the site. Copies of all field moisture/density testing performed by independent testing firms shall be submitted to the City. The cost for these tests shall be paid for by the Contractor for City projects.

Field testing for moisture content and dry density of the compacted soil will be done by a qualified geotechnical testing service. Frequency and location for the tests will be at the City's discretion. In general, a minimum of one test per foot of fill and/or along the bases of cuts and fills, will be taken for each 200' of roadway being constructed.

Any areas where the field test indicates that the soil does not meet the moisture or density specification shall be wetted or dried as necessary and reworked until the requirements are

satisfied.

7.4 METHOD OF MEASUREMENT

In general, excavation and embankment will not be measured or paid for as a separate bid item but will be considered subsidiary to a bid item such as hot bituminous pavement, sidewalk, driveway, curb & gutter, etc.

When paid for as a separate bid item, excavation and embankment will be measured by the volume of embankment in cubic yards as compacted in-place, based on the grading plans and cross sections. When paid for as a separate bid item, borrow shall be measured in cubic yards in its original position using the method of end areas.

Volume for unsuitable material shall be the actual measurements of the excavation required to remove the objectionable material computed to cubic yards. When the unsuitable material is replaced by aggregate base course, measurement shall be by the volume in cubic yards or by the ton and fraction thereof as evidenced by weight tickets for each truckload placed.

Rock excavation shall be measured as the actual volume in cubic yards of verified rock removed to the limits established by the Engineer.

7.5 BASIS OF PAYMENT

No payment will be made for excavation and/or embankment unless noted otherwise in the Special Provisions. When paid for, embankment will be paid for per cubic yard as compacted in place material measured in accordance with Section 7.4 METHOD OF MEASUREMENT.

All costs associated with clearing and grubbing, removal of obstructions, excavation, embankment, compaction, grading and all related work shall be paid for as a separate bid item unless otherwise noted in project's plans and/or special provisions.

Payment for excavation to remove unsuitable material beyond the compaction limits shall be full compensation for all costs associated with the complete removal and disposal including hauling and landfill fees if necessary, and the replacement with suitable material.

Rock excavation will include all costs associated with the removal and disposal of rock as defined in this Article. Payment for rock excavation will be for actual costs of documented labor and equipment associated with rock removal plus 15% mark-up. Rates for equipment shall not exceed the rental rates used by the Colorado Department of Transportation.