

2015 Standard Specifications for Road and Bridge Construction



**Prepared by
Louisville Metro Public Works
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SECTION 01000 – GENERAL REQUIREMENTS

(January 2015)

PART 1 - GENERAL

1.1 SUMMARY OF WORK

Work covered by the Contract Documents consists of providing all work indicated on Drawings or required by Project Manual dated _____, 20__ for the project.

- 1.2 The Owner agrees to make the _____ site accessible to the Contractor _____.
To arrange for access at these or any other times permitted by the Owner, the Contractor shall be accompanied by Metro personnel for unlocking or locking the facility when leaving. No keys will be furnished for use by the Contractor.

1.3 CONFLICT BETWEEN PLANS AND SPECIFICATIONS

Any plans drawn by the Engineer to supplement the specifications are intended to be explanatory, but, should any discrepancy appear or any misunderstanding arise as to anything contained in either, the explanation of the Engineer shall be final and binding on the Contractor. Any corrections of errors or omissions in drawings and specifications may be made by the Engineer when such corrections are necessary for the proper fulfillment of their intentions as construed by him. Any adjustment by the Contractor without such a determination shall be at his own risk and expense. Supplemental drawings, if necessary, showing further detail may be made in accordance with the contract and these specifications and such supplemental drawings shall become part of the contract.

1.4 SPECIFICATIONS AND DRAWINGS

The Contractor shall keep at the work site a copy of the approved drawings and specifications including all authorized change orders and shall at all times give the Engineer access thereto. Plans, field changes, change orders, and handling of unforeseen circumstances shall be designed and constructed in accordance with this manual and its design modules unless otherwise directed by the County Engineer.

1.5 AUTHORITY OF THE ENGINEER

The Engineer or his representatives shall have free access to the sites at all times for measuring and inspecting materials and work. The Contractor shall afford him all necessary facilities and assistance for doing so. To prevent disputes and litigations, the Engineer shall in all cases determine the amount, quantity, acceptability, and the fitness of the several kinds of work and materials which are to be paid under the contract. He shall decide all questions which may arise as to the interpretation of the Specifications or Plans relating to the work, the fulfillment of this Contract on the part of the Contractor, and the rights of the different Contractors on the project. Such decisions shall be final and conclusive upon the parties of the Contract. The representation, measurement, and inspection by the Engineer shall in no way relieve

the Contractor from the responsibility to perform the work in accordance with the Contract. Methods and techniques of construction used by the Contractor and by the Subcontractors and others in performance of their Contract shall not be subject to the control of the Owner or the Engineer, and neither the Owner nor the Engineer shall be responsible or liable for injury, damage, or loss resulting from such construction methods or techniques.

1.6 CONSTRUCTION INSPECTION

The Metro Project Manager employed by Metro shall be authorized to inspect all work done and all materials furnished. Such inspection may extend to all or any part of the work and to the preparation, fabrication, or manufacture of the materials used. The Metro Project Managers are not authorized to revoke, alter, or waive any requirements of these specifications; however, he shall have authority to reject materials or suspend the work until any questions or issues can be referred to and decided by the Engineer. The presence or absence of a The Metro Project Manager shall not lessen the responsibility of the Contractor to properly perform the work.

1.7 SUPERVISION

The Contractor shall give his personal supervision to the faithful execution of the work and in case of his absence; he shall at all times have a competent superintendent present on the job. This person must be capable of performing all work specified to the satisfaction of the Engineer. The contractor shall not change superintendents during the course of the job except an extraordinary conditions and only when approved by the Engineer.

1.8 RESPONSIBILITY OF THE CONTRACTOR

The Contractor shall take all responsibility for the work and shall bear all risk of damage or loss to the project until final acceptance; and shall take all precautions for preventing injuries to persons and property in or about the work; shall bear all losses resulting to him on account of the amount or character of the work, or because the nature of the land in which or on which the work is done is different from what was estimated or expected or on account of the weather, elements, or other causes including, but not limited to, theft, vandalism, accidents, and natural disasters; and, shall assume the defense of and indemnify and save harmless Metro, its employees, and officers and agents from and against any and all claims, liabilities, judgments, costs, causes of actions, damages, and expenses, and shall pay all Attorney's fees, court costs and other costs incurred in defending such claims, which may accrue against, be charged to, be recovered from or sought to be recovered from Metro, its employees, officer and agents by reason of the Contractor's work, whether, such claims arise from the labor and materials, furnished for the work; from inventions, patents, and patent rights used in doing the work. The Contractor shall be responsible for any personal injury, death, property damage, expenses, damages, losses and costs of any nature whatsoever, including economic loss to Metro, its employees, officers and agents, or any third party may suffer as a result of the negligent or willful acts or omissions of the Contractor's work or the acts or omissions of the Contractor's employees, officials or agents in performing the work or furnishing materials thereto or caused by the acts of any other person regardless of whether or not such persons are subject to the Contractor's control; or in

consequence of any improper materials or implements of labor used therein; and, through any act, omission, or neglect of the Contractor and his employees, official and agents. Metro, its employees, officers and agents shall not have to give the Contractor any specific type of notice of claims arising out of the Contractor's work.

This section shall not require the Contractor to indemnify and save harmless Metro, its employees, officers and agents, for bodily injury to persons, or damage to property caused by or resulting solely from the negligence of Metro, its employees, officers and agents.

The Contractor shall at all times enforce strict discipline and good order among his employees; and shall seek to avoid employing on the work any unfit person or anyone not skilled or qualified in the work assigned to him.

1.9 CHARACTER OF WORKMEN AND EQUIPMENT

The Contractor shall at all times employ sufficient number of workmen for the proper performance of work in the manner and times specified; preference being given to local labor. The Engineer may demand the dismissal of any person or persons employed by the Contractor in, about, or upon the work, who shall misconduct himself or be incompetent or held negligent in the proper performance of his or their duties, or neglects or refuses to comply with the directions given, and such person or persons shall not be employed again without the written consent of the Engineer. Should the Contractor continue to employ or again employ such persons, the Engineer may withhold all estimates that are or may be due, or the Engineer may suspend the work until such orders are complied with.

The Contractor shall furnish such equipment as considered necessary for the proper execution of the work in an acceptable manner and at a satisfactory rate of progress. All equipment, tools, and machinery used for handling materials and executing any part of the work shall be subject to the approval of the Engineer and shall be maintained in a satisfactory working condition. The contract may be terminated if the Contractor refuses to provide adequate equipment for the work.

The Contractor shall have posted in a conspicuous spot with his equipment and on the work site a sign or sticker identifying his equipment as to its owner and an emergency 24-hour phone number.

1.10 COMPLIANCE WITH THE LAW

The Contractor shall at all times comply with all Federal, State, and Municipal laws, ordinances, and regulations in any manner affecting those engaged or employed in the work or the materials and appliances used in the work. He shall protect Metro against any claims or liability arising from or based upon the violation of such laws, ordinances, regulations, orders, or decrees, whether by himself or his employees, and shall be liable for all damages due to his neglect.

1.11 PAYMENT

A. Applications for Payment

- (1) The form of each application for payment shall be AIA Document G702 entitled, "Application and Certificate for Payment" accompanied by, "Continuation Sheet," AIA Document G703. Each application for payment by the Contractor, excluding the first, shall be accompanied by a "Contractor's Affidavit of Payment of Debts and Claims," AIA Document G706; "Contractor's Affidavit of Release of Liens," AIA Document G706A; and a DBE Usage Form (to be furnished by Owner). Payment for stored material delivered but not incorporated in the work will be the invoiced amount only. Stored materials drawdown shall be approved by the Owner. Submit applicable invoices with Application for Payment. Monthly partial payment request shall be submitted in TRIPPLICATE to the Metro Project Manager for approval by the 25th of the month so that the Owner can receive the approved payment request by the first working day of the next month. Partial payments shall be made on a monthly basis on or before the end of the next month for which the work was performed, in accordance with the Contract Documents.
- (2) The Owner shall pay to the Contractor 90 percent of the total amount due and the Owner shall retain ten (10) percent of the amount due until all work has been performed strictly in accordance with the Contract Documents and until such work has been accepted by the Owner.

B. Change order Procedures

- (1) No amount, in part or in whole, of a Change Order shall be included in a requisition for payment by the Contractor until the Change Order has been executed and copies of the Change Order have been distributed to the Owner and Contractor.
- (2) Proceed Orders: A Proceed Order is a device which enables the Owner to promptly order changes in the work which may involve changes in cost or contract time, or both pending preparation and execution of a formal Change Order.
- (3) Request for Change Order Proposal: The Owner may request the Contractor to submit a Change Order Proposal for changes in Contract work. The Contractor shall submit the proposal in accordance with contract requirements within a reasonable time. The Owner may issue to the Contractor a Proceed Order authorizing the required changes for an additional amount not to exceed, or a deduction of not less than the amount shown in the Proceed Order. If the Contractor is not in agreement with the amount stipulated in the Proceed Order, he shall, within a reasonable time after the issue date of the order, submit an equitable proposal and develop with the Owner a mutually acceptable price for the required change in work.
- (4) Change Order Proposal: Without further request and within a reasonable time from the issue date of a Proceed Order, the Contractor shall submit a written Change Order Proposal covering the work authorized in the Proceed Order so that a Change Order may be prepared for execution.

1.12 EXISTING WORK

- A. Removal and alteration of existing work shall include work necessary to provide final conditions as shown on drawings. Complete such work carefully to minimize disturbance to adjacent areas.
- B. Restore any areas disturbed during construction to their original condition, including patching, painting, etc. to the satisfaction of the County Engineer.
- C. If work is not as anticipated or involves structural considerations; notify County Engineer prior to proceeding.
- D. Defective and Unauthorized Work: Any work or materials not in accordance with these specifications will be rejected. All work that has been rejected or condemned shall be repaired or, if it cannot be satisfactorily repaired, shall be removed and replaced at the Contractor's expense. Materials not conforming to the requirements of these specifications shall be removed immediately from the site of the work and replaced with satisfactory material by the Contractor at his own expense.

Upon the failure of the Contractor to repair satisfactorily or to remove and replace, if so directed, rejected, unauthorized, or condemned work or materials immediately after receiving formal notice from the Engineer, the Owner may recover for such defective work or materials on the Contractor's bond or by action in court having proper jurisdiction over such matters, or may employ labor and equipment and satisfactorily repair or remove and replace such work and charge the cost of same to the Contractor, which cost will be deducted from any monies due him.

The approval of material and workmanship by the Construction Engineer, The Metro Project Manager, or any employee of the Engineer, does not under any consideration preclude the right of the Engineer to reject all or any part of the same at any time previous to final payment, if found not to be in accordance with these specifications, nor does any inspection of work release the Contractor from any of his obligations to fulfill his Contract as herein specified and defective work and materials shall be made good or rejected notwithstanding such work and materials that may have been previously accepted for payment.

At the request of the Engineer the Contractor shall, at any time before final acceptance of the work, remove or uncover such portions of the finished work as may be directed. After examination, the Contractor shall restore the said portions of the work to the standards required by the Contract Documents. Should the work thus exposed or examined prove acceptable, the uncovering or removing and the replacing of the covering or making good of the parts removed shall be paid for as extra work, but should the work so exposed or examined prove unacceptable, the uncovering or removing and the replacing of the covering or the making good of the parts removed, shall be at the Contractor's expense.

Work done without lines and grades having been given, work done beyond the

lines and grades shown on the plans, or as given, except as herein provided, work done without proper inspection, or any extra or unclassified work done without written authority and proper agreement in writing as to prices, will be done at the Contractor's risk and will be considered unauthorized and, at the option of the Engineer, may not be measured and paid for and may be ordered removed and replaced at the Contractor's expense.

- E. Abandonment and Neglect: If the work to be done under this contract shall be abandoned, or if this contract or any part thereof shall be sublet without the previous written consent of Metro, or the contract or any claim therein shall be assigned by the Contractor, otherwise than as herein specified, or if at any time the Engineer shall be of the opinion and shall so certify, in writing, to Metro that the conditions herein specified as to the rate of progress is not being fulfilled, or that the work or any part thereof is unnecessary or unreasonably delayed, or that the Contractor has violated any of the provisions of the Contract, Metro may notify the Contractor to discontinue all work or any part thereof, as Metro may designate, and Metro may thereupon, by Contract or otherwise, as it may designate or determine, complete the work, or such part thereof and charge the entire expense of so completing the work or part thereof to the Contractor; and for such completion Metro, for itself, or its Contractors may take possession of and use or cause to be used in the completion of the work, tools, equipment, and appliances of every description as may be found at the location of said work.

All expenses charged under the above article shall be deducted and paid for by Metro out of any monies then due or to become due the Contractor under this Contract or any part thereof; and in such accounting Metro shall not be held to obtain the lowest figures for the work of completion, but all sums actually paid thereof shall be charged to the Contractor.

In case the expense so charged is less than the sum which would have been payable under this Contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference; in case such expense shall exceed the said sum, the Contractor or his bondsmen shall pay the amount of the excess to Metro.

Permitting the Contractor to continue the work or any part of it after the time has expired for its completion, or after the date to which the time for the completion may have been extended, shall in no way operate as a waiver on the part of Metro or any of its rights under this contract.

The Contractor shall be expected to commence work and continue such work on a particular job on a time schedule set forth by the Engineer in written "Notice to Proceed" and any executed change orders. Failure to comply with this regulation shall be considered as "Abandonment and Neglect" by the Contractor and the penalties described in this section shall be invoked.

1.13 PROJECT MEETINGS

- A. When requested for a project, Contractor shall arrange a Preconstruction Conference within 10 days after the effective date of the Agreement. At a

minimum, attendees shall include the Contractor, The Metro Project Manager, and Engineer. Items of discussion shall include, but not limited to the following:

- (1) Tentative Construction Schedule
- (2) Work Sequencing
- (3) Designation of Responsible Personnel
- (4) Use of the Premises
- (5) Office, Work and Storage Areas
- (6) Equipment/Material Deliveries and Priorities
- (7) Security and Working Hours
- (8) Housekeeping

B. Progress Meetings: When requested for a project, at regular intervals, to be determined during the Preconstruction Conference, the Contractor shall hold a progress meeting to review progress to date and to resolve questions. Notify the Owner and Engineer at least one week in advance of the meeting to insure suitable date and time. Include meeting agenda with notification. Persons designated by the Contractor to participate in Progress Meetings shall have all required authority to commit the Contractor to decisions agreed upon.

C. A Metro Representative shall record all meeting results and distribute copies to everyone in attendance and others affected by decisions made in meetings.

1.14 SUBMITTALS

The following submittals shall be submitted to the County Engineer.

A. Progress Schedules: When requested for a project, submit a detailed construction schedule prior to the Preconstruction Conference. Revise the schedule before each progress meeting.

B. Shop Drawings, Product Data, and Samples: When requested for a project, within 10 days of Notice to Proceed, prepare a submittal schedule fixing the dates for submission of shop drawings, product data, samples, and the like and update this schedule at each Progress Meeting to reflect the status of each submittal item.

- (1) Submit five copies of all shop drawings.
- (2) A maximum of three marked copies will be returned to the Contractor.
- (3) Submit shop drawings, product data, samples, and the like as required by applicable specification sections within 30 days after award of Contract.
- (4) Shop drawings shall be approved by Contractor and those Subcontractors whose work is associated with the subject equipment as being in accordance with Contract Documents, prior to submission.

- (5) Where contents of submittal literature from manufacturers include data not pertinent to the submittal, clearly indicate which portion of the contents is not being submitted for review.
 - (6) Consecutively number all submittals. Accompany each submittal with a letter of transmittal showing the transmittal number, date, brief description of submittal, and the company name of the originator of the submittal. On at least the first page of each copy of each submittal, indicate the transmittal number, and name of project.
 - (7) When material is resubmitted for any reason, transmit under a new letter of transmittal with a new number, indicate by reference to previous submittal that this is a resubmittal. Make any corrections and resubmit the required number of corrected copies of Shop Drawings or new samples.
 - (8) Submit all samples of the exact article/material proposed to be furnished and in the quantity, which is required to be returned plus one which will be retained.
 - (9) Failure to comply with these requirements will result in the submittal being returned unprocessed.
- C. Construction Photographs: The Contractor shall provide digital photographs or video of all project areas to be disturbed prior to beginning construction and submitted immediately to The Metro Project Manager. These photographs and/or video shall record the site and surrounding properties, including existing items to remain during construction, from different vantage points. At the end of construction, the Contractor shall provide another set of digital photographs and/or video documenting final restoration.
- (1) Photographs shall adhere to the following specifications:
Digital images shall be provided with a minimum of 4.0 mega pixels and image resolution of not less than 1024 by 768 pixels. Cell phone photos are prohibited. All photographs shall be taken with a date and time stamp control on and each image filename shall bear the date and time.
 - (2) Video shall adhere to the following specifications:
The video shall be DVD NTSC (National Television System Committee) MPEG2. All video shall be recorded with the date and time feature engaged.

1.15 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

Arrangements for access to the site, workmen's parking locations, sites for storing material, sanitary facilities, utilities during construction, etc., shall be the responsibility of the Contractor.

1.16 PROJECT SIGN

One clear and legible project sign shall be provided on the project by the contractor

as soon as he commences work and mobilizes his forces.

A. The sign shall contain the following information and meet the following requirements:

(1) Sign dimensions shall be 4' x 8'.

(2) The sign shall include the Following information:

Project: XXXXXXXX Project
The Metro Project Manager: XXXXXXXX
Metro Public Works
Phone: XXX-XXXX

(3) The sign shall be constructed of a sturdy and durable material.

(4) Sign shall be placed in such a manner as to be clearly recognizable by the public. The location of the sign shall be as determined by the Owner.

(5) The project sign shall be approved by the Owner prior to placement.

B. The Contractor shall maintain this sign for the duration of the project and dispose of it after acceptance of the project. If this sign becomes deteriorated and the Owner decides a new sign is warranted, the Contractor shall furnish a replacement sign at no cost to the Owner.

1.17 MATERIALS AND EQUIPMENT

A. Quality: Material and Equipment Incorporated into the Work:

(1) Conform to applicable specifications and standards.

(2) Comply with size, make, type, and quality selected, or as specifically approved in writing by the County Engineer.

(3) Do not use material or equipment for any purpose other than that for which it is designed or is specified.

(4) When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation. Maintain one set of complete instructions at the job site during installation and until completion. Handle, install, connect, clean, condition, and adjust products in accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with the County Engineer for further instructions. Do not proceed with work without clear instructions. Perform work in accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

B. Transportation and Handling

- (1) Arrange deliveries of products in accordance with construction schedules. Coordinate to avoid conflict with work and conditions at the site. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.
- (2) Provide equipment and personnel to handle products by methods to prevent soiling or damage to products or packaging.

C. Storage and Protection

- (1) Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store products subject to damage by the elements in weathertight enclosures. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- (2) Exterior Storage: Store fabricated products above the ground, on blocking or skids; prevent soiling or staining; cover products which are subject to deterioration with impervious sheet coverings; and provide adequate ventilation to avoid condensation.
- (3) Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and free from damage or deterioration.

D. Project Substitutions

- (1) Trade names, brand names and/or manufacturer's information used in these specifications are for the purposes of establishing quality. Bids on products or other qualified manufacturers are acceptable provided request is made in writing not less than ten (10) days prior to scheduled receipt of bids, and, if approved:
 - (a) No major changes in the construction, design intent, or to any services or modifications to other equipment of the project would be required. Changes required accommodating substituted items or the cost to repair and damage resulting from effecting such changes or modifications made necessary or caused by substitution shall be made by the Contractor at no additional cost or time delay.
 - (b) Features of quality, capacity, construction, performance, appearance, size, arrangement, and general utility including economy of operation of substitutes offered, either parallel or exceed those of specified products.

(c) The provisions of the General Conditions and any other guarantees, if required by the specification sections, shall apply in full force and effect to the performance of such substitute products, approved for incorporation into the work.

(2) Technical data covering the proposed substitution shall be furnished with the request.

1.18 TESTING

Tests called for by other than public authorities shall be made by approved independent laboratories with the full cooperation of the Contractor. The laboratory charges shall be borne by the Contractor unless otherwise specified. Testing services other than those called for in these contract documents may be called for by the County Engineer to check compliance with specifications, the testing service charges will be borne by the Owner, but when non-compliance with specification is indicated, the testing service charges will be deducted from the Contract Sum.

1.19 PUBLIC CONVENIENCE

The Contractor shall at all times conduct his work as to insure the least possible inconvenience to the general public and the residents in the vicinity of the work. Fire hydrants on or adjacent to the work shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to insure the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches, which shall not be obstructed except as approved by the County Engineer.

1.20 UTILITIES

- A. Existing utilities shall be located, protected, and rerouted as necessary during construction. All utilities affected by construction shall be relocated or replaced in a workmanlike manner.
- B. The Contractor shall be responsible for anticipating and locating underground utilities and obstructions. When construction appears to be in close proximity to existing utilities, the trench(es) shall be opened a sufficient distance ahead of the work or test pits made to verify the exact locations and inverts of the utility to allow for changes in line and grade.
- C. If active utility lines are encountered, and are not shown on the Drawings or otherwise made known to the Contractor, promptly take necessary steps to assure that service is not interrupted.
- D. It is not the intent of these specifications to identify each existing utility, but the responsibility of the Contractor to maintain, repair, or restore all utilities. Contractor shall be responsible for the cost of any damages to utilities caused by the construction.
- E. The Contractor will not be compensated for any additional expenses incurred or delays due to utility conflicts. However, the construction schedule may be

adjusted accordingly at the discretion of the County Engineer.

- F. Coordination: Phases of the construction which involve the temporary interruption of essential services shall be scheduled in consultation with the Owner or his representative and shall not be of longer duration than essential to accomplish the purpose for such interruptions. Advance notice of at least 48 hours shall be given to the Owner when the Contractor requires interruption of water service.

G. Protection of Utilities

- (1) Location of any utility shown on the plans is approximate. The Contractor is responsible for the protection of all utilities.

Take necessary precautions to protect existing utilities from damage due to any construction activity. The Contractor shall locate existing utilities, culverts, and structures (above or below ground), before any excavation starts and coordinate work with utility companies. Protect, maintain in service, and prevent damage to utilities not designated to be removed. Omission from or inclusion of located utility items on plans does not constitute non-existent or definite location. Secure and examine local utility surveyor records for available location data including building service lines. Contact underground damage protection services by contacting KENTUCKY 811 at least 48 hours before you dig at 1.800.752.6007, as required.

The Contractor shall protect, maintain in service, and prevent damage to utilities not designated to be removed. When utilities are encountered and are not shown on drawings or when locations differ from those shown on drawings, notify the County Engineer for instruction before proceeding. In the event that a gas line, water line, sewer line, storm line, power cable or conduit, or telephone cable or conduit is broken or damaged, the Contractor shall give immediate notice to the proper authorities and shall be responsible for any damage to persons or property caused by such breaks. If a service pipe to an adjoining house is broken, the Contractor shall repair same at once and at his expense. Metro may, at the Contractor's expense, repair any such service without prior notice to Contractor.

Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on an extra work basis.

The Contractor shall be responsible for protecting all existing utilities that could be damaged by excavation near the proposed line. Trench boxes may be necessary to prevent sloughing, etc., as well as to protect workmen, the motoring public, and the pavement. Failure to use a box, which subsequently results in damage to an existing line or other public improvements, shall be cause for liability against the Contractor for the repair costs.

Construction may require work on private property. When this occurs, it shall be the responsibility of the Contractor to contact the individual private property owner for exact location of the underground utilities or services prior

to any excavation on the property.

Construction may require the relocation of some existing utilities. Contractor shall coordinate any such relocation necessary for the construction with the respective utility owner. Metro shall be responsible for cost of relocation of utilities if applicable.

Contractor shall be responsible for cost of any damages to utilities caused by the construction, and may be required to perform repairs at Metro's request.

- (2) Some work under this contract may involve work in close proximity to overhead high voltage lines. Before any work involving high voltage overhead lines is anticipated or encountered, the Contractor must first request the Power Company to make safety arrangements to protect his workers and the lines. The actual expense incurred by the Power Company in taking these precautionary measures shall be paid by the person responsible for the work. Metro will consider these charges and pay them as an add-on to the project.
- (3) Traffic Plate Bridging - The Contractor shall secure approval, in advance, from the County Engineer and/or private utility company authorities for the use of any traffic plate bridges proposed by it for public use.

Transverse or longitudinal cuts in the right-of-way that cannot be properly completed within a workday shall be protected by structural steel plate bridging in such a way as to preserve unobstructed traffic flow. All structural steel plates placed over surface voids, such as trenches and other areas to be protected in the public right-of-way shall conform to the following:

- a. All unrestored voids, trenches, holes, excavations, etc., that are in the pedestrian or traveled way shall be protected through the use of adequately designed barricades and structural steel plates that will support legal vehicle loads. Structural steel plate bridging shall be designed for HS 20-44 truck loading. Trench Width/Minimum Plate Thickness shall adhere to the table below:

Trench Width	Minimum Plate Thickness
10" (0.25 m)	1/2" (13 mm)
1'-11" (0.58 m)	3/4" (19 mm)
2'-7" (0.80 m)	7/8" (22 mm)
3'-5" (1.04 m)	1" (25 mm)
5'-3" (1.6 m)	1 1/4" (32 mm)

Note: For spans greater than 5'-3" (1.6 m), a structural design shall be prepared by a registered civil engineer and approved by the County Engineer.

- b. Steel plates used for bridging must extend a minimum of 12 inches (300mm) beyond the edges of the trench. All plates shall provide complete coverage to prevent any person, bicycle, motorcycle or motor vehicle from being endangered due to plate movement causing

separations or gaps.

- c. Plates shall be installed with the plate laid in reasonably flat plane and all vertical edges transitioned with asphaltic cold-mix or other acceptable ramping device(s) acceptable to the County Engineer. Fine graded asphalt concrete shall be compacted to form ramps with a maximum slope of eight and one-half percent (8.5%) and a minimum of 12-inches (300mm) taper to cover all edges of the steel plates. When steel plates are removed, any damage to the pavement shall be repaired with either graded fines of asphalt concrete mix, asphaltic cold mix, concrete slurry or equivalent slurry satisfactory to the County Engineer. The Contractor shall be responsible for maintenance of the structural steel bridging plates, shoring and asphalt concrete ramps.
- d. Structural steel plates shall have a skid-resistant surface.
- e. The trench shall be adequately shored to support the bridging and traffic loads.
- f. Steel plate bridging shall be secured against movement or displacement by using adjustable cleats, shims, welding, or other devices, and shall be installed in a manner that will minimize noise.
- g. When steel plates are placed within the public right of way:

The Contractor's name and twenty-four (24) hour phone number shall be visible, legible and permanently affixed on each plate or, The Contractor shall erect sign(s) in the immediate area of the trench plate(s) identifying the Contractor's name with a twenty-four (24) hour phone number.

The minimum height of letters and numbers shall be 2 inches (50 mm).

The Contractor shall immediately mobilize necessary personnel and equipment after being notified by the County Engineer of a repair need. This includes, but is not limited to, plate anchors, cold-mix, asphalt concrete to transition/ramp from the existing roadway or sidewalk to the plate surface and back down. Failure to respond to the emergency request within two hours will be grounds for Metro repairs that will be invoiced at actual cost including overhead or \$500 per incident, whichever is greater. All Traffic Control Plans currently require prompt repairs of steel plating by the Contractor. Lack of Contractor conformance will be automatic grounds for suspension of their permit/contract.

H. Protection of Surface Features

- (1) Whenever the utility line is to be placed in or near a paved street, the Contractor shall provide pads or take necessary precautions to protect the

pavement from damage by the construction equipment. Pavement damaged by cleated or tracked equipment, or by any other means, shall be repaired by the Contractor at his expense.

- (2) Where a utility line is in an existing paved area, the edges of the pavement for the utility line shall be cut in a straight line, parallel to the pipe on each side. A straight and vertical cut shall be made either prior to excavation or after, but before installation of the permanent pavement repair.
- (3) Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property.
- (4) Provide full access to public and private premises, to fire hydrants, at street crossings, sidewalks and other points as designated by Metro to prevent serious interruption of travel.
- (5) Protect and maintain bench marks, monuments, or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Metro.

I. Procedures for Repairing Damaged Utilities

- (1) If a located or unlocated service is interrupted as a result of work under this Section, immediately notify the governing utility owner of said interruption and await instructions from utility owner. The Contractor is responsible for all costs incurred due to damage of the utility.
- (2) Service Laterals: If a water or sewer service pipe is broken, the Contractor shall repair same at once and at his expense. Metro may, at the Contractor's expense, repair any such service without prior notice to the Contractor.

J. Bracing Trenches: The Contractor will be required to furnish all trench boxes, shoring, bracing, etc. where necessary and in accordance with generally accepted construction practices. Where adjacent utilities may be damaged, vertical trench walls may be necessary. When so warranted, the Contractor shall furnish, at no additional cost, all bracing, sheeting, shoring, trench boxes, etc. necessary to carry out the intended work. Conform to the requirements of Title 29 Labor, Part 1518 - "Safety and Health Regulations for Construction" and detailed requirements of Subpart P "Excavations, Trenching and Shoring," latest edition regarding trench protection requirements. NO compensation will be made for compliance with OSHA requirements. When OSHA regulations require work in addition to our minimum standards, no compensation will be made.

K. Encroachment Permits: All crossings under KYTC system roads shall be made in accordance with the requirements of the KYTC as outlined in the encroachment permit(s). No extra compensation will be allowed.

L. Railroad Permits: If installation is in Railroad right of way, all permits shall be obtained and Railway Company shall be notified prior to installation.

M. Roadway Crossings: If installation is in a Metro right of way, all permits shall be obtained and Metro shall be notified prior to installation.

1.21 SAFETY

Contractor to conform to all OSHA regulations for all construction on Metro Projects.

1.22 DUST CONTROL

The Contractor shall be required to sprinkle with water or to apply dust allaying materials in the vicinity of dwellings, schools, churches, stores, or other places, where in the opinion of the County Engineer, this is necessary to ensure that dust is held to an absolute minimum. Dust control is considered incidental and shall be carried out at the Contractor's expense.

1.23 PROTECTIVE EQUIPMENT

Use of protective equipment (e.g. safety harnesses, hoists, breathing apparatus) is required when working inside manholes in accordance with current OSHA guidelines.

1.24 TRAFFIC CONTROL

It shall be the sole responsibility of the Contractor to furnish and maintain, until the work has been accepted by Metro, any and all signs, lights, barricades, flashing directional arrows, flagmen, etc. necessary for the safety of the general public, including both vehicular and pedestrian traffic.

Traffic control shall conform to the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD). The Contractor shall furnish, install, and maintain amber warning lights at all locations necessary for the control and protection of vehicular traffic. Warning lights placed at or on warning signs shall be flashing lights. Warning lights used for delineation of traffic and at locations of hazardous construction shall be steady-burn lights. Amber warning lights shall battery power lights conforming to the MUTCD.

The contractor shall apply for a permit through Metro Public Works for any road closures a minimum of 1 week prior to implementation.

While working in street rights-of-way, traffic is to be maintained in such a manner as to provide safe passage of the public through the construction project at all times. Flagging should only be employed when required to control traffic or when all other methods of traffic control are inadequate to warn and direct drivers. Flaggers must be certified as having received training on MUTCD flagging procedures and have the certification card with them while flagging current within the last 5 years. At least one lane of traffic shall be maintained at all times. While work is not in progress, traffic is to be returned to the normal fashion. When two-way traffic is required, the Contractor shall construct within the right of way suitable detours around the work.

When traffic signals or their appurtenances are likely to be damaged or interfere as a result of the construction, coordinate temporary operation with the Metro Traffic

Engineer unless otherwise approved by the Metro Traffic Engineer. Provide 7 days notice prior to anticipated disturbance or interruption.

Whenever it becomes necessary to leave a section of trench open after completion of the days work, the Contractor shall provide barricades and lights to protect the public. Operate warning lights during hours from dusk to dawn each day and as otherwise required for inclement weather and visibility. Approval from County Engineer shall be acquired prior to leaving trench open.

The Contractor shall promptly remove any excavated material or other debris that may be spilled or tracked onto the traveled pavement during the conduct of his work.

Upon all road closings and detours, the Contractor shall be responsible for notifying EMS, FIRE, SWMS or other essential emergency or governmental services until such time the road is returned to normal operation.

The Contractor shall provide and place no parking signs on streets that are to be overlaid. These signs shall be placed not more than 36 hours in advance of resurfacing work and no less than 24 hours prior to work. Cost for placing these signs shall be included in other bid items, there will be no payment for the labor or equipment required to place these signs.

When roadwork is scheduled for major thoroughfares or expressways, the Contractor cannot obstruct the roadway before 9:00 a.m. or after 3:00 p.m.

1.25 SNOW REMOVAL

During the months of November, December, January, February, and March, the contractor shall be responsible for monitoring the weather and preparing the area for snow removal operations prior to an inclement weather event. The contractor shall bear all costs associated with damages resulting from failure to comply with any and all requirements set forth in this procedure.

1.26 CONSTRUCTION STAKING

All property pins or corners shown on plan or identified by property owners shall be referenced prior to start of construction and otherwise protected and any property corner removed shall be replaced by a Kentucky Licensed Professional Land Surveyor at no additional cost. The Metro Project Manager shall be furnished a copy of each property corner reference. The Contractor shall protect and preserve all reference points and offset stakes and replace it at no additional cost if they are destroyed. Failure to reference property pins or destroying references will not relieve the Contractor of the responsibility of restoring the property corners.

Metro will provide construction stakeout on all projects designed by Metro. For projects designed by consultants on behalf of Metro, construction stakeout will be provided by the consultant.

Upon completion of consultant-designed projects, the consultant shall provide the County Engineer with copies of all-original field notes, electronic field book files, worksheets, layouts, and computations in a standard notebook, or on disk.

1.27 ROCK EXCAVATION

Rock excavation shall consist of the removal and satisfactory disposal of all materials, which in the opinion of the Engineer, cannot be excavated except by drilling, blasting, wedging, "jack hammering or hoe ramming." It shall consist of undecomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than one-half cubic yard will be classified as rock. When rock is encountered in the trench, the inspector or engineer must be notified before any rock has been blasted or removed. The engineer or his representative will measure the rock, after which, the rock shall be excavated to the depth required. Rock shall be removed from the construction site unless otherwise approved by the County Engineer.

1.28 BLASTING

A. If necessary, the Contractor shall perform all blasting activities in general accordance with applicable Kentucky Revised Statutes (KRS).

1.29 DITCH REGRADING

When construction is at or near roadside ditches, the Contractor shall re-grade the shoulder and ditches to a condition equal to or exceeding the pre-construction condition.

1.30 PROTECTION OF UNFORESEEN UNIDENTIFIED ARCHEOLOGICAL OR CULTURAL RESOURCES

If previously unidentified archeological or cultural resources are encountered during structural or trench excavation, the contractor shall stop work in that area immediately and notify the engineer and the owner's representative. Archeological resources will generally include but not be limited to significant cultural layers containing concentrations of bones, artifacts, wooden or masonry structures all in consolidated soils. If the unidentified resources are deemed significant and require stoppage of work at the location for more than 4 hours, the contractor will be paid for equipment and personnel that must remain idle. The owner will make every effort to allow the contractor to move to another location on the project and continue work until this issue is resolved.

1.31 PROTECTION AND RESTORATION OF PROPERTY

The Contractor shall not enter upon private property for any purpose without first obtaining permission from the property owner. He shall use every precaution necessary to prevent damage or injury to any public or private property, trees, fences, monuments, and underground structures, etc., on and adjacent to the site of the work. He shall protect carefully from disturbance or damage all land monuments and property markers until an authorized agent has witnessed or otherwise referenced their locations and shall not remove them until directed.

The Contractor shall be responsible for all damage or injury to property of any character resulting from any act, omission, neglect, or misconduct in his manner or

method or executing said work, from his nonexecution of work, or from defective work or materials, and he shall not be released from said responsibility until the work shall have been completed and accepted.

When or where any direct or indirect damage or injury is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work, he shall restore such property, at his own expense, to a condition equal to or better than that existing before such damage or injury was done, by repairing, rebuilding, or otherwise restoring to the approval of the property owner and County Engineer.

1.32 CLEANUP AND RESTORATION OF SITE

Maintain the site in a neat and orderly condition at all times. Do not allow the accumulation of scrap, debris, waste material, and other items not required for construction of this work. Provide adequate storage for all items waiting removal from the site.

At all times, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site; and shall keep the site free of mud and dust to the satisfaction of the County Engineer. It is important that cleanup and restoration of the site follow the work closely. The Contractor shall dispose of surplus material and clean the street at the end of each day for the portion of work completed that day. After all work is completed, the Contractor shall remove all tools and other equipment, leaving the site free, clean, and in good condition.

1.33 SEEDING AND GROUND COVER, EROSION AND SEDIMENT CONTROL

A. Landscaping Materials shall comply with Sections 827 – *Erosion Control Materials* of the current KYTC *Standard Specification for Road and Bridge Construction*.

B. Channel lining materials and application shall comply with Sections 703 of the current KYTC *Standard Specification for Road and Bridge Construction*.

C. Preparation and application of seeding and ground cover shall comply with Sections 212 of the KYTC, *Standard Specification for Road and Bridge Construction*, which covers topsoil, seeding, sodding, and erosion control blankets.

1.34 EROSION AND SEDIMENT CONTROL

Erosion control design, procedures, and application of measures shall comply with the requirements of Metropolitan Sewer District (MSD) Standard Specifications and Drawings, latest edition. Any off-site location that is used as a source of borrow soil materials or receives waste soil materials from this site must be approved by MSD.

1.35 USE OF COMPLETED PORTIONS

The Owner shall have the right to use, occupy, or place into operation any portion of the work that has been completed sufficiently to permit safe use, occupancy, or

operation, as determined by the Engineer. Such use or occupancy shall not be construed to be an acceptance of the work.

1.36 CONTRACT CLOSEOUT

Contract Closeout shall include the following items prior to submission of final Application for Payment by the Contractor:

- A. Correct all punch list items within 30 days of final inspection.
- B. Schedule a final cleaning as approved by the Engineer to enable the Owner to accept a completely clean project. Clean up all debris; remove stains, spots, marks, and dirt; remove paint spots and smears from all surfaces; and clean fixtures. Remove all machinery, equipment, and surplus material.
- D. Guarantees, Warranties, and Bonds: Submit all required guarantees, warranties, and bonds.
- E. Statement of payment of taxes.
- F. Affidavit of Release of Liens.

1.37 GUARANTEE

The Contractor shall guarantee all work under this contract against defective materials, defective workmanship, or failure to perform any work shown or stated within the plans or specifications for a period of 12 months or 24 after the completion and acceptance of all, or any part of the project, by Metro. The surety underwriting the contract bond shall include such guarantee as a part of the contract bond.

PART 2 - MATERIALS

Not Applicable

PART 3 - EXECUTION

Not Applicable

END OF SECTION
01000

SECTION 01200 – MEASUREMENT AND PAYMENT

(January 2015)

Measurements for purposes of payment shall be in accordance with the unit quantities stated in the proposal as defined below. Prices for the following bid items shall include all labor, materials, tools, equipment, and other incidentals necessary to complete the work as shown on the plans and in accordance with KYTC Standard Specifications for Road and Bridge Construction.

1.1 TRENCHING, BACKFILLING & COMPACTION OF UTILITIES

A. Pavement Cut and Removal, Asphalt Concrete:

Measurement: Asphalt concrete pavement cut and removal will be measured in cubic yards.

Payment: Asphalt concrete pavement cut and removal will be paid for at the contract unit price per cubic yard for bituminous pavement cut and removal, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

B. Pavement Cut and Removal, Unreinforced Concrete:

Measurement: Unreinforced concrete pavement cut and removal will be measured in cubic yards.

Payment: Unreinforced concrete pavement cut and removal will be paid for at the contract unit price per cubic yard for unreinforced concrete pavement cut and removal, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

C. Pavement Cut and Removal, Reinforced Concrete:

Measurement: Reinforced concrete pavement cut and removal will be measured in cubic yards.

Payment: Reinforced concrete pavement cut and removed will be paid for at the contract unit price per cubic yard for reinforced concrete pavement cut and removal, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

D. Extra Depth Excavation – All Pipes:

Measurement: Extra depth excavation for pipelines will be measured by the cubic yard.

Payment: Extra depth excavation will be paid for at the contract unit price per cubic yard for extra depth excavation and shall include all material, equipment, and labor required for excavation. The price shall also include all shoring, trench boxes, dewatering, traffic control, and safety devices required.

E. Foundation Stone:

Measurement: Foundation stone for pipelines will be measured by the cubic yard of foundation stone placed in the trench. Each cubic yard of foundation stone material placed will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic foot).

Payment: Foundation stone will be paid for at the contract unit price for foundation stone by the ton. Price shall include removal and disposal of unusable material and placement of stone, complete in place.

F. Bedding Stone:

Measurement: Bedding stone for pipe bedding will be measured by the cubic yard of pipe bedding material placed in the trench. Each cubic yard of bedding material calculated will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic foot).

Payment: Bedding stone will be paid for at the contract unit price per ton for placement of stone, complete in place.

G. Compacted Aggregate Backfill:

Measurement: Compacted aggregate backfill will be measured by the cubic yard of material placed. Each cubic yard of material calculated will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic foot).

Payment: Compacted aggregate backfill will be paid for at the contract unit price per ton for aggregate backfill and shall include all materials, equipment, and labor required to furnish and compact in place. Dense Graded Aggregate shall be placed in the locations designated by the County Engineer.

H. Coarse Granular Aggregate Backfill:

Measurement: Coarse granular aggregate backfill will be measured by the cubic yard of material placed. Cubic yard of material calculated will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic foot).

Payment: Coarse granular aggregate backfill will be paid for at the contract unit price per ton for aggregate backfill and shall include all materials, equipment, and labor required to furnish and consolidate in place. KY #57 stone shall be placed in the locations designated by the County Engineer.

I. Trench (Select) Borrow Backfill:

Measurement: Trench borrow will be measured by the cubic yard of material installed in the trench, limiting the trench width to a maximum of the pipe outside diameter plus 2 feet.

Payment: Trench borrow will be paid for at the contract unit price by the cubic yard and shall include all material, equipment, and labor to furnish, haul, place, and compact the approved material in place, in the locations as designated on the drawings or as approved by the County Engineer.

J. Trench Rock:

Measurement: Trench rock excavation will be measured by the County Engineer or his representative in its original position, after which the rock shall be excavated to the depth specified by the County Engineer and then measured by the cubic yard. Rock excavation shall consist of the removal and satisfactory disposal of all materials, which are classified as rock in the opinion of the Engineer. No payment shall be made for rock removal by ripping.

Payment: Trench rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, and equipment to excavate and dispose of rock off site.

K. Trench Patching for New Pipe Installation – Permanent and Temporary:

See Section 1.6 Base Course & Paving

L. Excavation and Backfill:

Measurement and Payment: In accordance with Section 02220, *Trenching, Backfilling, and Compaction of Utilities*, all excavation and backfill, excluding select borrow backfill, shall be included in the cost of the other items bid – not a pay item.

M. Maintenance Stone for Pipe Installation:

Measurement: Maintenance stone for pipe installation will be measured by the cubic yard of material placed per the direction of the County Engineer's representative. Each cubic yard of material calculated will be converted to tons using the weight of 3915 pound per cubic yard (145 pounds per cubic foot).

Payment: Maintenance stone for pipe installation will be paid for at the contract unit price per cubic yard for aggregate backfill on a one time basis and shall include all materials, equipment, and labor required to furnish and compact in place. Dense Graded Aggregate shall be placed in the locations designated by the County Engineer.

N. Non-Metallic Warning Tape: (Not a pay item, incidental to other items bid)

O. Metallic Locating Wire: (Not a pay item, incidental to other items bid)

1.2 SANITARY SEWER

A. Sewer Pipe (including Carrier Pipe):

Measurement: Sewer pipe will be measured from the exact beginning of the pipe to the end of the line. No deductions in length will be made for branches and appurtenances along the line.

Payment: Sewer pipe will be paid for at the contract unit price per linear foot for pipe of the type and size specified, complete in place (excluding stone bedding), at the 4-foot minimum depth to top of pipe. This price shall include trench excavation (excluding rock), warning tape, tracing wire (as applicable per specifications),

shoring or use of trench box, installation, pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing and televising.

B. Bored and Jacked Sewer Pipe:

Measurement: Bored and jacked sewer pipe of the type and diameter specified will be measured by the linear foot that is installed by the boring and jacking method.

Payment: Bored and jacked sewer pipe will be paid for at the contract unit prices per linear foot per diameter per type of pipe bored and shall include any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts.

C. Encasement Pipe (Bored):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear foot of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe bored, complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the County Engineer. Carrier pipe shall be paid for separately.

Encasement of sewer lines by the dry bore and jacking method shall include any and all excavation, including the boring pit, any backfill, the encasement pipe, bore, jacking, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

D. Encasement Pipe (Open Cut):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe installed by the open cut method, complete in place. Carrier pipe shall be paid for separately.

Encasement of sewer lines by the open cut method shall include any and all excavation, including, any backfill, the encasement pipe, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

E. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

Payment: Tunneling will be paid for at the contract unit price per linear foot for diameter installed. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the County Engineer. Carrier pipe shall be paid for separately.

The tunneling method shall include any and all excavation, including the boring pit, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

F. Manholes - Standard:

Measurement: Standard manholes will be measured by the vertical foot of the manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest ½-foot.

Payment: Standard manholes will be paid for at the contract unit price per vertical foot, complete in place including excavation. Price shall include complete invert pouring and forming of concrete in accordance with the standards and drawings, rubber boots, bedding stone, bolting castings to cone, gaskets, vent pipe if required, external wrap, vacuum testing, backfill, compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

G. Manholes – Drop (Interior and Exterior):

Measurement: Drop manholes will be measured the same as for a standard manhole in vertical feet of manhole constructed plus, a separate measurement per vertical foot per drop height. The drop height shall be from invert of the lower line to invert of the upper line.

Payment: Drop manholes will be paid in vertical feet at the contract unit price of regular manhole plus a separate payment per linear foot for drop height (DH) and measured from the invert of lower line to the invert of upper line including pipe, bends, concrete, bedding stone, and excavation. Price is to include strapping to casting (as applicable), concrete, tees, elbows, plugs/caps, stone, backfill and compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

H. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price per vertical foot, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non- shrink grout as well as installation of the external grade/riser sealant.

I. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, complete in place.

J. Appurtenances:

Measurement: Wye Branches, tees, bends, etc. will be measured by the number of units installed of each size.

Payment: Wye branches, tees, bends, etc. will be paid for at the contract unit price per each, complete in place for each size.

K. Building Connection Service Pipe:

Measurement: Building connection service pipe will be measured from the outside end of the wye or 45-degree bend to the combination wye for the cleanout, in linear feet.

Payment: Building connection service pipe will be paid for at the contract unit price per linear foot per size of pipe, complete in place for a 4-foot depth above top of pipe, including warning tape and locating wire. All depths greater than 4 feet will be paid as "extra depth excavation." Any temporary pumps required to by-pass sewer around work areas shall be provided at no additional cost.

L. Cleanout Assembly:

Measurement: Cleanout assemblies will be measured on an each basis. No measurement will be made for the following items that are included in the cleanout assembly measurement: combination wye, adapter, and plug, 45-degree bend, 24" long SCH 40 PVC extension with solvent weld cap, warning tape, locating wire and cleanout assembly.

Payment: Cleanout assemblies will be paid for at the contract unit price per each for cleanout assemblies per size and shall include all labor, material, equipment necessary for installation, complete in place.

M. Cleanout Vertical Pipe:

Measurement: Cleanout vertical pipe will be measured from top of the combination wye to cap in linear foot.

Payment: Cleanout vertical pipe will be paid for per linear foot per size at the contract unit price, complete in place, including excavation, locating wire, and all materials, labor, and equipment and shall include full compensation for any final adjustments to grade once finish grade is established.

N. Service Saddles on Existing Lines:

Measurement: Service saddles for taps placed on existing lines will be measured on an each basis per size installed.

Payment: Service saddles for taps placed on existing lines will be paid for at the contract unit price per each, complete in place. Any temporary pumps required to by-pass sewer around work areas shall be provided at no additional cost.

O. Machine Core Existing Manholes:

Measurement: Machine core of existing manholes will be measured on an each basis.

Payment: Machine core of existing manholes will be paid for at the contract unit price per each. Price shall include all labor, equipment, and materials to machine core drill and install the neoprene flexible boot and adjustable band, complete in place.

P. Manhole Abandonment:

Measurement: Manhole abandonment will be measured on an each basis.

Payment: Manhole abandonment will be paid for at the contract unit price per each, complete in place in accordance with Section 708, *Filling and Capping, Safeloading, and Plugging Abandoned Underground Structures* within the latest revision of the KYTC *Standard Specification for Road and Bridge Construction*.

Q. Fernco Flexible Couplings:

Measurement: Fernco couplings will be measured on an each basis of the size required.

Payment: Fernco couplings will be paid for at the contract unit price per each of the size required. Price shall include a concrete support cradle 4 inches thick, extending to the springline of the fitting. The concrete shall extend for 6 inches of either edge of the fernco. Price shall include all labor, equipment, and materials to install the coupling, complete in place.

R. Harco Rigid Fittings:

Measurement: Harco rigid fittings will be measured on an each basis of the size required.

Payment: Fittings will be paid for at the contract unit price per each of the size required. Price shall include all labor, equipment, and materials to install the fitting, complete in place.

S. Rehab/Lining of Sanitary Sewers:

Measurement: Rehab/lining of existing sanitary sewer lines will be measured on a per foot basis of each size of line.

Payment: Rehab/lining of existing sanitary sewer lines (installation of a flexible liner) will be paid for at the contract unit price per foot of each size line by the cured-in-

place pipe process or folded and formed process. Price shall include all material, equipment, and labor, including bypass pumping, pre-insertion cleaning and television inspection, insertion and curing of liner, sealing liner at manholes, testing, and final television inspection for a complete in place lining. Price does not include point repairs or repairs to manholes.

T. Reinstatement of Laterals in Lined Sections:

Measurement: Reinstatement of laterals will be measured on an each basis of 4- and 6-inch service existing connections reinstated.

Payment: Reinstatement of laterals will be paid for at the contract unit price per each of 4- and 6-inch service connections. Price shall include all labor, equipment, and materials to reinstate the service laterals complete in place including determination of location of existing laterals by use of pre-lining video, use of dye to determine active laterals, and use of remote operated cutter.

U. Manhole Scour Protection – Sacrificial Concrete:

Measurement: Application of sacrificial concrete in a manhole will be measured on an each basis per manhole (based on 8 feet of depth of manhole coverage).

Payment: Application of sacrificial concrete in a manhole will be paid for at the contract unit price per each manhole. Price shall include all labor, equipment, and materials to apply the concrete complete in place.

V. Manhole Scour Protection - Coating:

Measurement: Application of coating in a manhole will be measured on an each basis per manhole (based on 8 feet of depth of manhole coverage).

Payment: Application of coating in a manhole will be paid for at the contract unit price per each manhole. Price shall include all labor, equipment, and materials to apply the coating complete in place.

1.3 WATER DISTRIBUTION

A. Water Pipe (including Carrier Pipe):

Measurement: Water pipe will be measured by the linear foot. All pipe will be measured from the exact beginning of the pipe to the end of the line without deduction for fittings (i.e. fittings and valves). Hydrant leads will also be measured as pipe.

Payment: Water pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified, complete in place. This price shall include trench excavation (excluding rock), shoring, or use of trench box, installation, warning tape, locating wire (as required per applicable specification), pumping, backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing, chlorinating, and proper disposal of chlorinated water. Payment for mechanical joint pipe shall also include accessory kits.

B. Bored and Jacked Water Main Pipe:

Measurement: Bored and jacked water pipe of the type and diameter specified will be measured by the linear feet installed by the boring and jacking method.

Payment: Bored and jacked water pipe will be paid for at the contract unit prices per linear foot per diameter per type of pipe bored and shall include any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off grade or alignment shall be rejected or corrected in a manner approved by the County Engineer.

C. Encasement Pipe (Bored):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe bored and shall include any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the County Engineer. Carrier pipe shall be paid for separately.

Encasement of water lines by the dry bore and jacking method shall include any and all excavation, including the boring pit, any backfill, the encasement pipe, bore, jacking, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

D. Encasement Pipe (Open Cut):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe installed by the open cut method, complete in place. Carrier pipe shall be paid for separately.

Encasement of water lines by the open cut method shall include any and all excavation, any backfill, the encasement pipe, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

E. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

Payment: Tunneling will be paid for at the contract unit price per linear foot for diameter installed. Lines either off grade or alignment shall be rejected or corrected

in a manner approved by the County Engineer.

The tunneling method shall include any and all excavation, including the boring pit, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

F. Valves:

Measurement: Gate valves, butterfly valves, double detector check valves and tapping valves, will be measured on an each basis of the size and type of valve installed.

Payment: Gate valves, butterfly valves, double detector check valves and tapping valves, will be paid for at the contract unit price, complete in place including megalugs, per valve for the type and size specified. This price shall include providing and installation of valve box. Cost for accessory kit included in price of valve.

G. Valve Boxes: (not a pay item)

H. Air and Vacuum Release Valves:

Measurement: Air and vacuum release valves will be measured on an each basis.

Payment: Air and vacuum release valves will be paid for at the contract unit price per air and vacuum valve for the size specified, complete in place. This price shall include the tap and/or saddle, brass corporation stop, valve, street ells and screen, (excluding the manhole and frame and cover), and other incidentals.

I. Wet Tap:

Measurement: Wet taps will be measured on an each basis.

Payment: Wet taps will be paid for at the contract unit price per tap for the size specified, complete in place. Wet tap price shall include furnishing all materials, equipment, and labor to make a wet tap on an existing line, to include valve, valve box, tapping sleeve, anchor blocks, excavations, backfill, and testing of sleeve.

J. Fire Hydrants (High Pressure and Low Pressure):

Measurement: Fire hydrants will be measured by the number of hydrants installed on an each basis.

Payment: Fire Hydrants will be paid for at the contract unit price per each to include all labor, materials, equipment necessary to install the hydrant including one-half cubic yard of #57 stone, accessory kits, megalugs, fabric, testing and disinfecting, painting, complete in place. When there is change in the plans, which results in the need for a longer extension of the fire hydrant barrel, the extension beyond the depth of 4 feet shall be paid for at the contract unit price per vertical foot of

barrel for the fire hydrant extension. No additional compensation will be made for hydrants located on either high or low pressure systems.

K. Fire Hydrants Pads:

Measurement: Fire hydrant pads will be measured on an each basis.

Payment: Fire hydrant pads will be paid for at the contract unit price per each to include all labor, materials, equipment necessary to install the hydrant pad, complete in place, including placement and compaction of 4 inches of Dense Graded Aggregate and placement of a 4' x 4' x 4" concrete pad.

L. Installation of Fire Hydrants on Existing Water Mains:

Measurement: Installation of fire hydrants on existing mains will be measured accordingly with each specific line item used for such installation. For example, items such as fire hydrants, pipe, pavement cuts, fittings, seeding and grading, etc. shall be measured under appropriate item description.

Payment: Installation of fire hydrants on existing mains including megalugs will be paid for accordingly with each specific line used for such installation. For example, items such as fire hydrants, pipe, pavement cuts, fittings, seeding and grading, etc. shall be paid under appropriate item description.

M. Relocation of Existing Fire Hydrants:

Measurement: Relocation of an existing fire hydrant by the method of removing and reinstalling a Metro owned fire hydrant at another location will be measured on an each basis.

Payment: Relocation of an existing fire hydrant by the method of removing and reinstalling a Metro owned fire hydrant at another location will be paid for on an each basis, at a lump sum price that is agreed upon and approved by the County Engineer prior to commencing any work.

N. Fittings and Accessories:

Measurement: Fittings and accessories will be measured by the pound.

Payment: Fittings and accessories will be paid for at the contract unit price by the pound based on AWWA C110/ANSI 21.10 published weights and shall include all material, equipment, megalugs and labor to install, test, disinfect, complete in place.

O. Flexible Couplings:

Measurement: Flexible couplings will be measured by the number of each size installed.

Payment: Flexible couplings will be paid for at the contract unit price per flexible coupling for the size specified, to include installation, complete in place.

P. Tie Rods, Mechanical Thrust Restraint, Retainer Glands and Retainer Clamps:

Measurement: Tie rods, mechanical thrust restraint, retainer glands, and retainer clamps will be measured in pounds of the specified size installed.

Payment: Tie rods, mechanical thrust restraint, retainer glands, and retainer clamps will be paid for at the contract unit price per pound for the type retainer specified, complete in place. The price shall include all nuts, bolts, eyebolts, gaskets, and special retainer washers required for assembly.

Q. Manholes for Air Release/Vacuum Valves and other Water Valves:

Measurement: Manholes for air release and vacuum valves and other water valves will be measured by the vertical height from the top of the footing to the bottom of the frame casting and recorded to the nearest ½ foot.

Payment: Manholes for air release and vacuum valves and other water valves will be paid for at the contract unit price per vertical foot for manholes, complete in place. The price shall include the concrete foundation and drainage. Cost for manholes is to include all installation, backfill, compaction, etc. The valve and the manhole frame casting are to be paid as separate items from the manhole.

R. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price per vertical feet, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non-shrink grout.

S. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, to include bolting the frame and cover to the structure, complete in place.

T. Vaults:

Measurement: Installation of vaults will be measured accordingly with each specific line item used for such installation. For example, items such as valves, fire hydrants, pipe, pavement cuts, fittings, formed concrete, etc. shall be measured under appropriate item description.

Payment: Installation of vaults will be paid for accordingly with each specific line item used for such installation. For example, items such as valves, fire

hydrants, pipe, pavement cuts, fittings, formed concrete, etc. shall be paid for and include all work as defined under the appropriate costs for that item description. Any additional costs for an item that does not have a specific price or is not included in other costs must be approved by the County Engineer prior to commencing any work.

U. Water Meter Box and Assembly (Replacement of Existing Connection Only):

Measurement: Water meter box and assemblies will be measured on an each basis.

Payment: Water meter box and assemblies will be paid for at the contract unit price per size indicated on drawings, in terms of one complete box and meter connection assembly, and shall include excavations, backfilling, testing, chlorinating, bacteriological testing, meter box, angle valve, iron yoke, yoke ell, cast iron top, and corporation stop, complete in place. If replacing an existing meter box, cost shall include removal and disposal of the old meter box and assembly. If meter box does not require tying into existing service, pigtail shall be crimped. Cost for either circumstance shall be included in other items bid.

V. Water Meter Box and Assembly (New Construction Only):

Measurement: Water meter box and assemblies will be measured on an each basis.

Payment: Water meter box and assemblies will be paid for at the contract unit price per size indicated on drawings, in terms of one complete box and meter connection assembly, and shall include excavations, backfilling, testing, chlorinating, bacteriological testing, meter box, angle valve, iron yoke, dual check valve, cast iron top, and corporation stop, complete in place. If replacing an existing meter box, cost shall include removal and disposal of the old meter box and assembly. If meter box does not require tying into existing service, pigtail shall be crimped. Cost for either circumstance shall be included in other items bid.

W. Copper Pipe for Water Services (Open Cut):

Measurement: Copper pipe for water services will be measured by the linear foot from the center of the water main to the center of the water meter box in a horizontal plane.

Payment: Copper pipe for water services will be paid for at the contract unit price per linear foot of the size indicated on the drawings and shall include all equipment, labor, and materials for installation, to include testing and disinfection, complete in place, at a minimum depth of 24 inches below the top of the meter box.

X. Copper Pipe for Water Services (by Jacking or Boring):

Measurement: Copper pipe by jacking or boring will be measured by the linear foot from the center of the water main to the center of the water meter box in a horizontal plane.

Payment: Copper pipe by jacking or boring will be paid for at the contract unit price

per linear foot of the size indicated on the drawings and shall include all equipment, labor, and materials for installation to include testing and disinfection, complete in place, at a minimum of 24 inches below the top of the meter box.

Y. Removal of Asbestos Cement Pipe:

Measurement: Removal of asbestos cement pipe will be measured based on the following definition: when the amount of pipe to be removed is less than 12 feet, the item will be measured on an each basis. When the amount removed exceeds 12 feet, the item will be measured on an each basis plus the bid price per linear foot for pipe removed in excess of 12 feet.

Payment: Removal of asbestos cement pipe will be paid for at the contract unit price per each up to 12 feet of removal then after 12 feet, an additional payment will be made on top of the each basis, per linear foot and shall include all labor, materials, and equipment to excavate, remove and properly disposal of pipe.

Z. Dechlorination: (Not a pay item, incidental to other items bid)

1.4 STORM DRAINAGE

A. Storm Pipe (including Carrier Pipe):

Measurement: Storm pipe will be measured from the exact beginning of the pipe to the end of the pipe.

Payment: Storm pipe will be paid for at the contract unit price per linear foot for pipe of the type and size specified, complete in place (excluding stone bedding), at the 4-foot minimum depth to top of pipe. This price shall include trench excavation (excluding rock), warning tape, locating wire (as required per applicable specifications) shoring or use of trench box, installation, pumping, joint compound, backfilling, compaction, televising and disposal of excess material.

B. Manholes - Standard:

Measurement: Standard manholes will be measured by the vertical foot of manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest ½-foot.

Payment: Standard manholes will be paid for at the contract unit price per vertical foot, complete in place, including excavation. Price shall include complete invert pouring and forming of concrete in accordance with the standards and drawings, rubber boots, bedding stone, bolting castings to cone, gaskets, vent pipe if required, vacuum testing, backfill, and compaction. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

C. Manholes – Drop (Interior and Exterior):

Measurement: Drop manholes will be measured the same as for a standard manhole in vertical feet manhole constructed plus, a separate measurement per vertical foot per drop height. The drop height shall be from invert of the lower line to invert of the upper line.

Payment: Drop manholes will be paid in vertical feet at the contract unit price of regular manhole plus a separate payment per linear foot for drop height (DH) and measured from the invert of lower line to the invert of upper line including pipe, bends, concrete, bedding stone, and excavation. Price is to include strapping to casting (as applicable), concrete, tees, elbows, plugs/caps, stone, backfill and compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

D. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non-shrink grout.

E. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, complete in place.

1.5 EARTHWORK

A. Offsite Borrow:

Measurement: Off-site borrow will be measured in its original position by cross sectioning the area excavated for borrow. The number of cubic yards will be computed from cross section measurements by the average end method.

Payment: Off-site borrow will be paid at the contract unit price per cubic yard for material placed, compacted, and complete in place, including all excavation, loading, hauling, erosion control of borrow source, placement, spreading and compaction of borrow material.

B. Onsite Borrow: Material obtained from the site by cut and fill areas or other areas onsite that are designated to be used as borrow material is not a pay item for material but payment will be made by regular excavation.

C. Regular Excavation:

Measurement: Regular excavation will be measured in its original position by cross sectioning the excavation area. The number of cubic yards will be computed from cross section measurements by the average end method. When it is impractical to measure by cross-section method, other acceptable methods, involving three-dimensional measurements may be used if approved by the County Engineer.

In cut sections, excavation of topsoil and root mat and material down to a point of 1 foot below elevation of the top of earthwork or to the depth specified on the plans will be measured at regular excavation. When areas of unsuitable material are shown on the plans, excavation down to a point of 1 foot below the elevation of such material shown on the plans will be measured as regular excavation.

In fill sections, excavation of topsoil and root mat and material down to an elevation of 1 foot below the bottom of topsoil and root mat will be measured at regular excavation. When areas of unsuitable material are shown on the plans, excavation down to a point 1 foot below the elevations of such material shown on the plans will be measured at regular excavation.

Payment: Regular excavation will be paid at the contract unit price per cubic yard of excavation and shall include all labor, equipment, and material required, complete in place, including all excavation, loading, moving of cut and fill material, placement, spreading and compaction of material.

D. Rock Excavation:

Measurement: Rock excavation will be measured by the County Engineer or his representative in its original position, after which the rock shall be excavated to the depth specified by the County Engineer and then measured by the cubic yard. Rock excavation shall consist of the removal and satisfactory disposal of all materials, which are classified as rock in the opinion of the Engineer. No payment shall be made for rock removal by ripping. Refer to Section 02200- *Earthwork-paragraph Rock Excavation* for definition of materials classified as rock.

Payment: Rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, and equipment to excavate and dispose of rock off site.

E. Undercut Excavation:

Measurement: The material shown on the plans as undercut excavation or determined by the County Engineer to be unsuitable and designated as undercut excavation and not included in regular excavation will be measured by cross sectioning the undercut area. The number of cubic yards will be computed by average end method. When it is impractical to measure by cross-section method because of erratic locations of isolated deposits, other acceptable methods, involving three-dimensional measurements may be used if approved by the County Engineer.

When unsuitable material must be removed from an area of the project where undercut is not shown on the plans, unsuitable material removed after reaching an elevation 1 foot below the top of the earthwork in cut sections and 1 foot below the bottom of topsoil and root mat in fill sections will be measured as undercut excavation. Unsuitable material removed after reaching an elevation 1 foot below the top of earthwork in cut sections, or 1 foot below the elevation of such material shown on the plans, or 1 foot below original ground in fill sections where topsoil and root mat are not required to be removed, will be measured as undercut excavation.

Payment: Undercut excavations will be paid for at the contract unit price per cubic yard for undercut excavation and shall include all labor, equipment, and material

required, complete in place, including all excavation and disposal of material.

F. Pavement Cut and Removal:

Measurement: Pavement cut and removal shall consist of the removal and satisfactory disposal of all materials that may be designated for removal by the County Engineer or shown to be removed on plans. Pavement cut and removed shall be measured by the cubic yard in terms of material removed from its original positions. No payment for materials removed without authorization from the County Engineer or beyond the lines and grades set by the County Engineer.

Payment: Pavement cut and removal will be paid for at the contract unit price per cubic yard. The price shall include all labor, equipment, and materials necessary to remove and dispose of, off site, any required structures, complete in place, including sawing or cutting the existing pavement if required.

G. Concrete Cut and Removal:

Measurement: Concrete cut and removal shall consist of the removal and satisfactory disposal of all materials in concrete structures that may be designated for removal by the County Engineer or shown to be removed on plans. These structures shall include sidewalks, concrete pavement, and other minor structures; measured by the cubic yard in terms of material removed from its original positions. No payment for materials removed without authorization from the County Engineer or beyond the lines and grades set by the County Engineer.

Payment: Concrete cut and removal will be paid for at the contract unit price per cubic yard. The price shall include all labor, equipment, and materials necessary to remove and dispose of, off site, any required structures, complete in place, including sawing or cutting the existing concrete if required.

H. Other: Other items shall be paid for as stated in the Proposal.

1.6 BASE COURSE & PAVING

A. Foundation Stone:

Measurement: Foundation stone for roadways will be measured by the cubic feet of foundation stone placed. Cubic feet of foundation stone material placed will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic feet).

Payment: Foundation stone, if approved by the County Engineer, will be paid for at the contract unit price for foundation stone by the ton. Price shall include removal and disposal of unusable material and placement of stone, complete in place.

B. Aggregate Base Course:

Measurement: Aggregate base course will be measured in tons. The quantity shall be determined on scales equipped with a dial and an automatic printer.

Payment: Aggregate base course will be paid at the contract unit price bid per ton as shown on the plans or unit price bid per ton for dense graded aggregate. Price shall include all material, equipment and labor required to furnish and install the stone, compact in place.

C. Portland Cement Treated Aggregate:

Measurement: Portland cement treated aggregate will be measured in square yards of material with thickness as shown on the plans or as directed by the County Engineer.

Payment: Portland cement treated aggregate will be paid at the contract unit price bid for square yards with thickness as shown on the plans or as directed by the County Engineer. This price shall include all material, equipment and labor required to furnish and install the Portland cement treated aggregate, complete in place.

D. Asphalt Concrete Pavement:

Measurement: Asphalt concrete pavement shall be measured in tons of the type specified as evidenced by plant delivery tickets. For all overlays, field measurements and calculations will be made also for use as a comparison between estimated and actual tonnage used. If quantity differences are found, without justification, measurement will be based on field measurement basis. Measurement for new roadways will be based on plan quantities and field measurement, not tonnage tickets.

Payment: Asphalt concrete pavement will be paid for at the contract unit price bid per ton for the type of Asphalt concrete specified. This price shall be full compensation for asphalt concrete pavement, complete in place, including all materials, labor, tools, equipment, tack coat, maintenance of traffic and all other incidentals necessary. Adjusting manholes, lampstacks, cleanouts, valve boxes, etc. will be paid separately at the bid price for each when adjusted by the Contractor.

Price Adjustment for Asphalt Material: Bid items which contain asphalt material will be subject to price adjustment by Metro as set for herein.

Price adjustments will be made in accordance with section 109.07.01 of the KYTC Standard Specifications for Road and Bridge Construction.

The current price index on the first of the month will be applicable for adjustments of estimates during the month.

When a schedule is completed prior to the conclusion of an estimate period, the most recent index prior to the date of completion will be used for price adjustment.

An apparent attempt to unbalance bids in favor of items subject to price adjustment may result in rejection of the bid proposal.

E. Tack Coat: (Not a pay item, incidental to other items bid)

F. Prime Coat:

Measurement: Liquid asphalt material will be measured by the gallon and cover aggregate by the ton.

Payment: Liquid asphalt material will be paid for at the contract unit price bid per gallon. Cover stone will be paid for at the contract unit price bid per ton. This price shall include all labor, equipment, and materials to furnish, install, and maintenance of the treatment until surface course is applied, complete in place.

G. Seal Coat:

Measurement: Liquid asphalt material will be measured by the gallon and cover aggregate by the ton.

Payment: Liquid asphalt material will be paid for at the contract unit price bid per gallon. Cover stone will be paid for at the contract unit price bid per ton. This price shall include all labor, equipment, and materials to furnish and install, complete in place.

H. Pavement Repair or Street Rehab: This item shall cover pavement repair in areas where it becomes necessary to remove and replace the existing pavement in failed areas or areas where patching is required as part of roadway work or in locations as otherwise requested by the County Engineer.

Measurement: Work and materials for pavement repair will be measured in the following manner.

- 1). Asphalt pavement and concrete pavement cut and removal for street repair will be measured in cubic yards of pavement, temporary maintenance stone, or other material removed.
- 2). Aggregate base stone for pavement repair will be measured in cubic yards.
- 3). Aggregate base stone for surface treated pavement repair will be measured in cubic yards.
- 4). Asphalt base for pavement repair will be measured in tons.
- 5). Asphalt surface for pavement repair will be measured in tons.
- 6). Surface treatment for surface treated pavement repair will be measured in squared yards.
- 7). Temporary pavement repair will be measured in terms of square yards.

Payment: Work and materials for pavement repair will be paid for in the following manner.

- 1). Asphalt and concrete cut and removal for pavement repair will be paid for at the contract unit bid price per cubic yard. This price shall include all labor, equipment, and material to sawcut, excavate, remove and dispose of material, and all work and grading to prepare the surface for paving,

compact in place.

- 2). Aggregate base stone for pavement repair will be paid for at the contract unit price bid per cubic yard (at a specified depth as shown on applicable details or as directed by the County Engineer) for dense graded aggregate. This price shall include all labor, equipment, and material necessary to furnish and install the stone, compact in place.
- 3). Aggregate base stone for surface treated pavement repair will be paid for at the contract unit price bid per cubic yard (at a specified depth as shown on applicable details or as directed by the County Engineer) for dense graded aggregate. This price shall include all labor, equipment, and material necessary to furnish and install the stone, compact in place.
- 4). Asphalt base for pavement repair will be paid for at the contract unit price bid per ton for the type of base mix as shown on the plans or as directed by the County Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, complete in place.
- 5). Asphalt surface for pavement repair will be paid for at the contract unit price bid per ton or as directed by the County Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, compact in place.
- 6). Surface treatment for surface treated pavement repair will be paid for at the contract unit price bid per square yard for surface treatment for pavement repair. This price shall be full compensation for one prime coat and two seal coats, compact in place.
- 7). Temporary pavement repair will be paid for at the contract unit price bid per square yard for temporary pavement repair at a specified depth as shown on applicable details or as directed by the County Engineer.

I. Trench Patching for New Pipe Installation - Permanent and Temporary:

Measurement: Trench patching will be measured in square yards per patch type.

Payment: Trench patching will be paid for at the contract unit price bid in square yards per patch type and shall include all labor, materials, and equipment necessary to install the patch, complete in place. Pavement cut and removed for this item will be paid for separately, see trenching section of these specifications.

J. Adjusting Manholes, Lampstacks, and Valves for Resurfacing:

Measurement: Manhole, lampstack, and valve box adjusting will be measured on an each basis for the type of structure adjusted.

Payment: Manhole, lampstack, and valve box adjusting by the method of removing and adjusting the frame and cover will be paid for at the contract unit price per each for adjusting manholes, lampstacks, and valves, and shall include all labor, equipment, and materials necessary for a complete in place installation.

K. Manhole, Valve Box, and Lampstack Adjusting Rings for Resurfacing:

Measurement: Manhole, valve box, and lampstack adjusting rings, will be measured on an each basis for the type of ring installed.

Payment: Manhole, valve box, and lampstack adjusting rings will be paid on an each basis for the type of ring installed at the contract unit price and shall include all labor, material, and equipment necessary to place inserting ring in existing frame, complete in place, including countersinking holes and installation of epoxy.

L. Manhole, Valve Box, and Lampstack Replacement for Resurfacing: Measurement: Manhole, valve box, and lampstack replacement will be measured on an each basis for the type of frame installed.

Payment: Manhole, valve box, and lampstack replacement for resurfacing will be paid on an each basis for the type of frame installed at the contract unit price and shall include all labor, material, and equipment necessary to remove and install a new frame, complete in place.

M. Dense Graded Aggregate for Shoulder Restoration after Paving:

Measurement: Dense graded aggregate for restoration after paving will be measured by the cubic yards as shown on the plans or as directed by the County Engineer. Cubic yards of stone material placed will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic feet).

Payment: Dense graded aggregate for restoration after paving will be paid for at the contract unit price by the ton. Price shall include all labor, equipment, and materials necessary for furnishing and placing of stone, compact in place.

N. Maintenance Stone for Pipe Installation:

Measurement: Maintenance stone for pipe installation will be measured by the cubic yard of material placed per the direction of the County Engineer's representative. Cubic yard of material calculated will be converted to tons using the weight of 3915 pounds per cubic yard (145 pounds per cubic foot).

Payment: Maintenance stone for pipe installation will be paid for at the contract unit price per ton for aggregate backfill on a one time basis and shall include all materials, equipment, and labor required to furnish and compact, compact in place, dense graded aggregate in the locations designated by the County Engineer.

O. Asphalt Concrete Curb:

Measurement: Asphalt concrete curb will be measured by the linear foot.

Payment: Asphalt concrete curb will be paid for at the contract unit price bid in linear foot and shall include all labor, equipment, and materials necessary for a complete in place installation.

P. Asphalt Concrete Paved Flumes, Walks, etc.:

Measurement: Asphalt concrete paved flumes, walks, etc. will be measured in

square yards for a depth of 4 inches.

Payment: Asphalt concrete paved flumes, walks, etc. will be paid for at the contract unit price bid in square yards for a depth of 4 inches and shall be installed to include all labor, equipment, and materials necessary for a complete in place installation.

1.7 CURB & GUTTER, DRIVEWAYS, SIDEWALKS, AND MISCELLANEOUS CONCRETE ITEMS

A. New Concrete Sidewalk, 4 inches thick:

Measurement: New sidewalk, 4 inches thick will be measured in square yards of finished concrete.

Payment: New sidewalk, 4 inches thick will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation, and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

B. Replacement of Concrete Sidewalk, 4 inches thick:

Measurement: Replacement of sidewalk, 4 inches thick will be measured in square yards of finished concrete.

Payment: Replacement of sidewalk, 4 inches thick will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing sidewalk, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation, and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

C. New or Replacement of Residential Single Family Concrete Driveways, and Sidewalks, 6 inches thick:

Measurement: New or replacement of residential single family concrete driveways, and sidewalks, 6 inches thick will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

- 1) In length from face to face of the curb at the back edge of the driveway.
- 2) In width from the back edge of the driveway to the back edge of the curb extended.

Payment: New or replacement of residential single family concrete driveways, and sidewalks, 6 inches thick will be paid for at the contract unit price bid per square yard at a depth of 6 inches. This price shall include all labor, equipment,

and material for excavation, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

D. New or Replacement of Multi-Family Residential Concrete Driveways, Commercial Entrances, and Sidewalks, 8 inches thick:

Measurement: New or replacement of residential multi-family concrete driveways, commercial entrances, and sidewalks, 8 inches thick will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

- 1) In length from face to face of the curb at the back edge of the driveway.
- 2) In width from the back edge of the driveway to the back edge of the curb extended.

Payment: New or replacement of residential multi-family concrete driveways, entrances, and sidewalk, 8 inches thick will be paid for at the contract unit price bid per square yard at depth of 8 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

E. New Concrete Curb and Gutter:

Measurement: New concrete curb and gutter will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: New concrete curb and gutter will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the Standard Plan 410 and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

F. Replacement of Concrete Curb and Gutter:

Measurement: Replacement of concrete curb and gutter will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete

in place installation as shown on Standard Plan 410 and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

G. Integral Concrete Curb/Sidewalk:

Measurement: Integral concrete curb will be measured in linear feet along the face of the curb including handicap ramps but excluding driveway openings. Facedown curb is not a pay item through a driveway opening. The sidewalk portion of this line item will be measured in square yards for 4 inches thick sidewalk.

Payment: Integral concrete curb will be paid in linear foot the contract unit price for 6"X12" face down curb. The sidewalk portion of this item will be paid for as 4 inches thick sidewalk. Both line item prices shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the Standard Plan 411 and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

H. Concrete Handicap Ramp:

Measurement: Concrete handicap ramps will be measured in square yards of finished concrete with a thickness of 4 inches.

Payment: Concrete handicap ramps will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer. Price does not include detectable warning panels. Panels will be paid for as a separate pay item.

I. Formed Concrete for Retaining Walls, Headwalls, Piers, Steps, and other misc. Concrete Structures:

Measurement: Formed concrete for retaining walls, headwalls, piers, steps, and other misc. concrete structures will be measured by the cubic yard and class as specified on the drawings or applicable details.

Payment: Formed concrete for retaining walls, headwalls, piers, steps, and other misc. concrete structures will be paid for at the contract unit price bid per cubic yard for concrete, complete in place. Reinforcing steel, weep holes, water stops, etc. will be included in the price of concrete for retaining walls. All backfilling will be included in bid price for concrete. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

The only additional pay items for retaining walls will be:

1. Excavation -will be measured and paid for in cubic yards at the unit price bid for regular excavation.

2. Porous backfill material – will be measured and paid for in tons as coarse granular aggregate backfill.

No payment will be made for excavation or any other structures.

- J. Unformed Concrete for Footings, Collars, Thrust blocks, etc. (Poured without Forms):

Measurement: Unformed Concrete for footings, collars, thrust blocks, etc. will be measured by the cubic yard and class as specified on the drawings or applicable details.

Payment: Unformed Concrete for footings, collars, thrust blocks, etc. will be paid for at the contract unit price per cubic yard and class for unformed concrete for footings, collars, etc. and shall include all labor, equipment, and material to place the concrete for a specific item, complete in place. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

- K. Reinforcing Steel Bars:

Measurement: When needed, reinforcing steel shall be included in the cost of concrete when shown on the drawings or applicable details.

- L. Reinforcing Steel Wire Mesh:

Measurement: When needed, reinforcing steel wire mesh shall be included in the cost of concrete when shown on the drawings or applicable details.

- M. Concrete Paved Ditches:

Measurement: Concrete paved ditches will be measured per square yard of paved ditch based on measurements as defined on applicable details.

Payment: Concrete paved ditches will be paid for at the contract unit price per square yard and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place and installed at the locations as shown on the construction drawings and/or as directed by the County Engineer.

- N. Metal Handrail:

Measurement: Metal handrails will be measured in linear foot.

Payment: Metal handrail will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and materials to install the handrail.

- O. Tree Well in Sidewalk:

Measurement: Tree wells will be measured on an each basis.

Payment: Tree wells will be paid for at the contract unit price per each and shall

include all labor, equipment, and materials to install the tree well, complete in place.

P. Concrete Parking Blocks:

Measurement: Concrete parking blocks will be measured on an each basis.

Payment: Concrete parking blocks will be paid for at the contract unit price per each and shall include all labor, equipment, and materials to install the parking block, complete in place.

Q. Detectable Warning Panel with Truncated Dome (new construction):

Measurement: Detectable warning panels will be measured on an each basis.

Payment: Detectable warning panels will be paid for at the contract unit price and shall include all labor, equipment, and materials to install the panel, complete in place.

R. Detectable Warning Panel with Truncated Dome (retrofit –existing sidewalk):

Measurement: Detectable warning panels will be measured on an each basis.

Payment: Detectable warning panels will be paid for at the contract unit price and shall include all labor, equipment, and materials to install the panel, complete in place.

1.8 ITEMS MISCELLANOUS TO ALL SECTIONS

A. Clearing and Grubbing:

Measurement: Clearing and grubbing within the right-of-way will be measured by a single lump sum.

Payment: Clearing and grubbing will be paid for at the contract lump sum cost and shall include all material, equipment, and labor required to clear and grub lightly wooded areas in accordance with these specifications. The price shall also include the removal and disposal of items that cannot be mulched or built into brush piles.

B. Removal of Trees and Stumps:

Measurement: Removal of trees and stumps in excess of 12 inches in diameter will be measured by each unit. Each tree width shall exceed 12 inches measured at 2 feet above the ground or across the top of the existing stump in less than 2 feet high. Trees or stumps not meeting these criteria shall be considered incidental to clearing and grubbing.

Payment: Miscellaneous Unformed Concrete will be paid for at the contract unit price per each tree or stump removed, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings

and/or as directed by the County Engineer.

C. Temporary Access or Haul Roads:

Measurement: Any grading or excavation required for equipment travel during the course of construction as well as erosion control, removal, restoration, seeding and ground cover shall be included in other items bid.

Payment: Included in other items bid. Not a pay item.

D. Flowable Fill Concrete:

Measurement: Flowable fill will be measured by the cubic yard of concrete placed.

Payment: Flowable fill will be paid for at the contract unit price, complete in place, and shall include all materials, labor and equipment to place the concrete in locations as directed by the County Engineer or designated on the plans. This price shall also include any excavation and blocking or forming required.

E. Miscellaneous Unformed Concrete:

Measurement: Miscellaneous Unformed Concrete will be measured by the cubic yard and class as specified on the drawings.

Payment: Miscellaneous Unformed Concrete will be paid for at the contract unit price per cubic yard for unformed concrete for reaction anchor blocks, collars, footings, and so forth complete and in place, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings and/or as directed by the County Engineer. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

F. Miscellaneous Formed Concrete:

Measurement: Miscellaneous Formed Concrete will be measured by the cubic yard and class as specified on the drawings.

Payment: Miscellaneous Formed Concrete will be paid for at the contract unit price per cubic yard for formed concrete placed that is designated to be paid for as "formed concrete", complete and in place, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings and/or as directed by the County Engineer. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

G. Seeding and Fine Grading:

Measurement: Seeding and fine grading will be measured in square yards of area seeded. Seeding and fine grading shall be provided as described section in *General Requirements*, Section 01000. Extra compensation will not be made for additional seeding beyond all limits of construction as defined in applicable section.

Payment: Seeding and fine grading will be paid for at the contract unit price per

square yard for seeding and fine grading as described in *General Requirements*, Section 01000. No compensation will be made for reseeding, if required.

H. Dry Riprap and Channel Lining:

Measurement: Dry Riprap will be measured by the ton.

Payment: Dry Riprap will be paid for at the contract unit price per ton of the size as indicated on the drawings and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation.

I. Grouted Riprap and Channel Lining:

Measurement: Grouted Riprap will be measured by the ton.

Payment: Grouted Riprap will be paid for at the contract unit price per ton of the size as indicated on the drawings, with the top 6 inches grouted and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation.

J. Construction Entrance for Erosion Control, (KY #3 stone):

Measurement: Construction entrance for erosion control will be measured by the ton of #3 stone. Calculation shall be based on the length X width X depth of the entrance, and converted to tons.

Payment: Construction entrance for erosion control will be paid for at the contract unit price per ton and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation. Payment will be made on a one time basis. No additional payment will be made for maintaining stone.

K. Silt Fence Barrier:

Measurement: Silt fence barrier for erosion control will be measured by the linear foot.

Payment: Silt fence barrier for erosion control will be paid for at the contract unit price per linear foot and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of silt fence upon stabilization of ground cover.

L. Straw Bale Barrier:

Measurement: Straw bale barrier for erosion control will be measured by the linear foot.

Payment: Straw bale barrier for erosion control will be paid for at the contract unit price per linear foot and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of straw bales upon stabilization of ground cover.

M. Drop Inlet Silt Trap:

Measurement: Drop inlet silt trap for erosion control will be measured on an each basis.

Payment: Drop inlet silt trap for erosion control will be paid for at the contract unit price per each and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of the trap upon stabilization of ground cover.

P. Traffic Control:

Measurement: Barricades, and Lighted Barrels will be measured on an each basis per day. Pilot Trucks will be measured on an hourly basis.

Payment: Barricades, Lighted Barrels, and Pilot Trucks will be paid for at the contract unit price as determined by the approved traffic control plan and shall include all material, labor, and equipment necessary for a complete installation. The price shall also include removal of these items. All other traffic control items, devices and measures including flagmen are not a pay item and shall be considered incidental to other bid items.

S. Horizontal Control Monument:

Measurement: Horizontal Control Monuments will be measured on an each basis.

Payment: Horizontal Control Monuments will be paid for at the contract unit price per each and shall include all material, equipment, and labor necessary for a complete in place installation.

1.9 GUARDRAIL

Measurement and Payment for Guardrail and appurtenances shall be in accordance with Section 719 of the KYTC Standard Specification for Road and Bridge Construction 2012 edition or latest revision.

END OF SECTION
01200

SECTION 02200 – EARTHWORK

(January 2015)

PART 1 – GENERAL

The Contractor shall furnish all labor, materials, and equipment to perform all work for all site clearing, site excavation, grading and embankment, excavation and filling and backfilling for structures. Complete all as shown on the contract drawings and in accordance with these Specifications and completely coordinated with all other trades.

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Requirements and Supplementary Conditions applicable to this specification.
- B. Section 01000 – General Requirements.
- C. Section 02220 – Trenching, Backfilling, and Compaction of Utilities.

1.2 SUMMARY

- A. This section includes:
 - 1) Site clearing and grubbing.
 - 2) Stripping and stockpiling topsoil.
 - 3) Excavation and embankment placement.
 - 4) Preparing subgrades for pavements, walks, curb & gutter, and turfed areas.
- B. Construction and materials related to this section but specified in other sections:
 - 1) Landscaping, Seeding, and Groundcover: Section 01000 – *General Requirements*.
 - 2) Erosion Control: See Section 01000 - *General Requirements*.

1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to earthwork that come under the authority of Metro as specified within this section and other sections of this manual.

- A. Borrow: Borrow excavation shall consist of approved select fill material imported from off-site.
- B. Clearing: Clearing shall consist in the felling, cutting up, and satisfactory disposal of trees and other vegetation designated for removal in accordance with these specifications.
- C. Fill (in terms of volume): In terms of volume, fill is defined as a

compacted post-construction volume in-place.

- D. Grubbing: Grubbing shall consist of the removal of roots 1 ½ inch and larger, organic matter and debris, and stumps having a diameter of 12 inches or larger, to a depth of at least 18 inches below the surface and or subgrade; whichever is lower, and the disposal thereof.
- E. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.
- F. Rock Excavation: Removal and satisfactory disposal of all unsuitable materials, which, in the opinion of the County Engineer, cannot be excavated except by drilling, blasting, wedging, jack hammering or hoe ramming. It shall consist of undecomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than ½ cubic yard and/or solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling, blasting, or hoe ramming will be classified as rock.
- G. Select Fill Material: Material obtained from roadway cuts, borrow areas, or commercial sources used as foundation for subbase, shoulder surfacing, fill, backfill, or other specific purposes.
- H. Structures: Incidental buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- I. Subgrade: Surface or elevation remaining after completing the excavation, or top surface of a fill or backfill immediately below subbase or topsoil materials, as applicable.
- J. Topsoil: Topsoil shall consist of friable clay loam, free from roots, stones, and other undesirable material and shall be capable of supporting a good growth of grass.
- K. Undercut Excavation: Undercut excavation shall consist of the removal and satisfactory disposal of all unsuitable material located below subgrade elevation. Where excavation to the finished grade section results in a subgrade or slopes of muck, peat, matted roots, etc., the Contractor shall remove such material below the grade shown on the plans or as directed; and areas so excavated shall be backfilled with approved select borrow as ordered by the County Engineer.

1.4 SUBMITTALS

- A. Submit product data and a sample of separation fabric and fully document each with specific location or stationing information, date and other pertinent information.

- B. Product Data
 - 1) Stabilization/Separation fabric
- C. Material Test Reports: Provide from a qualified testing agency test results and interpretation for compliance of the following requirements indicated:
 - 1) Classification according ASTM D2487 of each on-site or borrow soil proposed for backfill, unless otherwise directed by the County Engineer.
 - 2) Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for fill or backfill.
 - 3) Laboratory compaction curve according to ASTM D1557 for each on-site borrow soil material proposed for fill and backfill.
- D. Blasting: See Section 01000 – *General Requirements*.

1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing as documented according to ASTM D 3740 and ASTM E 548.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The Contractor shall comply with the latest revision of the Kentucky Occupational Safety and Health Standards for the Construction and General Industry as adopted by the Kentucky Occupational Safety and Health Standards Board, or the Kentucky Labor Cabinet, which supersede OSHA standards.
- D. The Contractor shall comply with Kentucky Department of Fish and Wildlife Resources, Soil and Water Conservation Commission, “Kentucky Erosion Prevention and Sedimentation Control Field Guide,” latest revision.
- E. Comply with applicable requirements of NFPA 495, “*Explosive Materials Code*.”
- F. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

American Society for Testing and Materials

ASTM C 33	Concrete Aggregates
ASTM C 136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates Sieve Analysis of Fine and Coarse Aggregate
ASTM D 422	Standard Test Method for Particle-Size Analysis of Soils

(classification purposes only)

ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (Standard Proctor)
ASTM D 1556	Standard Method of Test for Density of Soil in Place by the Sand-Cone Method
ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (Modified Proctor)
ASTM D1883	Standard Test Method for CBR (California Bearing Ratio) of Laboratory-Compacted Soils
ASTM D 2049	Standard Method of Test for Relative Density of Cohesionless Soils
ASTM D2167	Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method
ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D 4254	Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

American Association of State Highway & Transportation Officials

AASHTO T 99	The Moisture-Density Relations of Soils using a 5.5-pound hammer and a 12-inch drop
AASHTO T 180	The Moisture Density Relations of Soils using a 10-pound hammer and an 18-inch drop
AASHTO M 145	The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

1.6 STANDARD ABBREVIATIONS

ANSI	American National Standards Institute
AREA	American Railway Engineers Association

FWS	Kentucky Department of Fish and Wildlife Resources
MSDS	Material Safety Data Sheets
OHSA	Occupational Safety and Health Administration
CHFS	Kentucky Cabinet for Health and Family Services
KYTC	Kentucky Transportation Cabinet

1.7 TESTING SERVICES

- A. The Testing Laboratory shall be approved by the County Engineer and will be responsible for conducting and interpreting tests. The Testing Laboratory shall state in each report whether or not the test specimens conform to all requirements of the Contract Documents and specifically note any deviation.
- B. Specific test and inspection requirements shall be as specified herein.

1.8 PROJECT CONDITIONS

- A. Demolition: Demolish and completely remove from the site existing utilities, structures or surface features indicated on the plans to be removed. Coordinate with applicable utility companies to shut off services if lines are active.
- B. Environmental: Before crossing or entering into any jurisdictional wetlands, Contractor shall verify whether or not a wetlands permit has been obtained for the encroachment and whether special restrictions have been imposed. Care shall be taken to prevent draining or otherwise destroying non-permitted wetlands. Restore as stated on either the project drawings, the contract documents, and/or as noted in the permit.
- C. Geotechnical Investigation
 - 1) Where a Geotechnical report has been provided to the Contractor, the data on sub-surface soil conditions is not intended as a representation or warranty of the continuity of such conditions between borings or indicated sampling locations. It shall be expressly understood that Metro will not be responsible for any interpretations or conclusions drawn there from by the Contractor. Data is made available for the convenience of the Contractor.
 - 2) In addition to any report that may be made available to the Contractor, the Contractor is responsible for performing any other soil investigations he/they feel(s) is necessary for proper evaluation of the site for the purposes of planning and/or bidding the project, at no additional cost to Metro.

1.9 COORDINATION

- A. At the direction of the County Engineer, temporary bypass pumping of sewerage flow may be required to be provided.

- B. Coordinate tie-ins to municipal system with Metro.
- C. When traffic signals or their appurtenances are likely to be damaged or interfered with as a result of the construction, coordinate temporary operation with the Louisville Metro Government Traffic Engineer. Provide a minimum of 48 hours notice prior to anticipated disturbance or interruption.
- D. Benchmark/Monument Protection: Protect and maintain benchmarks, monuments or other established reference points and property corners. If disturbed or destroyed, replace at own expense to full satisfaction of Metro.

PART 2 – PRODUCTS

2.1 SOIL MATERIALS

Provide borrow material when sufficient satisfactory soil material is not available from excavations.

2.1.1 MATERIAL CLASSIFICATION

- A. Excavation: All excavation material shall be classified as either Regular, Rock, or Undercut Excavation.
- B. Off-site Borrow: Off-site borrow shall be select fill material approved by the County Engineer from an off-site borrow source. See paragraph 1.3 of this specification for the definition of select fill material.
- C. Riprap and Channel Lining: See Kentucky Standard Specifications for Road and Bridge Construction Section 805.13
- D. Topsoil: Topsoil meeting the definition prescribed in paragraph 1.3 obtained either from on-site or an off-site source.

2.1.2 SOIL CLASSIFICATION

- A. Satisfactory Soils: Non-plastic soils as defined by ASTM D 2487 soil classification group (Unified Classification System) (such as SW, SM, and SC); free of rock or gravel larger than 3 inches in any dimension, debris, organic matter, waste, frozen materials, muck, roots, vegetation, and other deleterious matter.
- B. Unsatisfactory Soils: Plastic soils as defined by ASTM D 2487 soil classification group (such as ML, CL CH, MH, OH, OL and PT); soils which contain rock or gravel larger than 3 inches in any dimension, debris, organic matter, waste frozen materials, vegetation, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within 20-percent of optimum moisture content at time of compaction, unless otherwise approved by either the County Engineer or a Geotechnical Engineer.

2.2 MISCELLANEOUS

Geotextile Fabric: See Kentucky Standard Specifications for Road and Bridge Construction Section 214.

PART 3 – EXECUTION

3.1 GENERAL

3.1.1 GENERAL REQUIREMENTS APPLYING TO ALL AREAS

- A. Contractor shall plan construction to minimize disturbance to properties adjacent to the project site and be within the construction limits shown on the plans.
- B. The County Engineer reserves the right to limit the width of land to be disturbed and to designate on the drawings or in the field certain areas or items within this width to be protected from damage.
- C. Any grading or excavation required for equipment travel during the course of construction as well as erosion control, access or haul road installation and removal, restoration, seeding and ground cover shall be provided by the Contractor.
- D. The Contractor shall be responsible for damage to areas or items designated by the County Engineer to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made at the Contractor's expense and to the satisfaction of the County Engineer before acceptance of the completed project.
- E. Any fences disturbed by the Contractor shall be repaired to a condition equal to or better than their original condition or to the satisfaction of the County Engineer at no additional cost.
- F. Contractor shall obtain written permission from property owners for use of any access other than ones located within rights-of-way. Written permission shall contain conditions for use and restoration agreements between property owner and Contractor. No additional compensation will be made for such access.
- G. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- H. The Contractor shall replace or repair all damaged or destroyed hedgerows and property corners. Protection of existing and restoration of damaged or destroyed property corners shall be in accordance with the requirements of Section 01000 – *General Requirements* – Construction Staking.

3.1.2 PROTECTION OF EXISTING UTILITIES

- A. Contractor is responsible for protection of existing utilities in accordance with Section 01000 – *General Requirements*.
- B. Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on a force account basis or on an extra work basis. Method of payment shall be agreed upon by the County Engineer and the Contractor prior to commencing work.

- C. If existing utilities are found to interfere with the permanent facilities being constructed under this section, immediately notify the County Engineer and secure instructions. Do not proceed with permanent relocation of utilities until instructions are received from the County Engineer.

3.2 CLEARING AND GRUBBING

- A. This work shall consist of clearing, grubbing, removing, and disposing of all vegetation and debris within the limits of construction, as designated on the plans or as required by the County Engineer. The Contractor shall remove only those trees and shrubs absolutely necessary to allow for the construction. The work shall also include the preservation from injury or defacement of all vegetation or objects designated to remain.
- B. The area within the limits of construction or as designated shall be cleared and grubbed of all trees, stumps, roots, brush, undergrowth, hedges, heavy growth of grasses or weeds, debris and rubbish of any nature which, in the opinion of the County Engineer, is unsuitable for foundation material. Nonperishable items that will be a minimum of five feet below the finish elevation of the earthwork or slope of the embankment may be left in place.
- C. The Contractor shall provide barricades, fences, coverings, or other types of protection necessary to prevent damage to existing improvements, not indicated to be removed, and improvements on adjoining property. All improvements damaged by this work shall be restored to their original condition or to a condition acceptable to the owner or other parties or authorities having jurisdiction.
- D. Protection of Trees and Vegetation: Contractor shall protect existing trees and other vegetation indicated by the County Engineer to remain in place against cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary fences or barricades as required to protect trees and vegetation to be left standing at no additional cost.

Trees and shrubs that are to remain within the construction limits will be indicated on the drawings or conspicuously marked on site. Unless otherwise noted, trees within the construction limits shall become the property of the Contractor and shall be removed from the site.

Carefully and cleanly cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of the utility line. The Contractor shall provide protection for roots and branches over 1 ½ inches diameter that are cut during construction operations. Temporarily cover all exposed roots with wet burlap to prevent roots from drying out. Provide earth cover as soon as possible.

Damaged trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to the County Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified Arborist.

- E. All brush, tree tops, stumps, and debris shall be hauled away and disposed of in accordance with all applicable laws and regulations. The contractor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes his property and is not to be reused in construction. Sale of material on the site is prohibited. Debris from the site shall be removed in such a manner as to prevent spillage. Keep pavement and area adjacent to site clean and free from mud, dirt, dust, and debris at all times.
- F. The method of stripping, clearing and grubbing the site shall be at the discretion of the Contractor. However, all stumps, roots and other debris protruding through the ground surface or in excavated areas shall be completely removed to a minimum depth of 18 inches below surface and/or subgrade whichever is lower and disposed of off the site by the Contractor, at his expense.
- G. Marginal Areas: In marginal areas, with the County Engineer's permission, remove trees where the following conditions exist.
- 1) Root Cutting: When clearing up to the "clearing limits," the Contractor shall also remove any tree which is deemed marginal such that when the roots are cut and the tree could be rendered unstable by the effects of high winds and in danger of toppling into either the right-of-way or onto private property.
 - 2) Slender Bending Trees: Where young, tall, thin trees are left unsupported by the clearing operation, and are likely to bend over into the right-of-way, the Contractor, during the clearing operation, shall selectively remove those trees which are located outside and adjacent to the clearing limits and Metro right-of-way or easement as well. During the course of construction and during the one to two year warranty period, the Contractor shall remove such young trees that overhang into the right-of-way or cleared area.
- H. Remove the existing topsoil to a depth of 6 inches or to the depth encountered from all areas in which excavation will occur. The topsoil shall be stored in stockpiles, separate from the excavated material, if the topsoil is to be respread. Otherwise material shall be disposed of off-site at the Contractor's expense.

3.3 REGULAR EXCAVATION, UNDERCUTTING, BORROW, EMBANKMENT:

3.3.1 DESCRIPTION

Prior to beginning grading or embankment operations in any area, all necessary clearing and grubbing in that area shall have been performed in accordance with these specifications.

Should the Contractor, through negligence or other fault, excavate below the designated grades, he shall replace the excavation with approved satisfactory materials, in an approved method, at his own expense. All material determined unsatisfactory shall be disposed of in waste areas as directed. Topsoil shall not be used in embankments but shall be handled and placed as

directed.

The Contractor shall satisfy himself as to the character, quantity, and distribution of all materials to be excavated. No payment will be made for any excavated material that is used for purposes other than those designated.

3.3.2 CONSTRUCTION METHODS

- A. Excavation: Excavation shall be performed as indicated on the plans or as directed by the County Engineer to the lines, grades, and elevations, and shall be finished to a reasonable smooth and uniform surface. During the process of excavation, the grade shall be maintained and surface shall be rolled so that it will be well drained at all times.

When solid rock is incurred in the excavation, the rock shall be removed to a minimum depth of 12 inches below the surface of the subgrade. Material unsatisfactory for subgrade foundation shall be removed to a depth specified to provide a satisfactory foundation. The portion so excavated shall be refilled with suitable material obtained from the grading operations or borrow area and thoroughly compacted by rolling. Material obtained from on-site grading operation must be approved by the County Engineer. For areas that do not require fill, scarify and compact to a depth of 6 inches.

Any removal, manipulation, aeration, replacement, and recompaction of suitable materials necessary to obtain the required density shall be considered as incidental to the construction operations, and shall be performed by the Contractor at no additional cost to Metro.

No rock, stone, or rock fragments, larger than 3 inches in their greatest dimension will be permitted in the top 12 inches of the subgrade. Below this elevation, rock fragments larger than 3 inches in their greatest dimension will need to be reviewed by the County Engineer or the Geotechnical Engineer prior to placement.

- B. Stabilization of Soft Subgrade with Geotextile: The use of Geotextile material for subgrade stabilization shall be approved by the County Engineer and shall meet all applicable KYTC standards and specifications.
- C. Borrow: Borrow shall not be used until all suitable, on-site, excavated material has been placed in the embankment, unless authorized by the County Engineer. Unless otherwise designated on the plans and contract documents, the Contractor shall make his own arrangements for obtaining select fill material for borrow and pay all costs involved. If the Contractor places more borrow than is required, and thereby causes a waste of excavation, the amount of such waste, unless authorized, will not be included for payment.
- D. Embankments
- 1) Evaluation of Subgrade: Prior to placement of compacted fill, the County Engineer or his representative shall carefully inspect the exposed subgrade. The Contractor shall then proofroll the exposed subgrade, in the presence of the County Engineer or his representative. The inspection

shall include, but not be limited to, proofrolling the prepared subgrade with a rubber-tired fully loaded dump truck that has a minimum gross weight of at least 40,000 pounds (20 tons). No other method will be acceptable. Any unsatisfactory materials thus exposed shall be removed and replaced with satisfactory select material as approved by the County Engineer. Provide the necessary amount of select fill compacted to the density requirements outlined in this specification.

- 2) Preparation of Ground Surface for Embankments or Fills: Before fill is placed, scarify existing grade to a minimum depth of 6 inches. In areas where the existing or proposed ground surface is steeper than one vertical to four horizontal, plow surface in a manner to bench and break up surface so that fill material will bind with the existing surface.
- 3) Embankments shall be made of satisfactory soil material and shall be built in successive horizontal layers of not more than 9 inches in loose depth for the full width of the cross sections.

The material entering the embankment in each of the layers shall be within a tolerance of plus or minus 3% of the optimum moisture content before rolling to obtain the prescribed density. Wetting or drying of the material and manipulation when necessary to secure uniform moisture content throughout the layer shall be required. Should the material be too wet to permit proper compaction or rolling, all work on the embankment shall be delayed until such time as the material has dried to the required moisture content. If high moisture is due to negligence of contractor due to improper drainage, the County Engineer may require removal and replacement of material.

Fill material shall not be placed on frozen ground or areas covered with ice and/or snow or areas with a moisture content above optimum.

E. Preparation of areas to receive asphalt pavement or concrete

- 1) Areas to be Paved: After all excavation, undercutting, and backfilling has been completed, the subgrade shall be properly shaped and thoroughly compacted. The compactive effort shall include all areas beneath pavement and shall extend at least a minimum of 1 foot behind the paving limits. Compaction shall be in accordance with Table 02200-1.
- 2) Curb and Gutter, Sidewalks and Driveway Aprons: The subgrade shall be constructed true to grade and cross section as may be shown on the drawings. Compaction shall be in accordance with Table 02200-1.

All subgrade shall be graded and protected as to prevent an accumulation or standing water, and consequent subgrade saturation, in the event of rain.

- F. Grading Tolerances of Finished Surface: Earthwork shall conform to the lines, grades, and typical cross sections shown on the plans or as established by the County Engineer. Changes in grade shall be accomplished by smooth curves.
 - 1) Shape subgrade under pavement and curb and gutter to within ½ inch of required subgrade elevations.
 - 2) Finish pavement and curb and gutter to within ½ inch of required finish elevations.
 - 3) Shape subgrade under sidewalks to within 0.10 foot of required subgrade elevations.
 - 4) Finish sidewalks to within 0.10 foot of required finish elevations.
 - 5) For all other areas, subgrade and finish elevations shall be within 0.10 foot of required corresponding elevations.

- G. Backfill of Curb and Gutter and Sidewalks: Immediately after the removal of forms for curb and gutter, sidewalks and driveways, the space between the back of the curb, sidewalks, and driveways shall be backfilled and smoothed off in a manner to prevent the accumulation of standing water.

3.4 SUBGRADE COMPACTION TESTING AND CONTROL

- A. Municipal Projects: For municipal projects, Metro may employ and compensate a Geotechnical testing firm to provide soils testing and inspection services.

- B. Private Projects: For private development projects which involves proposed Metro-owned infrastructure the developer, at the discretion of the County Engineer, may be required to employ a Geotechnical testing firm to perform the testing and provide copies of the tests reports to Metro for approval and record.

- C. All Projects
 - 1) Minimum Compaction Testing Frequency

Location	Frequency
Buildings and structures	1 test group ^a for every 2,500 square feet
Road	1 test group ^a for every 100 feet of road
Parking Lots	1 test group ^a for every 5,000 square feet
Unpaved areas	1 test group ^a for every 10,000 square feet
Pipe Trench	1 test group for every 300 feet

^a One test group consists of compaction tests on each layer of fill and backfill material.

- 2) In the absence of a pre-construction Geotechnical investigation, the Geotechnical testing firm shall obtain bulk samples of ALL materials proposed to be used as fill to determine if the material will be suitable as engineered fill and to perform laboratory Proctor tests to establish a

moisture-density relationships.

- 3) Contractor shall give a 24-hour notice to Geotechnical testing firm when ready for Proctor pick-up, compaction, or subgrade testing and inspection.
- 4) Should any moisture-density test fail to meet specification requirements, the Contractor shall perform corrective work necessary to bring the material in compliance and retest the failed area at no additional cost to Metro.

3.5 SUBGRADE PREPARATION AND COMPACTION REQUIREMENTS

- A. Minimum Compaction Requirements: Compaction percentages are percentages of maximum dry density as determined by indicated ASTM Standards. Unless otherwise directed by a Geotechnical Engineer, the material shall be placed at plus or minus 3% of optimum moisture content.

Table 2200.1	
Minimum Compaction Limits	
Location	Density
Beneath and within 25 feet of buildings	98% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Areas under roadway pavement surfaces, shoulders, sidewalks, and curb and gutter	95% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Under turf, sodded, planted, or seeded non-traffic areas	85% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.

- B. Failure of Compactive Efforts: If compaction efforts should fail to provide a stable subgrade, after subgrade materials have been shaped and brought to optimum moisture, such unstable materials shall be removed to the extent directed by either the Geotechnical Engineer or the County Engineer and replaced and compacted using new select material.

3.6 STRUCTURES: EXCAVATION, FILLING, AND BACKFILLING

See Section 02220 - *Trenching, Backfilling, and Compaction of Utilities* for excavation and backfilling for structures (manholes, etc.). See *KYTC Standard Specification for Road and Bridge Construction* for excavation and backfilling for retaining walls.

3.7 METHOD OF VOLUME MEASUREMENT

Contractors are required to furnish accurate counts of all excavation and/or fill moved which is to be paid for under the Contract unit price. The volumes shall be measured by either "truck tally" or by "cross-sectioning," whichever method is approved by the County Engineer or stated in the proposal and/or bid documents. When a truck count is used, the County Engineer or their representative shall verify the count independently.

A. Truck Tally Method

Excavation: When regular excavation or undercut volumes are to be counted by the truck tally method, "swell" is to be incorporated into the truck volume in the amount of 15%. Unless otherwise agreed to or justified by a Geotechnical Engineer, the following pay volumes are to be used for either regular or undercut excavation:

Tandem:	13 CY
Tri-axle:	15 CY

Borrow: When either off-site or on-site borrow is to be counted by the truck tally method, "shrinkage" is to be incorporated into the truck volume in the amount of 15% (shrinkage of truck volume placed compared to compacted fill volume) utilizing the following pay volumes:

Tandem:	10 CY
Tri-axle:	12 CY

Loading Truck: A qualified truck load is one that is loaded up to within approximately 6 inches of the top of the dump bed, prior to dumping.

B. Average-End-Method

Excavation and fill can be computed using the average-end-method. When used, this method is to be employed using the existing contours shown on the Contract Drawings and the Contractor's actual surveyed finished contours (surveyed by a licensed Professional Surveyor). In so doing, the finished contours are to be plotted at the same scale as the original drawing and a transparency furnished to the Engineer for comparison to design grades. The volume computations are also to be submitted along with the Surveyor's seal and a certification as to the volumes measured.

The Contractor, at his discretion and with the prior approval of the Engineer, may survey the "stripped" site (the site after topsoil has been removed) and compute the volumes based on the stripped site and the "designed" finished grade as shown on the Contract Drawings. As before, a transparency to the same scale and the Surveyor's computations and certification are to be submitted to the Engineer for comparison and verification.

C. Volume Formulas

Unless otherwise approved, the following formulas are to be used in computing cut and fill:

Fill Formula

$$\text{Net Fill} = \text{Raw Fill Vol.} - \text{Regular Excavation} \times (1 - \text{Shrink Factor}) + \text{Strip Vol.} - \text{Undercut or waste Fill placed in Fill Slopes} \times (1 - \text{Shrink Factor}) - \text{Pavement Section or Building Floor Pad}$$

Cut Formula

Net Cut = Raw Cut - Strip Vol. + Pavement Section or Building Floor
Pad

End of Section
02200

SECTION 02220 - TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES

(January 2015)

PART 1 – GENERAL

The Contractor shall furnish all labor, materials, tools, and equipment to perform all work and services necessary for or incidental to the completion of all underground utilities as shown on the drawings and as specified in the Contract Documents.

Contractor shall be responsible for coordination of work of all other trades.

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 01000 – GENERAL REQUIREMENTS.
- C. Section 02500 – BASE COURSE AND PAVING.
- D. Section 02200 – EARTHWORK.

1.2 SUMMARY

- A. This section includes:
 - 1) Excavating and backfilling trenches for buried water, sewer, and storm drainage pipe systems, buried utility structures, and appurtenances.
 - 2) Preparing subgrade for buried water, sewer, and storm drainage systems, buried utility structures and appurtenances.
- B. Construction and materials related to this section but specified in other specification sections:
 - 1) Section 01000 – *General Requirements*: Landscaping, Seeding and Groundcover, and Erosion Control.
 - 2) Section 02200 – *Earthwork*: site clearing, grubbing, topsoil removal, tree protection, roadway, and paving.

1.2 DEFINITIONS

For the purposes of this specification, the following definitions refer to sanitary

sewer, storm drainage and water distribution systems that come under the authority of Metro as specified within this section and other sections of this manual.

- A. Backfill: Soil materials used to fill an excavated trench:
 - 1) Initial Backfill (Select Earth Backfill): Backfill placed beside and 12 inches over the top of the pipe in a trench, including haunches to support sides of pipe.
 - 2) Final Backfill (Common Earth Backfill): Backfill placed over the initial backfill to fill a trench.
- B. Bedding Course: Layer placed over the excavated subgrade in a trench before laying pipe.
- C. Foundation Stone: Clean well-graded stone, authorized by the County Engineer, used to strengthen and/or provide support to an otherwise weak subgrade. Foundation stone is placed, and the subgrade improved before bedding stone is placed.
- D. Trench Rock Excavation: Removal and satisfactory disposal of all unsuitable materials, which, in the opinion of the County Engineer, cannot be excavated except by drilling, blasting, wedging, jack hammering or hoe ramming. It shall consist of undecomposed stone, hard enough to ring under hammer. All boulders containing a volume of more than $\frac{1}{2}$ cubic yard and/or solid ledges, bedded deposits, unstratified masses and conglomerations of material so firmly cemented as to possess the characteristics of solid rock which cannot be removed without systematic drilling, blasting, or hoe ramming will be classified as rock.
- E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- F. Subgrade: Surface or elevation remaining after completing the trench excavation or, the top surface of a backfill (stone or soil) immediately below the pipe conduit or pipe bedding, as applicable.
- G. Trench Borrow (Select): Trench borrow shall consist of approved material imported from off-site for use as fill or backfill required to be placed in trenches either as initial select earth backfill or final common earth backfill. Trench borrow shall not be used until all suitable trench excavation material has been placed in the trench, unless authorized by the County Engineer. The Contractor shall make his own arrangements for obtaining borrow and pay all costs involved, unless otherwise designated on the plans and in the contract documents. Borrow material must be approved by the County Engineer prior to use.
- H. Regular Excavation: Removal and disposal of any and all material above subgrade elevation, except solid rock and undercut excavation, located within the limits of construction.
- I. Undercut Excavation: Undercut excavation shall consist of the removal

and satisfactory disposal of all unsuitable material located below subgrade elevation. Where excavation to the finished grade section results in a subgrade or slopes of muck, peat, matted roots, etc., the Contractor shall remove such material below the grade shown on the plans or as directed; and areas so excavated shall be backfilled with approved select earth borrow or stone as directed by the County Engineer.

1.4 SUBMITTALS

- A. Submit product data for and a sample of the following in accordance with Section 01000, *General Requirements*. Fully document each with specific location or stationing information, date and other pertinent information.
 - 1) Stabilization/Separation fabric
 - 2) Drainage Fabric
 - 3) Metallic locating tape
- B. Material Test Reports: Provide from a qualified testing agency test results and interpretation for compliance of the following requirements indicated:
 - 1) Classification according to ASTM D2487 of each on-site or borrow soil proposed for backfill, unless otherwise directed by the County Engineer.
 - 2) Laboratory compaction curve according to ASTM D698 for each on-site or borrow soil material proposed for backfill.
- C. Blasting: See Section 01000 – *General Requirements*.
- D. Bury Depth Computations: Computations justifying pipe bury when bury depth exceeds the allowable depth shown in this specification. Provide method, applicable charts/graphs, print outs, assumptions, etc.

1.5 QUALITY ASSURANCE

- A. Geotechnical Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing as documented according to ASTM D 3740 and ASTM E 548.
- B. Comply with all codes, laws, ordinances, and regulations of governmental authorities having jurisdiction over this part of the work.
- C. The Contractor shall comply with the latest revision of the Kentucky Occupational Safety and Health Standards for the Construction and General Industry as adopted by the Kentucky Occupational Safety and Health Standards Board, or the Kentucky Labor Cabinet, which supersede OSHA standards.
- D. The Contractor shall comply with Kentucky Department of Fish and Wildlife

Resources, Soil and Water Conservation Commission, "Kentucky Erosion Prevention and Sedimentation Control Field Guide," latest revision.

- E. Comply with applicable requirements of NFPA 495, "*Explosive Materials Code.*"
- F. Comply with "*Gravity Sanitary Sewer Design and Construction,*" ASCE Manuals and Reports on Engineering Practice – NO. 60, WPCF Manual of Practice NO. FD-5.
- G. Comply with Uni-Bell PVC Pipe Association "*Handbook of PVC Pipe: Design and Construction,*" 5th edition. Dallas: UNI, 1991 for the installation of PVC piping, latest revision.
- H. Materials and operations shall comply with the latest revision of the Codes and Standards listed below:

American Society for Testing and Materials

ASTM C 33	Concrete Aggregates.
ASTM D 698	Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³) (Standard Proctor).
ASTM D 1556	Standard Method of Test for Density of Soil in Place by the Sand-Cone Method.
ASTM D 1557	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³) (Modified Proctor).
ASTM D 2049	Standard Method of Test for Relative Density of Cohesionless Soils.
ASTM D2167	Standard Method of Test for Density of Soil in Place by the Rubber-Balloon Method.
ASTM D 2487	Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).
ASTM D 2922	Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
ASTM D 4253	Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
ASTM D 4254	Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
ASTM D 4318	Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

American Association of State Highway & Transportation Officials

AASHTO T99	The Moisture-Density Relations of Soils using a 5.5-pound Rammer and a 12-inch drop.
AASHTO T180	The Moisture Density Relations of Soils using a 10-pound Rammer and an 18-inch drop.
AASHTO M 145	The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes.

American Water Works Association

AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances.
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1.6 STANDARD ABBREVIATIONS

ANSI	American National Standards Institute
AREA	American Railway Engineers Association
DEQ	Department of Environmental Quality
DIP	Ductile Iron Pipe
MSDS	Material Safety Data Sheets
OHSA	Occupational Safety and Health Administration
PVC	Polyvinyl Chloride Plastic Pipe
RCP	Reinforced Concrete Pipe
PCP	Plain Concrete Pipe (Non-Reinforced)
CHFS	Kentucky Cabinet for Health and Family Services
KYTC	Kentucky Transportation Cabinet

1.7 TESTING SERVICES

- A. The Testing Laboratory shall be selected by the Contractor/Developer and approved by the County Engineer and will be responsible for conducting and interpreting tests. The Testing Laboratory shall state in each report whether or not the test specimens conform to all requirements of the Contract Documents and specifically note any deviation.
- B. Specific test and inspection requirements shall be as specified herein.

1.8 PROJECT CONDITIONS

- A. Demolition: Demolish and completely remove from the site existing

underground utilities indicated on the plans to be removed.

- B. Environmental: Before crossing or entering into any jurisdictional wetlands, Contractor shall verify whether or not a wetlands permit has been obtained for the encroachment and whether special restrictions have been imposed. Care shall be taken to prevent draining or otherwise destroying non-permitted wetlands. Restore as stated on either the project drawings, the contract documents, and/or as noted in the permit.

1.9 COORDINATION

- A. At the direction of the County Engineer, temporary pumping/bypass of sewerage flow may be required to be provided.
- B. Coordinate tie-ins to municipal system with Metro.
- C. When traffic signals or their appurtenances are likely to be damaged or interfered with as a result of the construction, coordinate temporary operation with The Metro Traffic Engineer. Provide a minimum of 48 hours' notice prior to anticipated disturbance or interruption.

PART 2 – PRODUCTS

2.1 BEDDING AND BACKFILL

- A. Backfill Around Structures: Backfill shall be approved by the County Engineer and shall be free from large or frozen lumps, wood, or rocks more than 3 inches in their greatest dimension or other extraneous material. Porous backfill shall conform to the requirements of applicable sections of the *KYTC Standard Specification for Road and Bridge Construction*.
- B. Bedding Material: KY #57, #68, or #78 stone.
- C. Coarse Aggregate Backfill: See applicable *KYTC Standard Specification for Road and Bridge Construction* for properties and gradation of KY #57 stone.
- D. Common Earth Backfill
 - 1) Satisfactory Soils: ASTM D 2487 soil classification group (Unified Classification System) GW, GP, GM, SW, SM, SC, ML, and CL or a combination of these group symbols; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
 - 2) Unsatisfactory Soils: ASTM D 2487 soil classification group CH, MH, OH, OL and PT; soils which contain rock or gravel larger than 3 inches in any dimension, debris, waste frozen materials, vegetation, and other deleterious matter. Unsatisfactory soils also include satisfactory soils not maintained within 3-percent of optimum moisture content at time of compaction, unless otherwise approved by the County Engineer.
- E. Dense Graded Aggregate Backfill: See *KYTC Standard Specification for Road and Bridge Construction* for gradation requirements.

- F. Excavation: All excavation material shall be classified as either Rock or Regular Earth Excavation.
- G. Flowable Fill Concrete Backfill: Concrete strength shall be liquid enough to flow, be self-leveling, and have an ultimate minimum strength 50 psi (this product is a combination of sand and Portland cement).
- H. Foundation Stone: Foundation/Trench Stabilization Material: KY #1 or #2 stone. If used for foundations, 6 inches of dense graded aggregate shall be placed on top of the open graded stone to help prevent ponding of water, if applicable.
- I. Select Earth Backfill: Select earth backfill shall be free of debris, roots, frozen materials, organic matter, rock, or gravel larger than 1 inch in any dimension, or other harmful matter and shall generally meet KYTC *Standard Specification for Road and Bridge Construction*, Section 207 – *Select Material* for properties and gradation. Sand and rock dust are acceptable materials.
- J. Topsoil: Topsoil shall consist of friable clay loam, free from roots, stones, and other undesirable material and shall be capable of supporting a good growth of grass. Topsoil shall be free of material greater than 1 inch in any dimension.

2.2 MISCELLANEOUS

2.2.1 GEOTEXTILE FABRIC

See the Section 843 of the KYTC Standard Specification for Road and Bridge Construction.

2.2.2 NON -METALLIC WARNING TAPE

Acid and alkali resistant polyethylene film tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, colored as follows:

Blue: Water Systems
Green: Sewer systems

2.2.3 METALLIC LOCATING WIRE

Locating wire shall be 12 gauge copper wire jacketed with an acid and alkali resistant high density polyethylene coating; colored as follows:

Blue: Water Systems
Green: Sewer systems

PART 3 – EXECUTION

3.1 PREPARATION

3.1.1 GENERAL REQUIREMENTS APPLYING TO ALL AREAS

- A. Contractor shall plan construction to minimize disturbance to properties adjacent to the sewer, water, and storm lines.
- B. The County Engineer reserves the right to limit the width of land to be disturbed and to designate on the drawings or in the field certain areas or items within this width to be protected from damage.
- C. Any grading or excavation required for equipment travel during the course of construction as well as erosion control, access or haul road installation and removal, restoration, seeding and ground cover shall be provided by the Contractor at no additional cost.
- D. The Contractor shall be responsible for damage to areas or items designated by the County Engineer to be protected. Repairs to, replacement of, or reparations for areas or items damaged shall be made at the Contractor's expense to the satisfaction of the County Engineer before acceptance of the completed project.
- E. The Contractor shall protect all buildings, structures, and existing utilities located along the utility line. Hand trenching, shoring, or other methods may be required at no additional cost.
- F. Any fences disturbed by the Contractor shall be repaired to a condition equal to or better than their original condition or to the satisfaction of the County Engineer at no additional cost.
- G. Contractor shall obtain written permission from property owners for use of any access other than ones located within right-of-way. Written permission shall contain conditions for use and restoration agreements between property owner and Contractor. No additional compensation will be made for such access.
- H. All areas disturbed shall be restored to a condition equal to or better than their original condition and shall be graded to drain.
- I. The Contractor shall replace or repair all damaged or destroyed hedgerows and property corners. Protection of and restoration of damaged or destroyed property corners shall be in accordance with the requirements of Section 01000 – *General Requirements, Construction Staking*.
- J. When a property owner requests that a tree(s) within construction limits remain, a waiver shall be signed between the property owner and Metro.

3.1.2 CONSTRUCTION LIMITS

- A. Contractor shall not disturb any areas outside the limits contained in this section without the express written permission from the County Engineer.

- B. The following widths measured from the centerline of the sewer, water, and storm drainage lines shall be considered the allowable working area and be referred to as the “construction limits.”

Pipe Size	Distance from C/L	Total Allowable Width
12" or smaller	15 feet	30 feet
15" to 18"	20 feet	40 feet
24" and larger	25 feet	50 feet

The Contractor shall protect all areas outside these construction limits unless written variations are granted by the County Engineer.

3.1.3 CLEARING AND GRUBBING

- A. This work shall consist of clearing, grubbing, removing, and disposing of all vegetation and debris within the limits of construction, as designated on the plans or as required by the County Engineer. The work shall also include the preservation from injury or defacement of all vegetation or objects designated to remain.
- B. The Contractor shall clear and grub the surface as required for the full length of the trench within the rights of way or easements or within the construction limits indicated on the drawings. The width shall not exceed that width as specified herein. The Contractor shall remove only those trees and shrubs absolutely necessary to allow for the construction.
- B. Prior to commencement of clearing, Contractor shall notify The Metro Project Manager 48 hours in advance.
- C. The Contractor shall provide barricades, fences, coverings, or other types of protection necessary to prevent damage to existing improvements, not indicated to be removed, and improvements on adjoining property. All improvements damaged by this work shall be restored to their original condition or to a condition acceptable to the owner or other parties or authorities having jurisdiction.
- D. Protection of Trees and Vegetation

Contractor shall protect existing trees and other vegetation indicated by the County Engineer to remain in place against cutting, breaking, or skinning of roots, skinning and bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary fences or barricades as required to protect trees and vegetation to be left standing at no additional cost.

Trees and shrubs that are to remain within the construction limits will be indicated on the drawings or conspicuously marked on site.

Carefully and cleanly cut roots and branches of trees indicated to remain where the roots and branches obstruct construction of the utility line. If

directed by the County Engineer, the Contractor shall provide protection for roots and branches over 1½ inches diameter that are cut during construction operations. Temporarily cover all exposed roots with wet burlap to prevent roots from drying out. Provide earth cover as soon as possible.

Damaged trees and vegetation designated to remain shall be repaired or replaced at Contractor's expense in a manner acceptable to the County Engineer if they are damaged by construction operations. Repair tree damage as directed by a qualified Arborist.

- E. All brush, tree tops, stumps, and debris shall be hauled away and disposed of in accordance with applicable laws and regulations. The Contractor shall clean up debris resulting from clearing operations continuously with the progress of the work and remove promptly all salvageable material that becomes his property and is not to be reused in construction. Sale of material on the site is prohibited. Debris from the site shall be removed in such a manner as to prevent spillage. Keep pavement and area adjacent to site clean and free from mud, dirt, dust, and debris at all times. Unless otherwise noted, all trees with diameters of 6 inches or larger, measured at the base, cut on any project shall be cut into fireplace lengths, 24 inches, stacked within the "construction limits" at a location suitable to the property owner. Contractor shall not remove any wood from this project without written authorization from the County Engineer. No additional compensation shall be made if removal of trees from property is required.
- F. The method of stripping, clearing, and grubbing the site shall be at the discretion of the Contractor. However, all stumps, roots and other debris protruding through the ground surface or in excavated areas shall be completely removed and disposed of off the site by the Contractor, at his expense.
- G. Remove the existing topsoil to a depth of 6 inches or to the depth encountered from all areas in which excavation will occur. The topsoil shall be stored in stockpiles, separate from the excavated trench material, if the topsoil is to be re-spread. Otherwise, material shall be disposed of off-site at the Contractor's expense.
- H. Specific Requirements Applying to Developed Subdivision/Lots
 - 1) All trees located beyond 10 feet of the centerline of the sewer, water, or storm drainage line shall be protected by the Contractor. The County Engineer reserves the right to designate other trees located closer to the centerline for protection where possible.
 - 2) All shrubs, hedges, or other ornamental plantings located along the line shall be protected or removed and replanted by the Contractor and guaranteed within the warranty period at no additional cost.
 - 3) The Contractor shall protect septic systems, wells, or springs.
 - 4) Damage to lawns shall be kept to the absolute minimum necessary for construction.

- 5) Excavated or blasted rock shall be removed from the site unless otherwise ordered by the County Engineer.

3.1.4 PROTECTION OF EXISTING UTILITIES

- A. Contractor is responsible for protection of existing utilities in accordance with Section 01000 – *General Requirements*.
- B. Should it become necessary to move the position of any underground structure, the Contractor may be required to do such work and shall be paid on a force account basis or on an extra work basis as specified in Section 01000 – *General Requirements*. Method of payment shall be agreed upon by the County Engineer and the Contractor prior to commencing work.
- C. If existing utilities are found to interfere with the permanent facilities being constructed under this Section, immediately notify the County Engineer and secure instructions. Do not proceed with permanent relocation of utilities until instructions are received from the County Engineer.

3.1.5 PROTECTION OF SURFACE FEATURES

Refer to Section 01000 – *General Requirements*.

3.1.6 PROCEDURES FOR REPAIRING DAMAGED UTILITIES

Refer to Section 01000 – *General Requirements*.

3.1.7 PROTECTION OF PERSONS AND PROPERTY

Refer to Section 01000 – *General Requirements* for requirements relating to protection and restoration of property.

3.2 TRENCH EXCAVATION

3.2.1 GENERAL

A. Pipe Cover

Minimum Cover: Unless shown otherwise on the construction documents, provide minimum trench depth indicated to maintain a minimum cover over the top of the installed item. Minimum cover on pipe is measured from top of pipe to original ground or proposed finished grade as applicable and shall be per standard details. When minimum cover cannot be maintained, alternate construction shall be approved by the County Engineer.

- B. Remove all material from trench limits. Material of a compactible nature that can be re-used as trench backfill shall be re-installed and re-compacted to the requirements set forth in these specifications.

- C. At the Contractor's expense, dispose of all unsatisfactory material, of what ever nature, to a site which legally can accept such material as fill. Adhere to all applicable laws and ordinances regarding permitting of waste site, erosion

control, zoning, etc. as may be applicable.

- D. Material of an uncompactable nature, material unsatisfactory for backfill, trash and excess material shall be removed from project site and disposed at the Contractor's expense. Where removal of unsatisfactory material is due to negligence on the part of the Contractor (i.e. resulting from inadequate shoring or bracing, failure to dewater, improper material storage exposing it to rain or flooding, or other failure to meet specified requirements), work shall be performed at no additional cost to Metro. If additional material is required, the Contractor shall supply same from an approved borrow pit at no additional cost to Metro.

3.2.2 TRENCHING

- A. Where the utility line is in an existing paved area, the pavement shall be saw cut in a straight line parallel to the pipe on each side. Saw cutting operations shall be performed prior excavation to avoid excessive removal of asphalt. Care shall also be taken during the installation of pipe to avoid damage to adjoining paved surfaces.
- B. All trenches shall be excavated to the lines and grades as shown on the plans. Trenches for water lines may be curved within the limits of curvature of the pipe as allowed by AWWA C600.

- 1) Trench Width: The sides of trench shall be uniform and vertical.
- 2) Trench Depth: All trenches shall be excavated to accommodate the bedding as required in Table 2220.1. No extra compensation will be made for stone bedding used to bring the trench up to grade as applicable and specified in Table 2220.1.

In excavating for the trench, it is essential that the trench bottom be uniform in grade and remains static during backfilling and under all subsequent trench conditions. The grade of the bottom of the trench shall be graded to within 0.04 foot (1/2-inch) of the plan specified grade. The stone shall be graded to the same tolerance.

Care shall be taken not to over excavate the trench. Refer to paragraph 3.2.4 for over excavation specification.

- 3) Open Trench Exposure: Once trench is opened, proceed immediately to place specified materials in trench, or to otherwise utilize trench for intended purpose. Schedule work and order materials so that trenches are not left open for a longer period than is reasonably necessary and do not extend length limits specified in applicable specifications.

3.2.3 TRENCH ROCK

When rock is encountered in the trench, The Metro Project Manager or County Engineer must be notified before any rock is blasted or removed. The County Engineer or his representative will measure the rock, after which, the rock shall be excavated. Rock shall be removed from the construction site unless otherwise approved by the County Engineer. See

Section 01000 – *General Requirements* for blasting requirements.

3.2.4 PREPARATION OF FOUNDATION FOR PIPE LAYING

- A. The bedding surface shall provide a firm, stable, and uniform support through the entire length of the pipe.
- B. Unsuitable Trench Subgrade/Foundation Improvement: Notify Metro when unstable materials are encountered and define by drawing station locations and limits where encountered. If the trench subgrade is found to be soft, spongy, excessively wet, unstable or in any other way unfit such that there is inadequate pipe support, when directed by the County Engineer or The Metro Project Manager, the material shall be removed for the full width of the trench, and the excavated area shall be strengthened for foundation purposes by furnishing and placing either approved crushed stone, a concrete cradle, concrete mud mat, concrete encasement or a combination of these materials. Whenever the bottom of the trench is such that it cannot be reasonably stabilized, the County Engineer may require the pipe to be laid in cradles supported on piles. These foundations shall be placed as directed by the County Engineer.
- C. Over Excavation: Exercise care to avoid excavations below established grade where firm earth conditions exist. Unauthorized over-excavation consists of removal of material beyond indicated subgrade elevations or side dimensions, without specific approval of the County Engineer. Unauthorized excavation shall be replaced at Contractor's expense. Where unauthorized excavations have been carried beyond points required, restore these areas to the elevations and dimensions shown on the drawings with approved fill material and compact as specified. If over-excavation occurs, such over excavation shall be replaced with clean KY #57 stone.

3.2.5 DEWATERING

- A. When ground water is encountered, the Contractor shall pump or otherwise remove any water that accumulates in the trenches or pits and shall perform all work necessary to keep the trenches or pits clear from water while pipe is being laid, masonry units are being placed, and structures are either being set or constructed. All water removed from the trench shall be conveyed in a proper manner to a suitable point of discharge and shall comply with applicable erosion and sediment control laws at no additional cost.
- B. No pipe shall be constructed in water and water shall not be allowed to drain through the pipe. The open end of the pipe shall be kept closed with a tight fitting plug to prevent washing of any foreign matter into the line.
- C. No structure shall be constructed in water and water shall not be allowed to flow over or rise upon any concrete or masonry structure until the work has been accepted.
- D. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches. Reroute surface water runoff away from or around excavated areas.

3.2.6 TRENCH PREPARATION FOR PIPE

A. Preparation of Trenches for Gravity Pipelines

Depending upon the bedding class, the bottom of the trench for gravity pipelines shall be excavated to a minimum over depth as indicated in Table 2220.1 to provide for improved pipe bedding material for the entire length of the gravity pipeline, including sewer lateral connections, except in rock where bedding shall be a minimum of 6 inches deep. Rock larger than 3 inches shall be removed from the trench bottom and any voids filled with soil or clean stone. The bedding shall be shaped so that the bottom quadrant of the pipe rests on the bed. Bell holes and depressions as required of the joint shall be dug after the bedding has been graded and shaped, and shall be only of such length, depth, and width as required for properly making the particular type of joint. The trench for sanitary sewers, sanitary sewer lateral connections, and storm drainage lines shall then be backfilled as indicated in Section 3.4 - Backfilling.

B. Preparation of Trenches for Water Mains

When bedding is required, the bottom of the trench for pipe line shall be excavated to a minimum over depth as indicated in Table 02220.1. The trenches for water lines shall be graded to avoid local high points. Trenches shall be graded either level or on a continuous upslope to the high points designated on the drawings. Trenches shall be of such depth as to provide a minimum cover over the top of the pipe as noted in Section 1.8 – Project Conditions. Pipe shall not bridge any areas. Rock larger than 3 inches shall be removed from the trench bottom and any voids filled with soil or clean stone. Bell holes shall be provided at each joint to permit proper joint assembly and proper pipe support. Rock shall be removed 6 inches below pipe and bedding shall be a minimum of 6 inches. The trench for water lines shall then be backfilled as indicated in Section 3.4 – Backfilling.

3.2.7 TRENCHING IN FILLS

In areas where trenching for pipes will be in fills, the fills shall be brought to an elevation of at least 12 inches above the top of the pipe, and then the trench excavated in the compacted fill, as herein specified for trench excavation.

3.2.8 EXCAVATION FOR APPURTENANT STRUCTURES

- A. Excavate for appurtenant structures to provide at least 12 inches (minimum) clear distance between outer surface of the structure and undisturbed earth.
- B. Where rock is encountered so that a built-in-place manhole, precast structure (such as a manhole or vault), or other structure will bear over rock, remove the rock to a minimum of 12 inches below the foundation or footing of the structure and place an 12-inch cushion of KY #57 stone over the rock.

3.2.9 DEPOSITION OF EXCAVATED MATERIAL

All excavated material shall be placed in accordance with all applicable

OHSA and State and local erosion and sedimentation regulations.

3.3 BEDDING

3.3.1 BEDDING FOR STRUCTURES

The bottom of structure excavations shall be excavated to minimum over depth of 12 inches below the bottom of the structure to provide for stone bedding. Bedding material shall be shaped and graded so that the entire bottom of the structure rests on the material for its entire area.

3.4 BACKFILLING

A. General

- 1) Reopen trenches that have been improperly backfilled, to a depth as required for proper compaction. Refill and compact as specified, or otherwise correct to the approval of the County Engineer and at no additional cost to Metro.
- 2) Should any of the work be so enclosed or covered up before it has been approved, uncover all such work and, after approvals have been made, refill and compact as specified, all at no additional cost to Metro.
- 3) Observe specific pipe manufacturer's recommendations regarding methods of backfilling and compaction.
- 4) Insure compaction of each lift to requirements stated in these specifications.
- 5) All trenches shall be backfilled prior to the completion of the day's work unless otherwise directed or permitted by the County Engineer.
- 6) Exercise extreme care in backfilling operations to avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion. Repair damages, distortions, or misalignments to full satisfaction of the County Engineer.

B. Methods

- 1) Select Earth Backfill: Furnish select earth backfill where indicated on drawings and specified for compacted backfill conditions up to 12 inches above top of pipe. Comply with the following:

Care shall be taken to prevent any disturbance to the pipe or damage to newly made joints. The filling of the trench shall be carried on simultaneously on both sides of the pipe in such a manner that injurious side pressures do not occur such that the pipe could be displaced or dislodged. Do not backfill on muddy or frozen soil.

Sheeting and shoring generally should be removed only when the trench below it has become substantially filled, and every precaution shall be taken to prevent any slides of material from the sides of the trench onto or against the pipe.

- a. Hand place, shovel slice, and pneumatically tamp all select earth backfill.
 - b. Place backfill in lifts not exceeding 6 inches (loose thickness).
- 2) Common Earth Backfill: Comply with the following:
- a. Unless otherwise specified or approved by the County Engineer, backfill the remainder of the trench, from 1 foot above the pipe to grade, with common earth fill. Before placing any backfill, all rubbish, forms, blocks, wires, or other unsuitable material shall be removed from excavation. The backfilling shall be placed in layers not over 6 inches.
 - b. All areas within the limits designated on the drawings, including adjacent transition areas, shall be uniformly graded. The Contractor shall finish surfaces within the specified tolerances with uniform levels or slopes between points where elevations or existing grades are shown.
 - i. Finish subgrade areas that are to receive topsoil. Bring such areas to within 0.10 foot of required subgrade elevations.
 - ii. Shape subgrade under sidewalks to line, grade, and cross-section. Subgrade is to be brought to within 0.10 foot of required subgrade elevations.
 - iii. Shape subgrade under pavement to line, grade, and cross-section. Bring to within ½ inch of required subgrade elevations.
 - c. The Contractor shall protect newly graded areas from traffic and erosion and repair and re-establish grade in settled, eroded, or rutted areas. Where compacted areas are disturbed by subsequent construction or adverse weather, the Contractor shall scarify the surface, reshape, and re-compact to the required density. If the Contractor shall fail to maintain any trench within 2 days after receipt of written notice from the County Engineer, the County Engineer may refill the said depressions and the cost of such work may be retained from monies due the Contractor or billed directly to the Contractor. In case of emergency, the County Engineer may refill any dangerous depressions without prior notice to the Contractor.
- 3) Structure Backfill: Take care to prevent wedging action of the backfill against structure by carrying the material uniformly around the structure so approximately the same elevation is maintained in each lift. The Contractor shall refill all excavations as rapidly as practical after completion of the structural work therein, or after the excavations have served their purpose.
- 4) Aggregate Backfill
- a. Dense Graded Aggregate Backfill: When select earth backfill/borrow cannot be obtained, dense graded aggregate may be substituted with the County Engineer's approval.

- b. Coarse Aggregate Backfill: In confined areas where compaction cannot be achieved, coarse aggregate may be substituted with the County Engineer's approval.

3.5 COMPACTION/DENSITY

- A. Quality Assurance (QA): In the course of backfilling trenches for utility installations, the County Engineer may require "Field Density Determinations" or compaction tests. When compaction tests are called for, the County Engineer will determine the location of the tests and the Developer (Owner) shall engage a qualified testing firm to perform the test. Field density determinations shall be performed in accordance with AASHTO T191, T205, and T214, modified to include material sizes used in the laboratory determination of density with nuclear field density testing device or by other approved methods. A representative of the County Engineer will observe tests and a copy of the test results and inspection report will be submitted by the testing firm directly to the County Engineer or his/her representative. When the test results indicate that the density is less than the percent specified, the Contractor shall excavate and re-compact the areas that have failed at no expense to Metro. Payment for failed compaction test shall be made by the Contractor by deducting the cost from the forthcoming retainage or billed directly to the Contractor.
- B. Soil shall be compacted using equipment suitable for the material and the work area location.
- C. Compaction Requirements: Unless noted otherwise on drawings or more stringently by other sections of these specifications, place and insure backfill and fill materials achieve an equal or "higher" degree of compaction than undisturbed materials adjacent to the work; however, in no case shall degree of compaction fall below the following percentages of the maximum density at optimum moisture content. Tolerance is to be within +/- 3 percent of the optimum moisture content.

Location	Density
Beneath and within 25 feet of buildings	98% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Areas under roadway pavement surfaces, shoulders, sidewalks, and curb and gutter	95% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.
Under turf, sodded, planted, or seeded non-traffic areas	85% of the maximum dry density by ASTM D 698 (Standard Proctor), AASHTO T-99.

- D. Minimum Compaction Testing Frequency: Refer to Section 02200 – *Earthwork*, paragraph 3.4 – Subgrade Compaction Testing and Control.

3.6 SERVICE CUTS, DIRECTIONAL BORED OR PUNCHED SERVICES

- A. Open Trenches: Sewer lateral and water service connections that cross paved streets shall be installed by saw cutting the pavement and opening the trench.

Lateral and service connection trenches shall be backfilled as specified for gravity sewers and for water lines, as applicable. See Section 1.8 – Project Conditions of this specification.

- B. Directional Boring or Punching: At the direction of the County Engineer, service pipes may be required to be “punched” or “directional bored” beneath the pavement.

3.7 PAVEMENT REPAIR AND REPLACEMENT

Refer to specification Section 02500 – *Base Coarse and Paving*.

3.8 MISCELLANEOUS

3.8.1 IDENTIFICATION OF NEW LINES (Non-Metallic Warning Tape & Metallic Locating Wire)

A. SANITARY SEWER LINES

Placement of locating tape and wire during backfill operations shall be required on all newly installed non-metallic mains and service laterals. All new metallic mains and laterals will only require the installation of the warning tape. The non-metallic warning tape and metallic locating wire shall be per paragraph 2.2.2 and paragraph 2.2.3 of this specification. The warning tape shall be installed between 12 and 18 inches below the final grade. There shall be a minimum of 6 inches of separation between the warning tape and locating wire. The locating wire shall be installed along the crown of the pipe. Locater wire shall be connected to manhole frames on mains within streets, daylighted to surface grade immediately adjacent to manholes on offroad mains, and daylighted to surface grade adjacent to cleanouts on service laterals.

B. WATER LINES

Placement of warning tape during backfill operations shall be required on all newly installed mains. The non-metallic warning tape shall be per paragraph 2.2.2 of this specification and located between 12 and 18 inches below the final grade.

C. STORM LINES

Placement of warning tape and locating wire during backfill operations shall be required on all newly installed non-metallic mains. All new metallic mains will only require the installation of the warning tape. The non-metallic warning tape and metallic locating wire shall be per paragraph 2.2.2 and paragraph 2.2.3 of this specification. The warning tape shall be installed between 12 and 18 inches below the final grade. There shall be a minimum of 6 inches of separation between the warning tape and locating wire. The locating wire shall be installed along the crown of the pipe. Locater wire shall be connected to manhole frames on mains within streets, daylighted to

surface grade immediately adjacent to manholes on offroad mains, and daylighted to surface grade adjacent to cleanouts on service laterals. If storm line is a culvert under a Metro street or street entrance with no connecting structures, warning tape and locating wire are not required.

3.8.2 FLOWABLE FILL CONCRETE BACKFILL

When directed by the County Engineer, the Contractor shall backfill trenches or undercut areas with flowable fill concrete plant mix. If placed, traffic can typically be placed on mixture within an hour or two after placement. Final surfacing of pavements; however, should be delayed if possible at least 24 hours to allow for shrinkage and hydration of concrete. Settlement of 2 to 3 inches is to be expected.

3.8.3 SALVAGE OF USEABLE MATERIALS

Useable materials include paving blocks, Belgium blocks, Bluestone, brick, castings, and pipe etc., removed during excavation that are useable on this project or future projects as determined by the County Engineer. Such material shall be stockpiled on site or as directed by The Metro Project Manager at no additional cost to Metro. Unnecessary abuse and damage to these items shall be the Contractor's responsibility and the cost of replacement may be deducted from the retainage.

End of Section
02220

SECTION 02400 - CURB & GUTTER, DRIVEWAYS & SIDEWALKS

(January 2015)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 01000 – GENERAL REQUIREMENTS.
- C. Section 02200 – EARTHWORK.
- D. Any Specifications or details not covered herein shall be per KYTC, *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

1.2 SUMMARY

This section includes concrete curbs, combination curb and gutters, ramps, sidewalks, driveways, flumes, valley gutters, median strips, islands, retaining walls, steps, and headwalls on municipal roadways and its appurtenances.

1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to the streets and roadway system that comes under the authority of Metro as specified within this section and other sections of this manual.

Street or Roadway: A publicly dedicated street or roadway right-of-way maintained by Metro.

1.4 SUBMITTALS

Submit product data and shop drawings for the following in accordance with Section 01000, *General Requirements*:

- A. Air Entrainment
- B. Concrete cylinder break tests.
- C. Concrete admixtures
- D. Joint Sealants and expansion joint material
- E. Job mix formula
- F. Other embedded items

1.5 QUALITY ASSURANCE

Materials and operations shall comply with the latest revision of all applicable Codes and Standards.

1.6 STANDARD ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
ACI	American Concrete Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
C&G	Concrete Curb and Gutter
CRSI	Concrete Reinforcing Steel Institute
FS	Federal Specifications
MSDS	Material Safety Data Sheets
KYTC	Kentucky Transportation Cabinet
WWF	Welded Wire Fabric

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Concrete Handling/Transportation

- 1) Hydraulic cement concrete plant operations shall comply with the latest revision of the KYTC *Standard Specification for Road and Bridge Construction*.
- 2) Time limitations and intervals between deliveries shall be in accordance with Section 601.03.07 of the KYTC *Standard Specification for Road and Bridge Construction, 2012* or latest revision.
- 3) See Part 3 - EXECUTION of these specifications for handling of materials during placement of hydraulic cement concrete.

B. Steel Handling/Examination

- 1) Steel Reinforcing Storage:
Reinforcing steel shall be stored on platforms, skids, or other supports that will keep the steel above ground, well drained, and protected against deformation. Upon deliver to site, epoxy coated steel shall be covered with an opaque covering. Coverings shall be placed to provide air circulation and prevent condensation.
- 2) Steel Reinforcing Inspection
 - a. Plain Steel Reinforcing: The Contractor shall be responsible for inspecting materials thoroughly upon arrival. Examine materials for damage or excessive rust. Remove damaged or rejected

materials from site. A light coat of rust is permitted to develop on steel bars and fabric; however, rust scaling and flaking is not permitted.

- b. Coated Steel Reinforcing: Handling and storage of coated bars shall conform to the requirements of AASHTO M284. Visible damage to the coating shall be patched or repaired with materials compatible to the existing coating in accordance with AASHTO M284.

- 3) Pre-Installation Inspection: Prior to being installed, inspect each bar of steel reinforcing for the presence of dirt, paint, oil, rust scaling, flaking or other foreign matter. Remove such matter with appropriate methods and to the satisfaction of the County Engineer.

- C. Observe manufacturer's directions for delivery and storage of materials and accessories.

1.8 PROJECT CONDITIONS

1.8.1 PROTECTION OF STREAMS

Do not discharge excess concrete into a drainage pipe, catch basin, ditch, stream, river, pond, lake, or on Metro property without the approval of the County Engineer.

1.8.2 PROTECTION OF ROADWAYS

Do not discharge or allow concrete to spill onto any roadway or appurtenances either during placement or while in transit. Remove spills immediately or otherwise repair street as directed by the County Engineer. The contractor shall be responsible for cleanup of all waste/excess of concrete.

1.8.3 PROTECTION OF PROPERTY

Do not discharge excess concrete without written permission of the property owner.

1.9 COORDINATION

Coordinate placement of sidewalk and driveway connections to municipal streets and roadways with the County Engineer.

PART 2 – PRODUCTS

2.1 HYDRAULIC CEMENT CONCRETE

Ready mixed concrete shall comply with ASTM C94, *Standard Specification for Ready-Mixed Concrete*. Cement concrete shall meet the requirements of Section 601, *KYTC Standard Specification for Road and Bridge Construction, 2012* or latest revision. Concrete strength shall be as specified on Standard Details and drawings. Concrete class for combined curb and gutter, curbs, sidewalks, driveways, flumes, ditches, steps, headwalls, and islands shall be a minimum of Class A, 3500 psi or as designated in the specifications or drawings. Unless otherwise specified, all concrete shall be Class A, 3500 psi minimum.

All exposed concrete shall be air entrained with an air content conforming to the requirements of Table 601.03.03, Section 601 of the *KYTC Standard Specification for Road and Bridge Construction*, latest revision. Air entrained admixtures for use in portland cement concrete shall meet the requirements of AASHTO designation M154. Only those admixtures shall be used which have been approved by the County Engineer.

Calcium chloride may be used as an admixture if approved by the County Engineer. Calcium chloride shall conform to AASHTO M144, type 2. The use of calcium chloride is not permitted in reinforced concrete construction.

Concrete admixtures, when specified, shall conform to Section 802 of *KYTC Standard Specifications for Road and Bridge Construction*.

Concrete Classes (KYTC) to Design Compressive Strength at 28 days (f'c):

Class A	General	3,500-psi
Class A Modified	Concrete Deposited Under Water	3,500-psi
Class AA	Bridge Substructures	4,000-psi
Class AAA	Bridge Decks	5,500-psi
Class B	Gravity Retaining Walls	2,500-psi
Class D	Prestressed I Beams	4,000-psi
Class D Modified	Prestressed Box	5,000-psi
Class M1	Bridge Joint Repair	4,000-psi
Class M2	Bridge Joint Repair	4,000-psi
Class P	JPC Pavement	3,500-psi

2.2 HISTORICAL CONCRETE MIX

2.2.1 DESCRIPTION

This work shall consist of constructing sidewalks, driveways and median strip, except sidewalk driveways and median strip that is integrally a part of a structure, constructed of "historic mix" concrete, at the locations and to the dimensions, lines, grades, and cross section indicated on the Plans or as directed by the Engineer, and in conformity with the provisions and requirements set out in these Specifications.

2.2.2 MATERIALS

Materials used in this construction shall meet the following requirements:

Sand-Grout Concrete Mix Design		
Mix ID: 6-1/2 bag grout – 4,000 psi		
	Weights/Volumes per Cubic Yard (Saturated, Surface-Dry)	Yield, Cu. Ft.
Type 1 Portland Cements (lbs.)	640	3.21
Class F Fly Ash (lbs.)	110	0.70
Class A Sand (lbs.)	2,729	17.02
Water (lbs.) (Gal.-US)	295 (35.3 lbs./Cu. Yd.)	4.73
Total Air (%)	5.0 ± 1.0	1.35
Total		27.0
Add Mixture		
Russ Tech. Finishease NC, (oz.)	29.60	
Air Entrain		
Russ Tech, RSA-10 (ox.-US)	5.9	
Water/Cement Ration (lbs.)	0.40	
Slump	4.00	
Concrete Unit Weight (lbs./cu. Ft.)	139.4	

Compensation for free and negative moisture will be made at the time of batching.

Concrete Set Retarder: SUPER TARD – S, or Engineers approved equal

2.2.3 EXECUTION

Construction shall meet the requirements of the Louisville Metro Standard Drawings together with Section 505 – Concrete Sidewalks, Steps and Entrance Pavements; *KYTC Standard Specifications for Road and Bridge Construction*.

Complete floating and troweling until all the surface bleed water disappears. Using an ordinary, low-pressure garden sprayer, uniformly apply retarder to the surface without puddling.

Cover the treated surface with plastic sheeting (preferably black) or continuously-wetted burlap until the retarded paste is to be removed.

To expose the aggregate, direct a jet of water over the surface while scrubbing with a coarse floor brush to remove the retarded paste. Power washing is more efficient and should be used when possible.

Test a small area to determine the depth of retardation before proceeding with the rest of the surface. If the depth is excessive, wait a while before washing.

2.3 MISCELLANEOUS

2.3.1 HANDRAILS

Handrails shall conform to requirements of Section 720 of the KYTC *Standard Specification for Road and Bridge Construction*.

2.3.2 ASPHALT EXPANSION JOINT FILLER

Asphalt expansion joint filler material shall be in accordance with Section 807 of the KYTC *Standard Specification for Road and Bridge Construction*, 2012 or latest revision. Material shall be approximately ½ inch in thickness and a width and depth equal to those of the incidental structure.

2.3.3 CURING MATERIALS

White pigmented liquid membrane curing compound, PE film, or water for curing shall meet the requirements of Section 601 and 823 of the KYTC *Standard Specifications for Road and Bridge Construction*.

2.3.4 INSULATION BLANKET

In cold weather operations, insulated blankets must retain or supply moisture and maintain the temperature at the outermost surfaces of concrete above 45° F for at least 72 hours and above 40° F for at least an additional 24 hours.

2.3.5 POROUS BACKFILL AND WEEP HOLES

Porous backfill material and drain pipes for weep holes for retaining walls shall conform to requirements of Section 703 of the KYTC *Standard Specifications for Road and Bridge Construction*.

2.3.6 PORTLAND CEMENT

Type I, CSA normal, ASTM C150 *Standard Specification for Portland Cement*.

2.3.7 REINFORCEMENT

A. Reinforcing Bars

Reinforcing bars shall conform to the requirements Section 811, Grade 60 of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

B. Welded Wire Fabric

Wire mesh reinforcement shall be minimum 6 x 6, 10 Ga. shall conform to the requirements of Section 811 of KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

2.3.8 AGGREGATE BASE MATERIAL

Aggregate base materials for foundation support shall be Dense Graded Aggregate, compacted into place.

PART 3 – EXECUTION

3.1 CONSTRUCTION – ALL CONCRETE ITEMS

3.1.1 CONSTRUCTION OF SUBGRADE

- A. Subgrade Preparation: Excavation and subgrade preparation shall be in strict compliance with Section 02200, *Earthwork*. The subgrade upon which this work is to be placed shall be shaped and compacted to a firm, even surface conforming to the elevation and cross-sections shown on the plans, the Standard Details or as directed by the Engineer. All soft, frozen, and unsuitable material shall be removed and replaced with approved material. The subgrade shall be moist when the concrete is placed.
- B. Subgrade Fine Grading (Trimming): When forms have been set to exact grade and secured, fine grading to exact sub-grade elevation shall be completed by hand. Before pouring operations begin, the Contractor shall have forms set and grade tested and approved by The Metro Project Manager ahead of pouring operations. Subgrade fine grading shall be the responsibility of the Contractor to insure that the subgrade conforms to the Standard Details.

3.1.2 FORMS

Forms for this work shall be of wood, metal, or other approved material, shall extend to the full depth of the concrete and shall be straight, free from warps and of sufficient strength to withstand the pressure of the concrete without springing. Bracing and staking of the forms shall be such that the forms will remain in both horizontal and vertical alignment until their removal. Forms shall be cleaned of foreign matter and oiled before concrete is placed.

3.1.3 CURING

A. Curing – Year Round

The following method of curing is required year round:

- 1) Liquid Membrane Compound: Apply membrane-curing compound for curing, sealing, and moisture retention. The entire surface of the concrete shall be sprayed uniformly with a white pigmented membrane-forming compound immediately following the texturing operation.

Perform application in accordance with manufacturer's directions but at a minimum rate of 100 to 150 square feet per gallon and not more than 350 square feet per gallon. Application shall be by a sprayer or long-nap roller and shall be an even, continuous membrane produced on the concrete surface. No puddling shall be produced. At the time of use, the compound shall be in a thoroughly mixed condition, with pigment uniformly dispersed through the vehicle.

The membrane shall harden 30 minutes after application. Personnel and equipment shall be kept off the freshly applied material to prevent damage to the seal for a minimum of 72 hours. If the membrane becomes damaged within the initial 72 hours, damaged portions shall be repaired immediately with additional compound. Other requirements for protection of the structural integrity of concrete from pedestrians, vehicular traffic, and equipment shall be per these specifications as stated in applicable sections.

If removal of forms is required, exposed sections shall be protected immediately to provide a curing treatment equal to that provided for the surface.

- 2) No extra compensation will be made for curing of any type.

B. Cold Weather Curing – Additional Requirements

No concrete is to be poured when the outside ambient temperature is 40 degrees and falling. Cold weather curing shall be applied when the outside temperature is 50 degrees and falling.

- 1) Concrete Temperature: Conform to the requirements of paragraph 601.03.09 Section D *Placing Concrete* within the *KYTC Standard Specifications for Road and Bridge Construction, 2012* or latest revision.
- 2) Cold Subgrade: No concrete is to be placed on a frozen subgrade.
- 3) In addition to year round curing, install insulated blankets that will retain or supply moisture and maintain the temperature of concrete at the outermost surfaces above 45° F for at least 72 hours and above 40° F for at least an additional 96 hours, or until acceptable strength is achieved as determined by compressive strength testing. Blankets shall be left in place for a minimum of 7 days.
- 4) In cold weather applications, calcium chloride may be used as an admixture, if approved by the County Engineer

C. Hot Weather Curing – Additional Requirements

Hot weather curing shall be applied when the outside temperature is 75 degrees and rising. Care shall be taken in hot, dry, or windy weather to protect the concrete from shrinkage cracking by applying at a minimum, liquid membrane compound as described in Section 3.1.3 A, above.

Routine hot weather measures shall include cooling forms and wetting subgrade in addition to any other measures as required by the County Engineer.

Other measures for curing may be required by the County Engineer, such as: fog spraying, sprinkling, ponding, windbreaks, shading, or wet covering with an approved light colored material.

Hot weather curing shall remain in place for a minimum of 7 days.

D. Improper Curing

Any work damaged due to improper curing, freezing, or rain, shall be replaced at the Contractor's expense.

3.1.4 PROTECTION OF CONCRETE

- A. Protect new concrete sidewalks and appurtenances from pedestrian traffic for a minimum of 24 hours and driveway surfaces and curb and gutter from vehicular traffic for minimum of 7 days, unless otherwise approved by the County Engineer. Erect and maintain warning signs, lights, and watchmen to protect pedestrians and to direct traffic as needed.
- B. No equipment shall be driven or moved across newly concreted surfaces unless such equipment is rubber-tired and only if concrete surface is designed for and capable of sustaining loads imposed by the equipment.
- C. Protect new concrete from graffiti.

3.1.5 TESTING

- A. When required, minimum concrete testing shall include slump, air content, temperature, and compressive strength of concrete cylinders. Additional testing may be required if specified by the County Engineer.
- B. When required, compressive strength specimens shall be cast for each day's placement over 5 cubic yards and every 50 cubic yards thereafter. Five (5) 4"x8" concrete cylinders shall be cast for each test for compressive strength testing. Compressive strength testing shall be performed at the following intervals: 1 cylinder tested at 7 days, 3 cylinders tested at 28 days, and 1 cylinder held in reserve if the average 28 compressive strength does not meet specified strength. If the average 28 compressive strength does not meet the specified strength, the hold cylinder shall be tested at 56 days, or at the discretion of the County Engineer.

3.1.6 COORDINATION OF POURS

It will be the responsibility of the Contractor to coordinate the times of pours with The Metro Project Manager. For miscellaneous concrete pours (i.e. sidewalk, curb & gutter, collars, etc), a minimum of 24 hours notice shall be given to The Metro Project Manager so that he/she can check all aspects of the work before the pouring activities begin. For structural pours (i.e. retaining walls, bridge decks, box culverts, etc.), a minimum of 48 hours notice shall be given to The Metro Project Manager. Under no circumstances shall the Contractor pour concrete until The Metro Project Manager has had time to observe the areas of planned work.

3.1.7 PLACING AND FINISHING – ALL CONCRETE ITEMS

The concrete shall be placed in the forms in such a manner as to prevent the segregation of the mortar and the aggregate. The concrete shall be spaded, tamped, or vibrated sufficiently to bring the mortar to the surface.

Prior to and during pouring operations, the Contractor's foreman or formsetter shall carefully watch all alignment and grades to detect any errors in grade or misalignment. In the event any of the work is damaged from any cause or proves defective in any way, or is out of alignment or grade, the Contractor shall remove such work and replace at his own expense. The detection of poor subgrade shall also be his responsibility.

When sufficient concrete has been placed in the forms, it shall be well spaded along all areas in contact with the forms in order to eliminate all honeycombing. Concrete shall be floated to the proper grade and alignment, free from depressions or other irregularities, after which the exposed surfaces shall then be screeded with a straight edge and finished with a steel or wooden trowel.

The concrete shall be troweled smooth and, before the concrete obtains full set, very lightly brushed with a brush moistened with clear water. No mortar shall be used in the finishing. Immediately following finishing operations, the finished concrete shall be cured and protected in accordance with these specifications.

3.1.8 DEFECTIVE WORK

Metro will require the removal and replacement of any concrete items where they have been broken, cracked, chipped, have become misaligned, grades are incorrect, does not meet dimensions as shown in the Project Drawings, improperly cured, or of a substandard or non-approved product. Such areas designated by the County Engineer shall be replaced at no cost to Metro. Items replaced shall conform to the requirements for new work as to strength and construction. During removal of defective work, an amount equal to the required lengths of construction joints for each item or the amount as directed by the County Engineer must be removed and replaced.

The Engineer may drill cores from completed slabs to make depth measurements. Sections showing a deficiency of more than 3/8 inch shall be removed and replaced to the specified depth at the Contractor's expense.

3.1.9 PLACEMENT LIMITATIONS

Conform to the requirements of section 601.03.09 *Placing Concrete* of the KYTC *Standard Specification of Road and Bridge Construction, 2012* or latest revision for concrete temperature.

3.2 STANDARD CONCRETE CURB AND COMBINED CURB AND GUTTER

3.2.1 GENERAL REQUIREMENTS – COMBINED CURB & GUTTER

This work shall consist of a single course of portland cement concrete, constructed on a prepared subgrade in accordance with these specifications. It shall have the dimensions, cross-section, and location as shown on the plans or as directed by the County Engineer.

Horizontal alignment of curbs and combined curb and gutter shall be in reasonably close conformity to the lines shown on the plans. Vertical alignment shall not exceed +/- ¼ inch in 10 feet from plan grade.

Before concrete obtains full set, all exposed surfaces shall be finished with a brush moistened with clear water.

When constructing curb and gutter, the Contractor will be responsible for filling and compacting material in the space left behind the curb and gutter after the forms are removed. This shall take place within 3 to 7 days from pour and the material shall be compacted to the grade of the back of the curb. No extra compensation shall be made for this work.

When tying curb and gutter into inlets, dowels shall be placed in the throat plate, to tie gutter to plate as required in the use of conventional forms.

3.2.2 JOINTS FOR CURB AND GUTTER

A. Transverse Joints

- 1) Transverse joints for crack control for fixed forms shall be provided at the following locations:
 - a. At approximately 10 foot intervals;
 - b. At the gutter where the curb and gutter ties to the gutter apron of drop inlets;
 - c. When time elapsing between consecutive concrete placements exceeds 45 minutes; and
 - d. Where no section shall be less than 6 feet in length.
- 2) Transverse joints for crack control may be formed by using one of the following methods:
 - a. Removable 1/8 inch thick templates;
 - b. Scoring or sawing for a depth of not less than 3/4 inch when using curb machine; or
 - c. Approved “leave-in” type insert or may be formed or created using other approved methods which will successfully induce and control the

location and shape of the transverse cracks. Approval by the County Engineer is required.

If templates are used for transverse joints, templates shall be removed by stages, but not entirely until the concrete has become thoroughly hard. After removal of the templates, there must be a clear division throughout between these sections. Edging tools will be used to form an edge along the back and front form and at each template.

- B. Expansion Joints: See PRODUCTS, Section 2.2.2 of these specifications for approved expansion materials.

Expansion joints shall be formed at intervals of approximately 50 feet, at all radii points at concrete entrances and curb returns, at locations no less than 6 feet and no more than 10 feet from drop inlets, at the end of the days work, and or all cold joints.

3.2.3 FORMS – COMBINED CURB & GUTTER

- A. Fixed Forms

Fixed forms shall be straight, free from warp, and of such construction that there will be no interference with the inspection of grade and alignment. Forms shall extend the entire depth of the item and shall be braced and secured so that no deflection from alignment or grade will occur during concrete placement. Radial forms shall be sufficiently flexible or otherwise designed to provide a smooth, uniform, curved surface of the required radius. When sufficient concrete has been placed in the forms, it shall be well spaded along all areas in contact with the forms in order to eliminate all honeycombing. Face forms shall be removed as soon as concrete has attained sufficient set for the curb to stand without slumping. The exposed surface shall then be smoothed by the use of a suitable finishing tool.

- B. Slip Forms

The contractor will be permitted to slipform combined curb & gutter provided that he has obtained approval by the County Engineer and that all slipform requirements stated in the KYTC, *Standard Specification for Road and Bridge Construction*, Section 501.02.11, or latest revision are adhered to.

3.3 STANDARD PORTLAND CEMENT CONCRETE SIDEWALK AND DRIVEWAY ENTRANCES

3.3.1 GENERAL REQUIREMENTS

This work shall consist of the construction of portland cement concrete sidewalk 4 inches thick and in accordance with these specifications. Sidewalks crossing family residential driveways entrances shall have a concrete thickness of 6 inches while sidewalks crossing multi-family residential driveways and commercial entrances shall have a concrete thickness of 8 inches.

Curb cuts for driveways and handicap ramps shall be constructed as shown

on the Standard Details for the type driveway or ramp specified on the plans or as directed by the County Engineer.

Handicap ramps shall be constructed at all street intersection corners. The ramps shall be constructed as shown on the Standard Details for the type shown on the plans or as directed by the County Engineer.

Sidewalks shall not be opened to pedestrian traffic for the first 24 hours. Vehicular traffic shall be excluded for the first 7 days or until the minimum design compressive strength is attained, whichever is the lesser time.

Tolerances: Horizontal alignment of sidewalks shall be to the lines and grades as shown on the plans and details. Vertical alignment shall not exceed +/- ¼ inch in 10 feet from the plan grade.

3.3.2 JOINTS FOR CONCRETE SIDEWALK AND DRIVEWAY ENTRANCES

Transverse expansion joints shall be constructed at intervals of approximately 50 feet. Slabs shall be separated by transverse preformed joint filler, ½ inch in thickness, that extends from the bottom of the slab to approximately ¼ inch below the top surface.

The slab between expansion joints shall be divided into sections approximately 5 feet in length by transverse score joints formed by a jointing tool, trowel, or other approved means. Transverse control joints shall also be provided when the time period between consecutive concrete placements is more than 45 minutes. Control joints shall extend into concrete for at least ¼ of the depth and shall be approximately 1/8 inch in width. Where slabs are more than 7 feet in width, control joints shall be formed longitudinally to obtain secure uniform blocks that are approximately square. Transverse control joints shall also be installed where the corners of the drop inlets project into the sidewalk.

Construction joints shall be formed around appurtenances extending into and through the sidewalk. Preformed joint filler 3/8-inch thick shall be installed in these joints except that joint filler shall not be used adjacent to drop inlets. Preformed joint filler shall be securely fastened. An expansion joint shall be formed and filled with 3/8 inch preformed joint filler no less than 6 feet and no more than 10 feet from drop inlets. Preformed joint filler shall also be installed between concrete sidewalk and any adjacent fixed structure which is not tied to the sidewalk with steel dowels.

3.3.3 PLACING AND FINISHING CONCRETE

The foundation shall be thoroughly moistened immediately prior to concrete placement. Concrete shall be placed in forms by methods that will prevent segregation. Concrete shall be spread to the full depth and brought to grade by screeding and straightedging. Concrete shall be spaded adjacent to forms to prevent a honeycomb appearance, and the surface shall be floated with a wooden float to produce a surface free from irregularities. The final

finish shall be obtained with an approved hand float that will produce a uniform surface texture. Light brooming shall be used to hide trowel marks. Outside edges of the sidewalk slab and joints shall be edged with an edging tool having a radius of 1/4 inch.

See paragraph 3.1.3 *Curing* for requirements of curing concrete.

3.3.4 FORMS

A. Fixed Forms

See paragraph 3.2.3 A *Fixed Forms*, of these specifications. B. Slip Forms

Slip form pouring shall be allowed with approval of the County Engineer. All portions of paragraph 3.2.3 B, *Slip Forms*, of these specifications, concerning pouring operations with slip forms shall apply.

3.4 INTEGRAL PORTLAND CEMENT CONCRETE SIDEWALK

This type of sidewalk construction shall consist of standard sidewalk as specified in above paragraph 3.3 - *Standard Portland Cement Concrete Sidewalk and Driveway Entrances*, of these specifications, poured monolithically with a 12-inch curb.

The methods of construction for integral sidewalk shall be the same specified in paragraph 3.3 - *Standard Portland Cement Concrete Sidewalk and Driveway Entrances* of these specifications with the following additions:

- A. A joint shall be cut with an approved edging tool 6 inches from the face of the curb and parallel thereto.
- B. All expansion joints in the sidewalk shall extend across the top and face of the curb.
- C. The final finish for the top of the curb shall be made with a brush dampened with water, to match the finish of the adjoining structure.

3.5 MISCELLANEOUS PORTLAND CEMENT CONCRETE STRUCTURES AND APPURTANCES

This work shall consist of portland cement concrete retaining walls, headwalls, steps, piers for stream crossings, flumes and ditches, median barriers, median strips, islands, etc. constructed in accordance with these specifications. Any specifications or details pertaining to these items that are not covered herein shall be per KYTC *Standard Specifications for Road and Bridge Construction*, latest revision. These structures shall be constructed to the dimensions, cross-sections, and locations as shown on the plans, shown on the Standard Details, or as directed by the County Engineer.

END OF SECTION
02400

SECTION 02500 – BASE COURSE AND PAVING

(January 2015)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 01000 – GENERAL REQUIREMENTS.
- C. Section 02200 – EARTHWORK.
- D. Section 02220 – TRENCHING, BACKFILLING AND COMPACTION OF UTILITIES.
- E. Section 02400 – CURB & GUTTER, DRIVEWAYS AND SIDEWALKS.
- F. Any Specifications or details not covered herein shall be per Kentucky Transportation Cabinet, Standard Specification for Road and Bridge Construction, 2012 or latest revision.

1.2 SUMMARY

This section includes all equipment, labor, material, and services required for complete installation of aggregate base courses and asphalt concrete pavement structures and specialties for municipal street systems.

1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to roadway and street systems that come under the authority of Metro as specified within this section and other sections of this manual.

- A. Aggregate Base Course: A layer of material of a specified thickness placed between the subbase and asphalt paving.
- B. Base Course: A layer of material of a specified thickness placed between the subbase or aggregate base course and the intermediate or surface course.
- C. Public Road System: Roadway, streets, and their appurtenances required for the conveyance of the motoring public that are maintained by either Metro or the Kentucky Transportation Cabinet.
- D. Subbase Course: A layer of material of a specified thickness that is placed on a subgrade to support a base course.
- E. Subgrade: The top surface of a roadbed shaped to conform to the typical section on which the pavement structure and shoulders are constructed.

- F. Subgrade Stabilization: The modification of roadbed soils by admixing with stabilizing or chemical agents that will increase the load bearing capacity, firmness, and resistance to weathering or displacement.
- G. Suitable Subgrade: A subgrade that consists of a material type and density that is approved by the County Engineer for placing a subsequent layer of material.
- H. Surface Course/Wearing Surface: The top layer of a pavement structure that resists skidding, traffic abrasion, and disintegrating effects of weather.

1.4 SUBMITTALS

- A. Submit job-mix formula for each mixture to be supplied within 30 days after contract is awarded.
- B. Submit product data and shop drawings for manhole, lampstack, and valve box adjustment rings in accordance with Section 01000, *General Requirements*.

1.5 QUALITY ASSURANCE

- A. Asphalt concrete pavement thickness and density shall conform to the requirements of Section 402 of KYTC *Standard Specification for Road and Bridge Construction, 2012* or latest revision. Asphalt concrete pavement coring sample thickness and density test reports shall be submitted at completion of project in accordance with the requirements of Section 402 of KYTC Standard Specifications of Road and Bridge Construction, 2012 or latest revision.
- B. Aggregate base course density shall conform to the requirements of Section 302 of KYTC *Standard Specifications for Road and Bridge Construction, 2012* or latest revision.
- C. Materials and operations shall comply with the latest revision of all applicable codes and standards.

1.6 STANDARD ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
ANSI	American National Standards Institute
AREA	American Railway Engineers Association
ASTM	American Society for Testing and Materials
BM	Base Mix
FS	Federal Specifications
HMA	Hot Mix Asphalt

IM	Intermediate Mix
MSDS	Material Safety Data Sheets
OSHA	Occupational Safety and Health Administration
RAP	Recycled Asphalt Pavement
SM	Surface Mix
KYTC	Kentucky Transportation Cabinet

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Plant operations shall be in accordance with Section 401 *Asphalt Mixing Plant Requirements* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.
- B. Hauling equipment shall be in accordance with Section 403.02.06 *Production and Placement of Asphalt Mixtures* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.
- C. Delivery
 - 1) Hauling equipment shall be loaded in a manner to minimize segregation of the mix.
 - 2) Haul trucks shall park in a designated area to minimize tracking of tack coats.
 - 3) Once loaded, haul trucks shall proceed immediately to the job site.

1.8 PROJECT CONDITIONS

1.8.1 PROTECTION OF STREAMS

Do not discharge excess concrete into a drainage pipe, catch basin, ditch, stream, river, pond, lake, or on Metro property without the approval of The Metro Project Manager.

1.8.2 PROTECTION OF ROADWAYS

Do not discharge or allow concrete to spill onto any roadway or appurtenances either during placement or while in transit. Remove spills immediately or otherwise repair street as directed by the County Engineer. The contractor shall be responsible for cleanup of all waste/excess of concrete.

1.8.3 PROTECTION OF PROPERTY

Do not discharge excess concrete without written permission of the property owner.

1.9 COORDINATION

- A. Coordinate manhole, lampstack, and valve box adjusting with Metro County Engineer.
- B. Coordinate tie-in to municipal roadways with Metro County Engineer.

PART 2 – PRODUCTS

2.1 AGGREGATE BASE COURSE

Aggregate base material shall be designated as Dense Graded Aggregate in accordance with Section 302 *Dense Graded Aggregate Base (DGA) and Crushed Stone Base (CSB)* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

2.2 CHEMICAL STABILIZATION

If required, hydraulic cement stabilization shall be performed by a specialty contractor in accordance with Section 208 *Chemically Stabilized Roadbed* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

2.3 ASPHALT CONCRETE PAVEMENTS

Asphalt concrete pavements shall be in accordance with Section 403 *Production and Placement of Asphalt Mixtures* of the KYTC *Standard Specification for Road and Bridge Construction*, 2012 or latest revision.

The use of reclaimed asphalt pavement (RAP) shall be in accordance with Section 404.02.05 and 409 of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

2.4 TACK COAT

Tack coat shall be in accordance with Section 406 *Asphalt Curing Seal and Asphalt Prime and Tack Coats* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

2.5 ASPHALT SEAL COAT

Asphalt seal coat shall be in accordance with Section 406 *Asphalt Curing Seal and Asphalt Prime and Tack Coats* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

PART 3 – EXECUTION

3.1 GENERAL

Construction and testing shall conform to these specifications as well as any specifications or details not covered herein shall be per the applicable sections of Divisions I, II, III, IV, VII and VIII of the *KYTC Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

3.2 PAVEMENT, PATCHES, REPAIR AND REPLACEMENT (PERMANENT & TEMPORARY)

- A. General: This work shall consist of replacing subbase stone, and asphalt material in the street in areas where it becomes necessary to remove the original pavement such as for roadway failures, sewer trenches, water main trenches, drainage pipe ditches, etc. Pavement repair depths shall be the type to match the existing street pavement as shown on the drawings or as determined by the County Engineer.
- B. Cutting Pavement: For all areas that are patched, the edges of the pavement shall be cut in a straight line revealing a vertical face for the patch to abut against. Care shall be taken during excavation and construction to avoid damage to adjoining paved surfaces. If patching is performed as part of piping installations, perform cutting operations prior to installation of line to avoid excessive removal of pavement.
- C. Surface Tolerances: The asphalt patched surface shall be tested using a 10- foot straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not exceed $\frac{1}{2}$ -inch allowing for the contours of the existing pavement. All humps or depressions exceeding the specified tolerance shall be corrected or the defective work removed and replaced with new material. Any deviation from this standard will be at the discretion of the County Engineer.
- D. Excavation: Excavation of the existing pavement and subbase shall be made to a depth that is found to be stable, or as directed by the County Engineer. Before the placement of any stone, concrete or asphalt material, a representative of the County Engineer shall inspect the underlying subgrade. The Contractor shall be responsible for correcting any ruts or soft yielding places to a depth of approved suitable subgrade before placing of the asphalt material. Any depths below 4 inches shall be paid as extra work.

3.2.1 PERMANENT PAVEMENT REPAIR

A. Asphalt Pavement Repair

Aggregate Base Stone: The aggregate base shall be installed and compacted to the density specified in *KYTC Standard Specifications for Road and Bridge Construction*, Section 302 *Dense Graded Aggregate (DGA and Crushed Stone Base (CSB)*, 2012 or latest revision.

Asphalt Concrete Pavement: The asphalt concrete pavement shall be installed and compact to the density specified in *KYTC Standard Specification for Road and Bridge Construction*, Sections 402 and 403, 2012 or latest revision.

Lift thickness shall not exceed those as referenced within these specifications. Before placing any asphalt material, all sides of the existing pavement and subbase shall be thoroughly tacked at the rate of 0.05 Gal/SY. The finished surface shall abut to the existing pavement with no overlap allowed.

B. Concrete Pavement Repair

Aggregate Base Stone: The aggregate base shall be installed and compacted to the density specified in *KYTC Standard Specifications for Road and Bridge Construction, Section 302 Dense Graded Aggregate (DGA and Crushed Stone Base (CSB), 2012 or latest revision.*

Hydraulic Cement Concrete Pavement: The concrete pavement shall be installed using a minimum 3500 psi concrete at 28 days. The County Engineer reserves the right to require that the Contractor pull concrete test cylinders for verifying concrete strength. Concrete shall meet *KYTC Standard Specifications for Road and Bridge Construction, Section 601 Concrete.*

3.2.2 TEMPORARY PAVEMENT REPAIR

A. Asphalt Pavement Repair

When shown on the plans, during winter months when asphalt concrete is unavailable, or when directed by the County Engineer, temporary pavement patches shall be installed. The Contractor shall maintain the temporary repair to the satisfaction of the County Engineer until the permanent pavement repair is made.

Cold patch material shall be installed in accordance with manufacturer's recommendations.

Density shall conform to the applicable sections referenced above under permanent pavement repair for each particular product (i.e. aggregate base course).

- B. Once hot asphalt mix is available, all temporary patch material shall be removed and replaced with a permanent hot asphalt patch within thirty calendar days.

3.3 AGGREGATE BASE COURSE

A. Subgrade Approval

The underlying course upon which the aggregate base course is to be placed shall be prepared in accordance with the requirements of Section 02200, *Earthwork*, of these specifications and applicable sections of *KYTC Standard Specifications for Road and Bridge Construction, 212 or latest revision.* Prior to any spreading operations, the underlying course shall be checked and accepted by the County Engineer. Any ruts or soft yielding places shall be corrected and rolled before the base course is applied.

B. Installation of Aggregate Base Course

The aggregate base course shall be mixed in an approved central mixing plant of the pugmill type and water added during mixing operations in the amount necessary to provide the optimum moisture content for compacting. After mixing, the material shall be transported to the job site and placed on the roadbed by means of an approved aggregate spreader.

The aggregate base course shall be constructed in layers not less than 3 inches or more than 6 inches of compacted thickness. When vibrating with other approved types of special compacting equipment, the compacted depth of a single layer of the aggregate base course may be increased to 8 inches upon approval by the County Engineer. The aggregate, as spread, shall be uniform in gradation with no segregation or pockets of fine or course material.

C. Compaction Operations and Density Requirements

After mixing and spreading, the aggregate base course shall be thoroughly compacted at optimum moisture within +/- 3-percent of optimum. Rolling shall progress gradually from the sides to the center and shall continue until the entire area of the course has been rolled by the rear wheels. Rolling shall continue until the material has been compacted to not less than 100 percent density when tested in accordance with AASHTO T191, latest revision.

D. Grading Tolerances of Final Surface

After final rolling, the surface shall be inspected and any irregularities in excess of ½ inch shall be corrected. Aggregate base course shall conform to the lines, grades, and typical cross sections shown on the plans, details or as established by the County Engineer within a tolerance of +/- ½ inch. Any irregularities in the surface shall be corrected by scarifying, remixing, reshaping, and recompacting until a smooth surface is obtained. If directed by the County Engineer, the aggregate base shall be opened to public traffic for at least 2 weeks before being surfaced. During this time, the surface shall be protected against loss of shape, required grades, and material by the addition of moisture and any re-working as necessary. This shall be at no additional cost to Metro.

3.4 CHEMICAL STABILIZATION

If needed, chemical stabilization, either by lime or cement, shall be performed in general accordance with the KYTC Standard Specifications for Road and Bridge Construction.

3.5 ASPHALT CONCRETE PAVEMENT

3.5.1 CONDITIONING EXISTING SURFACE

Preparation of Surface: Prior to beginning paving operations, the existing areas to be resurfaced shall be thoroughly cleaned by the contractor to the satisfaction of the County Engineer. This cleaning shall include sweeping of the streets with a power operated broom, cutting excess debris

with a grader, washing with a water truck, and hand cleaning any debris left after this operation is complete. Cleaning operations shall commence just prior to the resurfacing of streets. In addition, the contractor shall expose any existing paving areas, which have been covered by soil, grass, or debris. These areas shall be thoroughly cleaned and tacked before resurfacing. Any excess material left over after this operation shall be removed or spread out to the satisfaction of the County Engineer. No additional payment shall be made for this work.

When the surface of the existing pavement or base is irregular, it shall be brought to a uniform grade and cross section as directed by the County Engineer. The surface on which the asphalt concrete is to be applied shall be prepared in accordance with the requirements of the applicable specifications.

When specified, prior to placement of asphalt concrete, longitudinal and transverse joints and cracks in hydraulic cement concrete shall be sealed by the application of an approved joint sealing compound.

Any surface casting such as water boxes, manholes, grates, cleanouts, etc. shall be set to grade prior to beginning of paving activities. All telephone manholes and gas boxes are to be adjusted by the utility companies or contractor if approved by the County Engineer. All such castings shall be adjusted within a tolerance of 1/8 inch below or flush with the asphalt finished elevation. A maximum of three 2-inch riser rings will be allowed for adjusting to grade. Adjustments more than 6 inches above original grade will require excavation and frame adjustment. The contractor shall be required to coat the top of any such casting with a suitable coating material to prevent adhesion of the asphalt material to the casting. A tack coat of asphalt material, conforming to the requirements of these specifications, shall be applied prior to resurfacing operations.

A. Tack Coat

A tack coat of liquid asphalt shall be applied between the existing surface and each asphalt course placed thereafter. The tack coat shall conform to the applicable requirements of KYTC *Standard Specifications for Road and Bridge Construction* section 406.

Tack material shall be uniformly applied with a pressure distributor conforming to KYTC requirements. Hand spray equipment shall not be used except in areas inaccessible by a pressure distributor. Undiluted asphalt shall be applied at a rate of 0.05 to 0.10 gallons per square yard. Diluted asphalt shall be applied at a rate of 0.10 to 0.15 gallons per square yard. The time interval between applying the tack coat and placing the paving mixture shall be sufficient to ensure a tacky residue providing maximum adhesion of the paving mixture to the base. On rich sections or those that have been repaired by the extensive use of asphalt patching mixtures, the tack coat shall be eliminated only if approved by the County Engineer.

Application of tack at joints, adjacent to curbs, gutters, or other appurtenances shall be applied with a hand wand at the rate of 0.20 gallons per square yard. At joints, the hand wand applied tack shall be 2 feet in width with 4 to 6 inches protruding beyond the joint for the first pass. Tack for the adjacent pass shall completely cover the vertical face of the mat edge, so that

slight puddling of asphalt occurs at the joint, and extends a minimum of 1 foot into the lane to be paved. Milled faces that are to remain in place shall be tacked as above for the adjacent pass. Use of tack at longitudinal joint vertical faces will not be required when paving in echelon. Care shall be taken to prevent spattering of adjacent pavement, structures, trees, and private property. Any spattering shall be cleaned up by the contractor at no cost to Metro.

Tack shall be applied in such a manner as to offer the least inconvenience to traffic and to permit a minimum of one way traffic without pickup or tracking. Traffic shall be excluded from the any pavement that has received tack. New asphalt shall not be placed on tack or prime coats that have been damaged by traffic or contaminated by foreign material.

B. Removing Depressions/Irregularities

Where irregularities in the existing surface would result in a course more than 3 inches in thickness after compaction, the surface shall be brought to a uniform grade by scratching with a thin layer of asphalt concrete not exceeding the minimum thickness as recommended for that type of mix. Then the material shall be thoroughly compacted until it conforms to the surrounding surface. The mixture used shall be the same as that specified for the surface mix to be placed.

3.5.2 PAVING OPERATIONS

A. Asphalt Concrete Pavement Equipment

Bituminous concrete pavement equipment shall be in accordance with Section 403 of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

B. Placing and Finishing

Asphalt concrete asphalt shall not be placed until the surface upon which it is to be placed has been approved by the County Engineer.

The edge of the pavement shall be marked by means of a continuous line placed and maintained a sufficient distance ahead of the paving operation to provide proper control of the pavement width and horizontal alignment.

An asphalt paver shall be used to distribute the asphalt mix over the widest pavement width practicable. Wherever practicable and when the capacity of sustained production and delivery is such that more than one paver can be operated, pavers shall be used in echelon to place the wearing course in adjacent lanes. Crossovers, as well as areas containing manholes or other obstacles that prohibit the practical use of mechanical spreading and finishing equipment, may be constructed using hand tools. However, care shall be taken to obtain the required thickness, jointing, compaction, and surface smoothness.

The longitudinal joint in one layer shall offset that in the layer immediately below by approximately 6 inches. However, the joint in the wearing surface shall be at the centerline of the pavement if the roadway comprises two

traffic lanes or at lane lines if the roadway is more than two lanes in width. Offsetting layers will not be required when adjoining lanes are paved in echelon and the rolling of both lanes occurs within 15 minutes after laydown.

The contractor shall have a certified Asphalt Concrete Paving Technician present during paving operations. Immediately after placement and screeding, the surface and edges of each layer shall be inspected and straightedged by the technician and necessary corrections performed prior to compaction. The finished pavement shall be uniform and smooth.

The placement of asphalt concrete shall be as continuous as possible and shall be scheduled such that the interruption occurring at the completion of each day's work will not detrimentally affect the partially completed work. Material that cannot be spread and finished in daylight shall not be dispatched from the plant unless the use of artificial lighting has been approved. When paving is performed at night, sufficient light shall be provided to properly perform and thoroughly inspect every phase of the operation. Such phases include cleaning planed surfaces, tack application, paving, compacting, and testing. Lighting shall be provided and positioned such as to not create a blinding hazard to the traveling public.

During paving operations, the Contractor shall be responsible for furnishing and erecting temporary "no parking" signs on each street that is to be paved. The signs shall be erected at least 24 hours prior to paving operations and on each side of the street as necessary.

C. Layer Thickness

Asphalt concrete SUPERPAVE pavement courses shall be placed in layers not exceeding 4.0 times the nominal maximum size aggregate in the asphalt mixture. The maximum thickness may be reduced if the mixture cannot be adequately placed in a single lift and compacted to required uniform density and smoothness. The minimum thickness for a pavement course shall be no less than 2.5 times the nominal maximum size aggregate in the asphalt mixture. Nominal maximum size aggregate for each mix shall be defined as one sieve size larger than the first sieve to retain more than 10 percent aggregate.

Recommended Thickness Chart	
Nominal Maximum Aggregate size (Inches)	Lift Thickness (inches)
1.5	4.5-5.0
1.00	3.0-4.5
0.75	2.25-3.5

D. Joints

Care shall be exercised when tying into curb and gutter and newly overlaid travel lanes to ensure a uniform grade and joint.

The contractor shall construct the final riding surface to tie into the existing surface by cutting a notch 1 inch deep by 1 inch wide for all tie-ins to existing pavement, including driveways and ramps. Suitable guidelines or

devices shall be used to ensure cutting of the joint on a true line. The joint shall be thoroughly cleaned and dried prior to being sealed. This work shall be done at no additional cost to Metro.

Method of temporary joints at the end of each workday shall be approved by the Metro County Engineer.

E. Compaction

Immediately after the asphalt mixture is placed and struck off and surface irregularities are corrected, the mixture shall be thoroughly and uniformly compacted by rolling.

During compaction of asphalt concrete asphalt, the roller shall not pass over the end of freshly placed material except when a construction joint is to be formed. Edges shall be finished true and uniform.

The surface shall be rolled when the mixture is in the proper condition. Rolling shall not cause undue displacement, cracking, or shoving.

The number, weight, and type of rollers furnished shall be sufficient to obtain the required compaction while the mixture is in a workable condition. The sequence of rolling operations and the selection of roller types shall provide the specified pavement density.

Immediately after the hot mixture is placed, it shall be sealed with rollers. Thereafter, rolling shall be a continuous process, insofar as practicable, and all parts of the pavement shall receive uniform compaction.

Rolling shall begin at the sides and proceed longitudinally parallel to the center of the pavement, each trip overlapping at least $\frac{1}{2}$ the roller width, gradually progressing to the crown of the pavement. When abutting a previously placed lane, the longitudinal joint shall be rolled first, followed by the regular rolling procedure. On superelevated curves, rolling shall begin at the low side and progress to the high side by overlapping of longitudinal trips parallel to the centerline.

Displacements occurring as a result of reversing the direction of a roller, or from other causes, shall be corrected at once by the use of rakes or lutes and addition of fresh mixture when required. Care shall be taken in rolling not to displace the line and grade of the edges of the asphalt mixture. All roller marks shall be eliminated.

To prevent adhesion of the mixture to the rollers, the wheels shall be kept properly moistened with water or water mixed with a very small quantity of detergent or other approved material. Excess liquid will not be permitted.

Along forms, curbs, headers, walls, and other places not accessible to rollers, the mixture shall be thoroughly compacted with hot hand tampers, smoothing irons, or mechanical tampers. On depressed areas, a trench roller may be used or cleated compression strips may be used under the roller to transmit compression to the depressed area.

Edges of asphalt pavement surfaces shall be true curves or tangents. Irregularities shall be corrected.

The surface of the compacted course shall be protected until the material has cooled sufficiently to support normal traffic without marring.

F. Density

Asphalt compacted into place shall meet the minimum average target density of 92% compared to the theoretical maximum density as determined by laboratory testing. No individual test shall fall below 89% compaction or above 96% compaction compared to the theoretical maximum density.

G. Pavement Samples

If requested by the County Engineer, the Contractor shall cut core samples for testing depth and density. Samples shall be taken for full depth at the locations as selected by the County Engineer. The removed pavement shall be replaced with new mixture and refinished. No additional compensation will be made for such work.

H. Placement Limitations

Placement limitations, to include but not limited to, mixture temperatures, and cold weather paving shall be in accordance with Sections 401 and 403 of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision. Surface mix applications shall not be placed until the ambient air temperature and the base surface temperature is 45 degrees and rising without prior approval from the County Engineer. Base mix applications shall not be placed until the ambient air temperature and the surface temperature is 40 degrees and rising.

I. Pavement Tolerance

The surface will be tested by using a 10-foot straightedge. The variation of the surface from the testing edge of the straightedge between any two contacts with the surface shall not be more than 1/4 inch. Humps and depressions exceeding the specified tolerance shall be corrected, or the defective work shall be removed and replaced with new material.

3.6 PRIME COAT

When a prime coat is required, it shall conform to the applicable requirements of KYTC *Standard Specifications for Road and Bridge Construction*, Section 406.

When asphalt concrete to be placed has a total thickness of 4 inches or more, priming with liquid asphalt material will not be required on aggregate subbase or base material.

3.7 SEAL COAT

Seal coat shall be in accordance with Section 405, *Asphalt Seal Coat* of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

END OF SECTION
02500

SECTION 02510 – GUARDRAIL

(January 2015)

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this specification.
- B. Section 01000 – GENERAL REQUIREMENTS.
- C. Section 02200 – EARTHWORK.
- D. Section 02500 – BASE COURSE AND PAVING.
- E. Any specifications or details not covered herein shall be per Kentucky Transportation Cabinet, *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

1.2 SUMMARY

This section includes all equipment, labor, material, and services required for complete installation of guardrail systems.

1.3 DEFINITIONS

For the purposes of this specification, the following definitions refer to the guardrail systems that come under the authority of Metro as specified within this section and other sections of this manual.

Public Road System: Roadway, streets, and their appurtenances required for the conveyance of the motoring public that are maintained by either Metro or the Kentucky Transportation Cabinet.

1.4 SUBMITTALS

Shop drawings shall be submitted for all guardrail components upon request by Metro County Engineer and in accordance with Section 01000, *General Requirements*.

1.5 QUALITY ASSURANCE

Materials and operations shall comply with the latest revision of all applicable Codes and Standards.

1.6 STANDARD ABBREVIATIONS

AASHTO	American Association of State Highway Transportation Officials
ANSI	American National Standards Institute

AREA	American Railway Engineers Association
ASTM	American Society for Testing and Materials
FS	Federal Specifications
MSDS	Material Safety Data Sheets
OSHA	Occupational Safety and Health Administration
KYTC	Kentucky Transportation Cabinet

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

Inspect materials thoroughly upon arrival. Examine materials for damage. Remove damaged or rejected materials from site.

All material shall be protected during handling and installation to prevent any damage. Remove damaged or rejected materials immediately.

Observe manufacturer's directions for delivery and storage of materials and accessories.

1.8 COORDINATION

- A. Coordinate any and all removal and replacement of existing guardrail or installation of new guardrail with the County Engineer.
- B. Coordinate all work within municipal roadways with the County Engineer.

PART 2 – PRODUCTS

2.1 GENERAL

Products shall conform to Section 814, *Guardrail Systems*, of the KYTC *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

PART 3 – EXECUTION

3.1 GENERAL

Execution shall conform to Section 719, *Guardrail*, of the KYTC, *Standard Specifications for Road and Bridge Construction*, 2012 or latest revision.

END OF SECTION
02510