

## **CITY OF AUBURN STANDARD SPECIFICATIONS**

### **SECTION 13 EXCAVATION AND BACKFILL**

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#### **13.01 GENERAL**

The work included in this section shall consist of furnishing all materials and equipment and performing all labor and services necessary to prepare the site and construct the facilities specified herein and shown on the plans. The work shall include clearing and grubbing of any or all types of materials, removal and stockpiling of topsoil, site grading, construction of embankments, trenching, blasting, dewatering, sheeting, shoring, bracing, and the backfilling and tamping of trenches and foundations. The Contractor shall perform all excavation to the depth shown on the plans or specified herein for all underground structures, including manholes, piers, and all other pipeline appurtenances shown on the plans.

All excavation shall be unclassified unless a bid item is provided in the Bid Schedule for rock excavation or borrow excavation.

No specific payment will be made for items covered in this section, including items incidental to the work, unless a specific bid item is provided in the Bid Schedule.

#### **13.02 TESTING RESPONSIBILITY**

The cost of testing will be borne by the Contractor, unless otherwise noted in the contract documents. Testing required during the excavation and backfilling processes will be as outlined in Section 9 or within this section.

#### **13.03 CONTRACTOR RESPONSIBILITY**

The Owner will obtain title to the property or, in the case of pipelines, will obtain permits or easements across the affected property. It shall be the responsibility of the Contractor to give proper and adequate notice to the tenants of the affected property and to protect the property. Each improvement, both public and private, shall be protected from injury or damage except those specifically designated to be altered or removed. All costs of repairing or replacing improvements damaged by the Contractor shall be borne by the Contractor.

Cultivated trees, shrubs, and grass in rights-of-way or easements, but outside the specified limits for excavation, shall be protected and preserved during the entire period of construction. Site preparation shall be considered incidental to the construction work and no specific payment will be made therefor, unless otherwise noted in the contract documents.

The Contractor shall be responsible for all notifications for inspections and testing as outlined in the specifications.

The Contractor is responsible for disposal of all debris resulting from clearing, grubbing, and demolition work in a manner and location satisfactory to the contractor and the environmental management agency having jurisdiction. If stockpiling is done adjacent to excavations, the Contractor is responsible for ensuring they are placed in such a manner that no damage will result to the work or property in the event of rain.

## 13.04 **SITE WORK**

### A. Preparation

The Contractor shall remove all vegetation, debris, pavements, and other objectionable materials from the areas to be excavated and/or filled and the site shall be suitably grubbed. All large roots and stumps shall be removed to a depth of at least two feet (2') below the original surface. Pits or cavities resulting from the grubbing that extends beyond the excavation limits shall be backfilled as specified herein. The Contractor shall demolish and remove all buildings and structures specifically designated on the plans to be removed.

Topsoil shall be stripped from all areas to be excavated or filled. Topsoil shall be stockpiled at a suitable site and protected from erosion so that it can be spread over the areas to be grassed. The stripping operation shall remove all topsoil and *organic* matter not suitable for foundations. In general, topsoil will be removed to a depth of two inches (2") to six inches (6"). The Contractor shall dispose of unsuitable and excess material. Removal and storage of topsoil shall be considered incidental to the construction work and no specific payment will be made therefor, unless otherwise noted in the contract documents.

The Contractor shall dig exploratory holes to locate all underground utilities and structures. When underground utilities or structures are found, the Contractor shall use caution when working around the utilities or structures. The Contractor shall bear all costs of repairing underground utilities or structures damaged in the work and shall be fully responsible for all damage to other property and persons resulting from damage to the underground utilities and structures. All damages shall be repaired within a reasonable time; otherwise, the Owner may elect to give twenty-four (24) hours notice to the Contractor and then repair the damage at the Contractor's expense. No claim shall be made for damage or delay of the work on account of the proximity of or leakage from such underground utilities or structures.

### B. Grading

The sites for structures, including adjacent fills and access roads, shall be graded within the areas and to the elevations shown on the plans. The area outside the designated construction limits shall not be disturbed. All other grading within the construction limits shall be in accordance with Section 10.

## **13.05 TYPES OF EXCAVATION**

### **A. Structural**

The sites for structures shall be excavated large enough to permit proper erection of the forms, dewatering, and placement of concrete, but the excavation shall not be excessively large. Banks shall be sloped to a safe angle except where such sloping would endanger or damage existing or proposed facilities. The bottom of the excavation shall be true to the required shape and elevations shown on the plans. Backfilling with earth under structures will not be permitted except where specifically shown on the plans.

In the event the Contractor excavates below the correct elevation, he shall backfill to the correct elevation with approved material acceptable to the Engineer of Record or Geotechnical Representative at his own expense.

In the event muck, excessively wet, soft, or other materials unsuitable for foundations extend beyond the designated limits of the excavation, the Contractor shall remove these unsuitable materials and backfill to the proper elevation with crushed stone acceptable to the Engineer, thoroughly compacted, or with Class "B" concrete, as directed by the Engineer.

### **B. Trench**

Trenches shall be cut to the lines and grades shown on the plans or established by the Engineer of Record or Geotechnical Representative. The banks of trenches shall be cut in vertical, parallel planes equidistant from the centerline of the pipe, except where conditions will not permit vertical banks.

Where it is not practical to cut vertical banks, or where unprotected vertical banks would create dangerous conditions, the banks may be sloped to any width providing existing and proposed facilities will not be damaged or endangered. Sloped surfaces shall terminate at least one foot (1') above the top of the pipe, and from that point to the trench bottom, the walls shall be vertical.

Where trench excavation may damage roadways, utility poles, pipelines, conduits, or private property or create conditions dangerous to workmen, the Contractor shall install suitable sheeting for their protection. No specific payment will be made for sheeting except for sheeting which the Engineer orders to remain in place.

The bottom of all trenches shall be cut level in cross section and shaped to conform to the bottom of the pipe so as to afford full bearing on the pipe barrel, except where concrete cradles, foundation material, or embedment material is to be installed. Bell holes shall be excavated so as to relieve pipe bells of all loads but small enough to insure that support is provided throughout the length of the pipe barrel.

Where muck, excessively wet, soft, or other materials unsuitable for foundations or sub-grade are encountered and extend below the designated limit of excavation, these unsuitable materials shall be removed and replaced with pipe foundation material as specified in paragraph 13.06B.

Trenches shall not be excavated more than one hundred thirty feet (130') in advance of pipe laying in or along traveled roadways or more than three hundred feet (300') for other conditions. The work shall be performed so as to prevent any serious interruption of travel by the public and also to afford necessary access to public and private premises. Temporary bridges or crosswalks shall be built where necessary to maintain traffic in a safe manner.

The sides of all trenches and excavations for pipelines and structures shall be securely held in place by stay bracing or skeleton or solid sheeting and bracing, as necessary to prevent slides, settlement, or movement of the unexcavated material. Wood or sheet steel piling shall have sufficient strength and rigidity to withstand the pressures and maintain the walls of the excavation and protect all persons and property from injury or damage.

Where excavations are made adjacent to buildings or other structures, or in paved streets, the Contractor shall take particular care to sheet and brace the sides of the excavation adequately so as to prevent any settlement beneath the structures or pavement. The Contractor shall be solely responsible for any damage to any structure or injury to any person that results from his operations.

Bracing and sheeting may be removed in units when the level of the backfilling has reached the elevation necessary to protect the pipe work (not less than one foot (1') above the top of the pipe) and adjacent property. When, in the opinion of the Engineer, sheeting or shoring above this level cannot be safely removed, it shall be left in place and the Contractor will be paid for the material left in place. Sheeting so ordered to be left in place shall be cut off at least two feet (2') below the surface.

Bracing and sheeting shall be considered incidental to the construction work and no specific payment will be made except for sheeting ordered to be left in place.

#### C. Underwater

Underwater excavation procedures will be as outlined by the Engineer of Record or the Geotechnical Representative.

#### D. Rock

Rock is defined as any material, which occurs in its original position in ledges or bedded deposits of such hardness or texture that cannot be loosened, broken, or removed

without the use of drilling and blasting methods. Concrete and masonry structures which require drilling and blasting for removal and boulders having volumes greater than 8 cubic feet shall also be considered rock. In general, removal of rock will be considered as unclassified excavation and no specific payment will be made therefor except when a bid item is provided in the Bid Schedule for rock excavation.

In no case will pavements, manholes, and similar structures be classed as rock, nor will specific payment be made for drilling and blasting materials that can be removed by other methods.

When payment is to be made on a unit price basis for removing rock, the rock shall be completely stripped of all overburden over the entire area, if for a structure, and over a length of a least fifty feet (50') if for a pipeline. The Engineer of Record or Geotechnical Representative will then make the necessary measurements and take elevations on the rock to determine the volume of rock to be removed.

In trenches for pipelines, rock shall be removed for the overall width of the trench, which shall be as shown on the plans and to a minimum depth of six inches (6") below the bottom of the pipe for pipes smaller than twenty-four inches (24") in diameter.

Drilling and blasting methods used in rock excavation shall be optional with the Contractor but shall be conducted with due regard to the safety of persons and property in the vicinity of the work and in strict conformity with all laws, ordinances or regulations governing blasting and the use of explosives. Rock excavation near existing structures of all types shall be conducted with the utmost care, and every precaution shall be taken to prevent damage to such structures. Any damage or injury of whatever nature to persons or property caused directly or indirectly by blasting operations shall be promptly repaired, replaced or compensated by the Contractor at his own expense and to the entire satisfaction of the persons injured or the owners of the property damaged.

It shall be the responsibility of the Contractor to give proper and adequate notices to the tenants of the affected property within a minimum radius of 500 feet from the blasting area. In cases where a Blasting Survey is required and the City is Owner of the construction project, the City will notify each affected resident at least 72 hours before the survey is performed. The Contractor shall deliver or cause to be delivered to the City a list of all the affected addresses at least 72 hours before arrival of the Survey Company at an affected residence. In cases of private sector construction where a Blasting Survey is required, it shall be the responsibility of the Contractor to notify each affected resident at least 72 hours before the survey is performed.

### **13.06 CONSTRUCTION METHODS**

#### **A. Backfilling Trenches**

The backfilling of trenches shall commence immediately after the pipes have been

installed and examined by the Engineer of Record or Geotechnical Representative. Except where special methods of bedding and tamping are required, fine, loose earth free of stones, vegetable matter and other objectionable materials shall be carefully placed and loosely tamped, in layers, with proper tools, to a level at least one foot (1') above the top of the pipe.

The balance of the backfill shall be the same type material except that a broken stone content of not more than fifty percent (50%) by volume will be allowed, provided the stones do not exceed six inches (6") maximum dimension and are uniformly mixed with the earth.

In general, trenches that are in or across roadways shall be backfilled as shown on the standard details for utility trench and mechanically compacted as the material is placed in layers. Where trenches cut across or along pavement, the Contractor shall compact the backfill material and then construct a temporary patch over the cut. The temporary pavement shall not disintegrate under traffic and shall be maintained in good condition until the permanent pavement is constructed. No specific payment will be made for temporary pavements.

Where the trench is in an easement, the top one-foot (1') of the backfill shall consist of fine loose earth. After final settlement has taken place, the surface shall be hand raked if necessary to remove any objectionable materials and dressed with topsoil.

Where trenches are not under pavement, backfill material shall be neatly rounded over the trench to allow for settlement to grade after consolidation. If the material settles below the surface, the depression shall be refilled, compacted, and finally made to conform to the original surface. If there is a deficiency of suitable backfill material, the Contractor shall obtain the material elsewhere at his own expense and shall also dispose of any surplus materials at his own expense.

Backfilling around structures shall be done in the manner specified above for pipe trenches by mechanically tamping the material in layers from the bottom of the cut to finished grade.

The contractor shall replace all surface materials and restore all paving, curbing, sidewalk, fence, shrubs, and grass damaged or removed in the work, to a condition equal to that before the work began.

#### B. Foundation/Embedment Material

1. Crushed stone foundation material can consist of Type I or Type II crushed stone. Type I crushed stone shall be well-graded crush-and-run limestone or granite having a maximum size of one and one half inches (1 ½"). Type I stone shall be used to backfill trenches where shown on the plans or specified in the Special Conditions. Type II crushed stone shall be one (1") to one and one half inches (1 ½") in size and shall be used under structures where shown on the

plans or specified in the Special Conditions.

Crushed stone shall be kept clean and not allowed to mix with other materials. Crushed stone shall be thoroughly compacted with mechanical tampers.

Where muck, soft clay, and other unsuitable materials exist at the bottom of the trench, these materials shall be removed as directed by the Engineer and replaced with pipe foundation material.

Pipe foundation material shall be quarry run Class I crushed limestone or granite. Foundation material shall be mechanically compacted in six-inch (6") layers.

2. Crushed stone backfill material can consist of Type I or Type II crushed stone. Type I crushed stone shall be well-graded crush-and-run limestone or granite having a maximum size of one and one half inches (1 ½"). Type I stone shall be used to backfill trenches where shown on the plans or specified in the Special Conditions. Type II crushed stone shall be one (1") to one and one half inches (1 ½") in size and shall be used under structures where shown on the plans or specified in the Special Conditions.

Crushed stone shall be kept clean and not allowed to mix with other materials. Crushed stone shall be thoroughly compacted with mechanical tampers.

Pipe foundation material shall be quarry run Class I crushed limestone or granite. Foundation material shall be mechanically compacted in six-inch (6") layers. Pipe foundation material will be measured for payment only where its use was authorized or directed by the Engineer.

3. Embedment material can consist of materials identified on the City of Auburn standard drawings.

Pipe embedment material for use with ductile iron pipe or with vitrified clay or concrete drainage pipe shall be Class IV crushed limestone or granite, grading in size from one-fourth inch (¼") to three fourths inches (¾") unless otherwise specified by appropriate ASTM.

Embedment material shall be placed to support the full length of the pipe barrel at exact line and grade, and shall be mechanically tamped.

Where rock is encountered in the trench, embedment material shall be placed for the full width of the trench and to a depth of 6 inches below the bottom of pipes smaller than twenty-four inches (24") in diameter.

### C. Foundation Drilling

When excavation for foundations of major structures (buildings, tanks, etc.) is completed and when specified in the Special Conditions, the Contractor shall test drill the foundations. For foundations in earth, the test holes shall be drilled six feet (6') into the rock except that no holes will be drilled deeper than fifteen feet (15') below the grade. Test holes shall be spaced approximately twenty five feet (25') feet apart. In the event the holes indicate the presence of cavitated or other unsatisfactory conditions, the affected areas shall be excavated as directed by the Engineer of Record or Geotechnical Representative, and the additional excavation will be measured for payment.

### D. Disposal of Materials

All materials removed by excavation which are suitable for reuse shall be used whenever practicable for fills, embankments, backfilling pipe trenches. All materials not used for such purposes shall be considered as waste materials and disposed of by the Contractor.

Waste materials may be deposited in spoil banks on the site of the work if space is available and when authorized by the Engineer of Record or Geotechnical Representative. Waste materials shall not be left in unsightly piles, but shall be spread in uniform layers and nearly leveled and shaped. Spoil banks shall be provided with adequate openings to permit surface drainage of adjacent lands. Where on-site disposal is not practical, the Contractor shall be responsible for off-site disposal.

Upon completion of any part of the work, proper disposal shall be made of all surpluses or unused material within the construction limits of such work and the surface of the work left in a neat and workmanlike condition.

Disposal of excavated materials shall be considered an integral part of the excavation work and no separate payment therefor will be allowed.

### E. Maintenance

All excavated areas, backfill, embankments, trenches, access roads, and ditches shall be maintained by the Contractor in good condition at all times until final acceptance by the Owner. Where trench backfill has settled, trenches shall be refilled, compacted, and regraded to conform to the original surface.