

ITEM I - EXCAVATION

1.01 Trenching and Excavation Regulations

- (a) The CONTRACTOR shall comply with OSHA trenching and excavation regulations as revised in "Subpart P" of Part 1926 in the Federal Register. Shoring and/or shielding shall be used as specified in "Subpart P" to prevent caving of trench banks and to provide a safe excavation.
- (b) **The CONTRACTOR will be responsible for excavation safety and shall designate his "competent person" (as defined in Subpart P) for the determination of proper shielding/shoring systems.**

1.02 Site Grading or General Excavation

- (a) Sites for pumping stations and access roads shall be graded by mechanical equipment within the areas and to the elevations shown on the plans. Grading operations shall be conducted so that material shall not be removed or loosened beyond the required limits. The finished surfaces shall be left in reasonably smooth and uniform planes such as are normally obtainable from the use of mechanical equipment; if the CONTRACTOR is not able to obtain the required degree of evenness by means of mechanical equipment, he will be required to use hand labor methods. Slopes and ditches shall be neatly trimmed and finished to conform to the slope lines shown on the plans or as staked by the ENGINEER.
- (b) Topsoil from the surface of the ground to be excavated or occupied by fills, within the general area specified to be planted with grass, shall be "stripped" or removed before site grading or other excavation work is started. Topsoil so removed shall be stockpiled at a suitable location on the site of the work so that it can be reused later for planting grass as specified in these specifications. This "stripping" operation shall remove all leaves, loam, and loose topsoil which are unsuitable for foundations. The depth to which topsoil is removed shall be determined by the ENGINEER, but will be generally between the limits of two and six inches.

1.03 Structural Excavation

- (a) Excavation for structures shall be sufficiently large for the proper placing of forms and concrete and for dewatering purposes, but shall not be excessively large in horizontal area. Banks may be sloped at a safe angle provided that such excavation does not endanger or damage existing or proposed structures, pipelines, etc. The bottom of the excavation shall be true to the required shape and elevations shown on the plans. No earth backfilling will be permitted under structures unless specifically shown on the plans. Should the CONTRACTOR excavate below the elevations shown or specified, he shall fill the void made with thoroughly compacted Class I pipe embedment materials or with Class B concrete

at his own expense.

- (b) When muck, quicksand, soft clay, organic matter, soils with excessive moisture content or other material unsuitable for foundations are encountered within the limits of the excavation or which extend beyond the limits of the excavation, such materials shall be removed as directed by the ENGINEER and replaced with thoroughly compacted crushed stone or with Class B concrete as required by the ENGINEER.
- (c) In all cases where materials are deposited along open excavation, they shall be placed so that in the event of rain, no damage will result to the work or adjacent property.

1.04 Trench Excavation

- (a) Trench excavation or excavation for pipelines shall consist of excavation necessary for the construction of sewers, conduits and other pipelines and all appurtenant facilities thereof, including manholes, inlets, outlets, pipe embedment materials, and pipe protection as called for on the Plans. It shall include site preparation, backfilling and tamping of pipe trenches and around structures and the disposal of waste materials, all of which shall conform to the applicable provisions of these specifications.
- (b) Trench excavation shall be made in open cut and true to the lines and grades shown on the Plans or established by the ENGINEER, unless tunneling or boring is shown or specified. When practical, the banks of the trenches shall be cut in vertical, parallel planes equidistant from the pipe center line. The horizontal distance between such planes, or the overall width of trench, shall not be less than 12 inches on either side of the outside diameter of the pipe but in no case less than 3 feet, unless shown otherwise on the Plans. When vertical banks for trench excavation are not practical to construct or create dangerous conditions to workmen, the banks may be sloped, provided that such excavation does not endanger or damage adjacent structures or properties. When trench banks are sloped, the portion of the trench that is below the level of 12 inches above the top of the pipeline shall be cut to vertical planes as specified above. The sides of the remaining portion of the trench shall be graded to a slope which is sufficient to produce a stable embankment or stabilized with mechanical reinforcement. The bottom of the trench shall be level in cross section and shall be cut true to the required grade of the pipe except where concrete cradles or pipe embedment materials are shown on the Plans, specified or authorized by the ENGINEER, in which case the excavation shall extend to the bottom of the cradle or pipe embedment materials.
- (c) Bell holes for bell and spigot pipe shall be excavated at proper intervals so that the barrel of the pipe will rest for its entire length upon the bottom of the trench. Bell holes shall be large enough to permit proper installation of joints in the pipe.

- (d) Excavation for manholes and other pipeline structures shall be as specified for structural excavation.
- (e) When muck, quicksand, soft clay, swampy or other material unsuitable for foundations or subgrade are encountered which extend beyond the limits of the excavation, such material shall be removed and replaced with pipe foundation material as specified elsewhere in these specifications.
- (f) All work shall be performed so as to cause the least possible inconvenience to the public. Temporary bridges or crosswalks shall be constructed where necessary to maintain vehicular or pedestrian traffic. Crosswalks and bridges shall have handrails or other features necessary for safe use by the public, and shall be constructed to comply with all applicable codes.
- (g) In all cases where materials are deposited along open trenches, they shall be placed so that no damage will result to the work or adjacent property.

1.05 Dewatering Excavated Areas

- (a) The CONTRACTOR shall provide and maintain ample equipment with which to remove all water from every source which enters excavations for structures and pipelines. Dewatering operations shall ensure essentially dry excavations and the preservation of the elevations, lines, and grades shown on the Plans. Water pumped from excavations which does not meet NCDENR – DWQ turbidity requirements shall not be discharged directly into a natural stream or drainageway but shall be treated in such a manner as to bring the discharge flows into compliance with NCDENR – DWQ requirements.
- (b) Surface drainage shall not be allowed to enter excavated areas.
- (c) Where the areas to be excavated are located under water surfaces or near the banks of flowing streams or other bodies of water, the CONTRACTOR may adopt and carry out any method of dewatering he may deem feasible for the performance of the excavation work and for protection of the work thereafter; provided that the method and equipment to be used is in compliance with NCDENR regulations, and results in completed work which complies with the specifications and is acceptable to the ENGINEER. In such cases, the excavation area shall be effectively protected from water damage during the excavation period and until all contemplated construction work therein has been completed.
- (d) Prior to beginning excavation for structures which are to be constructed at or below the groundwater table, groundwater levels shall be lowered and maintained at workable levels. For structures other than manholes this level must be at least three (3) feet below the bottom of such structures until construction and backfilling operations have been completed.

- (e) The CONTRACTOR shall be responsible for damage to structures caused by hydrostatic displacement during construction operations.

1.06 Borrow Excavation

- (a) Wherever the backfill or embankment requires a volume of material that is in excess of the volume of suitable material available from the authorized excavations, such excess volume shall be obtained from other sources. Where borrow pits on the construction site are specifically designated on the Plans, borrow excavation shall be obtained therefrom; otherwise, the CONTRACTOR shall provide suitable borrow material from areas accessible to the work. Before a borrow pit is opened, the quality and suitability of the material to be obtained therefrom shall be approved by the ENGINEER.
- (b) Borrow pits shall be properly cleared and grubbed and all objectionable matter shall be removed from the borrow pit material prior to its placement in the backfills.
- (c) Borrow shall be excavated so that the remaining surfaces and slopes will be reasonably smooth and even and will provide adequate drainage over the entire area. Drainage ditches shall be constructed where necessary to provide outlets of water to the nearest natural channel so that the formation of pools in the borrow pit area will be avoided. Sides of borrow pit cuts shall be left at two to one slope unless otherwise authorized by the ENGINEER.
- (d) The CONTRACTOR shall furnish to the ENGINEER written approval for the use of the borrow pit site and shall meet all NCDENR and all other applicable Federal, State, and Local laws and requirements. Upon completion of work, the borrow pit shall be restored to a condition acceptable to the landowner.

1.07 Rock Excavation

- (a) The removal of sound, solid rock of whatever nature which occurs in its original position in ledges, bedded deposits or stratified and unstratified masses within the excavation limits shown on the plans, and which is of such hardness or texture that it cannot be loosened, or broken down and removed without resort to drilling and blasting methods or percussive hammering, shall be classified as rock excavation.
- (b) The removal of hardpan, chert, clay, soft or disintegrated shale, boulders, and other rock materials not included in Paragraph (a) above, shall not be classified as rock excavation although the CONTRACTOR may elect to excavate same by drilling and blasting methods. The excavation and removal of all such materials shall be classified as common excavation.

- (c) The removal of existing pavements, sidewalks, driveways, manholes and similar structures called for on the Plans shall be performed under these specifications and shall not be classified as rock excavation.

1.08 Rock in Pipe Trenches

- (a) Rock encountered in trench excavation for sewers and other pipelines shall be removed for the overall width of trench which shall be as shown on the Plans. It shall be removed to a minimum depth of 6 inches below the bottom of the pipe. Where pipelines are constructed on concrete cradles, rock shall be excavated to the bottom of the cradle as shown on the plans.
- (b) After the ENGINEER has examined the completed excavation, and has taken the necessary measurements for volume determination, the space below the ultimate pipe grade shall be filled with pipe embedment materials as required, compacted to proper grade and made ready for pipe laying.

1.09 Drilling and Blasting

- (a) Prior to commencing any blasting operations, the CONTRACTOR shall notify the ENGINEER and the official from the list below (if applicable) and obtain blasting permits as required. The CONTRACTOR must furnish certification of insurance specifically covering any and all obligations assumed pursuant to the use of explosives.

BLASTING PERMITS:

City of Asheville	FIRE MARSHAL (259-5636)
Biltmore Forest	PUBLIC WORKS DIRECTOR (274-3919)
Black Mtn. & Montreat	FIRE DEPT. (669-8074)
Town of Weaverville	FIRE MARSHAL (645-3500)
Buncombe County	FIRE MARSHAL (250-6620)
Town of Woodfin	TOWN MANAGER (253-4887)

- (b) 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 for by the CONTRACTOR at his own expense and to the entire satisfaction of the persons injured or the owners of the property damaged.

- (c) The CONTRACTOR shall not be allowed to blast within any rights-of-way maintained by any public agency without specific approval of the controlling agency and only in accordance with their respective requirements.

1.10 Pre-Blast Survey and Vibration Monitoring

- (a) Prior to conducting any blasting operations, the CONTRACTOR shall conduct a preblast survey of all structures within 300 feet of the proposed sewer line, along the entire route of the proposed sewer. Surveys shall be performed by a third party entity other than the blasting agent, and qualified to perform such surveys.
- (b) The pre-blast survey shall consist of digital color photographs of all observable exterior and interior surfaces. The photographs shall be compiled on a CD or DVD and indexed, describing the location of each photograph to facilitate easy comparison of a given structures condition. Existing defects in structures shall be photographed and appropriately documented. The CONTRACTOR shall furnish a copy of the survey results, including photographs, to the ENGINEER, prior to beginning blasting operations.
- (c) All blasting operations conducted within 300 feet of existing structures shall be monitored. In areas where several structures are located adjacent to blasting, a sufficient number of seismic units equipped to provide a printed readout shall be deployed to allow for comprehensive documentation of blasting operations. The resultant seismic data shall be provided to the blasters to allow for blast design changes based on the location of the next blast and the resultant vibration levels for the previous shot. A copy of all resultant seismic data shall be provided to the ENGINEER, immediately after the shot.
- (d) The pre-blast survey, vibration and over pressure monitoring shall be conducted by a professional seismic consultant, who is licensed and certified for this work.
- (e) No separate payment will be made for the pre-blast survey, vibration and over pressure monitoring, the post-blast survey, nor any other work related to the blasting or excavation of rock. This work shall be considered incidental to, and included in, the unit bid prices for sewer pipe, as listed in the bid schedule.

1.11 Backfilling Trenches

- (a) The backfilling of pipeline trenches shall be started immediately after the pipe work has been installed. The initial backfill material (above pipe embedment materials), shall be placed to a height of 2 feet above the top of the pipe.
- (b) Where the trench extends along or across streets, roadways, usable alleys, or sidewalks, the trench shall be completely backfilled (above pipe embedment materials) with material which is non-plastic nature and shall be sufficiently close

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to optimum moisture content to achieve specified compaction requirements. Backfill material shall exhibit no tendency to flow or behave in a plastic manner under blows of a mechanical tamp. Such materials shall be free of rock, roots, debris, or vegetable matter. Material which does not meet these requirements shall be removed from the site and replaced with suitable backfill materials. These suitable materials further known as "Select Backfill" may be earthen material meeting the above requirements, compacted aggregate base course, or screenings. Unless otherwise specified in the Special Conditions or shown on the Plans, such trenches shall be backfilled in 6 inch layers (before compaction) and thoroughly compacted with power tools to a minimum 95% Standard Proctor.

- (c) Where excavation has been made within the limits of easements across private property, the top 1 foot of backfill material shall consist of fine loose earth free from large clods, vegetative matter, debris, stones, and/or other objectionable materials. Backfill material shall be carefully placed and compacted not less than 85% Standard Proctor.
- (d) Any deficiency in the quantity of materials for backfilling the trenches, or for filling depressions caused by settlement, shall be supplied by the CONTRACTOR.
- (e) The ENGINEER may provide the services of a field technician or a recognized commercial testing laboratory during the compaction of the trench backfill to make density determinations. The field technician shall report the test results to the CONTRACTOR and ENGINEER on the project site as soon as these results are known. The results of all density tests shall be reported in writing and shall include the date of test, test location, depth below finished grade, wet density, moisture content, dry density, percent compaction of test sample, and maximum dry density used for comparison. Should any test fail, the cost of any subsequent test will be at the expense of the CONTRACTOR.
- (f) Where pipe trenches are cut across or along pavement, the CONTRACTOR shall construct a temporary surface over the cut which will not disintegrate under traffic and which shall be maintained in good condition under traffic until the permanent pavement has been restored.
- (g) Backfilling around structures shall be done in the manner specified above for pipe trenches by power tamping for the full depth of cut from the bottom of the finished grade.
- (h) All backfilling shall be done in such a manner as will not disturb or injure the pipe or structure over or against which it is being placed. Any pipe or structure injured, damaged or moved from its proper line or grade during backfilling operations shall be opened up and repaired and then re-backfilled as herein specified.

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- (i) The CONTRACTOR shall replace all surface materials and shall restore paving, curbing, sidewalks, gutters, shrubbery, fences, sod, and other surfaces disturbed, to a condition equal to that before the work began, furnishing all labor and materials incidental thereto as provided elsewhere in these Specifications.

1.12 Disposal of Unusable Materials

- (a) All materials removed by excavation which are suitable for backfill shall be used whenever practicable for fills, embankments, backfilling pipe trenches, and for such other purposes as may be shown on the Plans or authorized by the ENGINEER. All materials not suitable for backfill shall be considered as waste materials and disposed of by the CONTRACTOR.
- (b) All trees, limbs, brush, stumps, large roots, rubbish, demolition or construction debris shall be removed from the construction site. Neither the construction site nor the adjacent property shall be used for the disposal of such materials, unless specifically approved by the ENGINEER. The CONTRACTOR shall dispose of these materials off the site at a location chosen and obtained by the CONTRACTOR. Written acknowledgment by the property owner shall be obtained by the CONTRACTOR and a copy submitted to the ENGINEER.
- (c) The CONTRACTOR shall be solely responsible for securing approvals and permits for any site utilized for the disposal of said materials and excess or unusable soils. The CONTRACTOR shall strictly follow local, State and Federal regulations regarding disposal of all materials. The CONTRACTOR is also solely responsible for any violations and subsequent fines for not adhering to regulatory agencies regarding such fill or disposal activity.
- (d) Where appropriate, excess soil may be spread in uniform layers and neatly leveled and shaped. Where "on site" disposal is not practical, the CONTRACTOR shall be responsible for "off site" disposal.
- (e) Clean up and restoration shall be an ongoing process. All surplus or unused materials shall be removed and the surface of the work area left in a neat and orderly condition.

1.13 Maintenance

- (a) All excavated areas, backfills, embankments, trenches, access roads, grading, and ditches shall be maintained by the CONTRACTOR in good condition at all times until final acceptance by the DISTRICT. Where trench backfill has settled, trenches shall be re-excavated and compacted.

1.14 Pipe Embedment Materials

- (a) Pipe embedment materials shall be Class I material. Where pipes are installed

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below groundwater levels or where the trench is subject to inundation, Class I material shall be placed to the top of the pipe. Class I materials shall be graded crushed limestone, or granite. Materials under ¼ inch shall be limited to no more than 3% by weight. No. 67 stone shall be used for PVC pipe installation. No. 57 or No. 67 may be used for Ductile Iron pipe installation.

- (b) Pipe embedment materials shall be placed to support the full length of the barrel of the pipe at exact line and grade.
- (c) Pipe embedment materials shall be placed in the pipe trench to the trench width and depth shown on the Plans. Where rock has been removed from the pipe trench, it shall be placed to a minimum depth of 6 inches below the bottom of the pipe.
- (d) All materials shall be mechanically tamped and compacted to the percent required herein, or as shown on the Plans.

1.15 Backfill Material

- (a) Backfill material shall be of a relatively non-plastic nature and shall be sufficiently close to optimum moisture content to achieve specified compaction requirements. Material which does not meet these requirements shall be removed from the site and replaced with suitable backfill materials, as defined in Section 1.11(b).
- (b) Initial backfill material from the pipe crown to 2 feet above the crown, and/or select material shall consist of fine loose earth, free of large clods, stones, vegetable matter, debris, and/or other objectionable material.
- (c) The remainder of the backfill shall be the same type material as the initial backfill except that a broken stone content of not more than 50% by volume will be allowed provided that the stones are thoroughly mixed with earth. Maximum individual stone size shall be 0.75 cubic feet.

1.16 Pipe Foundation Material

- (a) Pipe foundation material shall be quarry run crushed limestone or granite ranging in size from fines to a maximum size of 3 inches. The material shall be power tamped in 6-inch layers.
- (b) Pipe foundation material shall be used in local areas where unsuitable materials such as muck, quicksand, soft clay, vegetative matter, or swampy material make it necessary to provide a satisfactory pipe foundation.
- (c) Pipe foundation material used as described above will be measured for payment only in specific locations where its use is authorized by the ENGINEER before

this work is performed.

1.17 Rip-Rap

- (a) Dumped rip-rap shall be Type I or Type II as shown on the Plans. All rip-rap shall be shot rock, field stone, or rough unhewn quarry stone. The stone shall be sound, tough, dense, resistant to the action of air and water, and suitable in all other respects for the purpose intended. Where shot rock from blasting is available, it shall be clean and may be used instead of stone, provided that it meets with the approval of the ENGINEER. Rip-rap shall be graded to meet requirements as specified. Shot rock from the job site shall be general graded to prevent concentrated areas of rip-rap that are too large or too small.
- (b) Type I Rip Rap stone shall vary in weight from 5 to 200 pounds. At least 30% of the total weight of the rip rap shall be in individual pieces weighing a minimum of 60 pounds each. Not more than 10% of the total weight of the rip rap may be in individual pieces weighing less than 15 pounds each.
- (c) Type II Rip Rap stone shall vary in weight from 25 to 250 pounds. At least 60% of the total weight of the rip rap shall be in individual pieces weighing a minimum of 100 pounds each. Not more than 5% of the total weight of the rip rap may be in individual pieces weighing less than 50 pounds each.

1.18 Aggregate Base Course

- (a) Aggregate base course shall be either Type A or Type B ABC aggregate base course which meets all requirements of Section 1010 of the NCDOT Standard Specifications for Road and Structures, current edition.

1.19 Crushed Stone (Class I Embedment)

- (a) Crushed stone shall be either No. 57, No. 67 or No. 78 stone, as called for in the Specifications or on the Plans, which meets the requirements of the NCDOT Standard Specifications for Roads and Structures, current edition.