

35.11 TESTING OF GRAVITY SANITARY SEWERS

On all projects involving installation of sanitary sewer lines, the finished work shall comply with provisions listed below or similar requirements which will ensure equal or better results:

1. After the collecting and/or outfall lines or system have been brought to completion, prior to final inspection, the CONTRACTOR shall rod out the entire system by pushing through each individual line in the system, from manhole to manhole, appropriate tools for removal from the lines of any and all dirt, debris and trash.
2. During the final inspection, the ENGINEER will inspect each individual line, from manhole to manhole, either by use of lights or other means at his disposal to determine whether the completed lines are true to line and grade as laid out or as shown on the plans.
3. The ENGINEER will require that the CONTRACTOR pass through the system under momentum a wooden ball of a diameter of one-inch less than the nominal diameter of the pipe, except that no ball larger than eight (8) inches in diameter shall be used.
4. Deflection tests shall be performed on a flexible pipe. The test shall be conducted after final backfill has been in place at least 30 days to permit stabilization of the system. No pipe shall exceed a deflection of 5 percent. If deflection exceeds 5 percent, pipe shall be replaced or corrected. The rigid ball cylinder or mandrel used for deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM Specification, including the appendix, to which the pipe is manufactured. The pipe shall be measured in compliance with ASTM D-2122 Standard Test Method of Determining Dimensions of Thermoplastic Pipe and Fittings. The test shall be performed without mechanical pull devices.
5. All lines or sections of lines that are found to be laid improperly with respect to line or grade, that are found to contain broken or leading sections of pipe, or are obstructed in such a manner that they cannot be satisfactorily corrected otherwise, shall be removed and replaced at the CONTRACTOR'S expense.
6. The CONTRACTOR shall lay sewer lines, including house connections, so that the access of ground water or loss of water from the sewer system or other gravity flow piping which does not normally flow full will be limited to 10 gallons per inch diameter per mile per day. This limitation is inclusive of manholes, sewers, house connections, and appurtenances. This requirement may be applied to a portion of the contract work, such as the sewers in a separate drainage area or to a single section of the line between two manholes.
7. To test for leaks, the ENGINEER will require that all completed piping as specified herein after backfilling be tested by low-pressure air test, exfiltration, or infiltration test. Low pressure air test will be restricted to sewer up through 24-inch diameter. Sewer larger than 24-inch diameter shall receive an exfiltration test if above ground

water, or infiltration test if below ground water. Should the low pressure air test results be inconclusive, or at the request of the ENGINEER, an exfiltration or infiltration test will be required on the low pressure air tested segments. Services, labor, equipment, and supplies required for all tests shall be furnished by the CONTRACTOR. These tests shall not be required on "lives" sewers.

8. Smoke testing may be used only to locate leaks and in no case shall be considered conclusive. In all cases the smoke test shall be accomplished by an air test, exfiltration test or infiltration test. Smoke testing may only be performed where ground water is low and smoke is blown into a conduit that is properly sealed. All such leaks or breaks discovered by the smoke test shall be repaired and/or corrected by the CONTRACTOR at his own expense. Equipment and supplies required for smoke tests shall be furnished by the CONTRACTOR. The CONTRACTOR may also be required to smoke test the first section (manhole-to-manhole) of each size of pipe and type of joint on each construction contract prior to backfilling to establish and check laying and jointing procedures. Other supplementary smoke tests prior to backfilling may be performed by the CONTRACTOR at his option; however, any such test shall not supplant the final tests of the completed work unless such final tests are waived by the ENGINEER.

9. The low pressure air test shall consist of meeting a required holding time during measured pressure drop. The maximum test pressure shall be 4.0 psi (minimum pressure shall be 3.5 psi), with the allowable pressure loss being 1.0 psi during calculated holding time. Holding time shall be calculated from the equation:

$$0.472 \times \text{pipe diameter (inches)} = \text{holding time (minutes)}$$

This formula shall apply for all sizes of pipe and lengths of line tested. Failure to maintain calculated holding time during pressure drop from 3.5 psi to 2.5 psi for each section shall be deemed test failure.

10. In order to test for infiltration the ENGINEER may also require exfiltration tests on section of pipe between manholes after it has been laid but prior to backfilling. Exfiltration tests shall be conducted by plugging the lower end of the section of sewer to be tested and filling the sewer with water to a point approximately five feet above the invert at the lower end and at least one foot above the pipe at the upper end, observing leakage at all joints and measuring the amount of leakage for a given interval count. Exfiltration shall not exceed 110 percent times the infiltration limits set out hereinabove. All observed leaks shall be corrected even though exfiltration is within the limits.
11. To test for infiltration, the ENGINEER may also require that the CONTRACTOR plug the ends of all lines at the manhole so that measurements may be made at each section of sewer line. Infiltration tests shall consist of weir measurements to determine quantity if any infiltration. Measurements shall be taken at line locations directed by the ENGINEER. This infiltration test will not be made until the sewer line is completed, and the CONTRACTOR will be required to correct all conditions that are

conducive to excessive infiltration that may be required to relay such sections of the line that may not be corrected even though infiltration is within allowable limits.

12. A closed circuit television(CCTV) survey is required for all newly installed sewer pipe, and/or any designated existing pipe. The television survey shall be performed according to Section 26 of these Specifications.

35.12 HOUSE CONNECTIONS

In those instances where 4-inch or 6-inch sanitary sewer pipe is used to connect a house to a sewer main, installation must be done by a Licensed Master Plumber. All House Laterals shall be connected per LFUCG Standard Drawings 230, 231, and 232. Lateral Cleanout shall be provided and installed as per the Two-Way Cleanout Drawing included in the Standard Drawing Section of these Specifications.

35.13 CLEAN UP

Upon completion of installation of the piping and appurtenances, the CONTRACTOR shall remove any surplus construction materials resulting from the Work. The CONTRACTOR shall grade the ground on each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as close as possible to the original ground line.

35.14 BY-PASS PUMPING

By-pass pumping shall be used to divert flow around an existing sanitary sewer most typically when a segment of sewer is being replaced. At least 24 hours prior to commencing by-pass pumping, the Contractor shall notify all affected residents, e.g; residents with lateral connections feeding the sewer segment to be replaced.

Contractor shall furnish and maintain all equipment necessary for by-pass pumping, including fully automatic self-priming trailer mounted pump, plugs, valves, pipe, hose, fuel and all incidental materials.

Pumping conditions will be site-specific. LFUCG will provide Contractor with suction lift, static head, distance and flow requirements. Pump shall be capable of passing a 3" solids at 500 gpm @ 100 ft TDH with up to 20 ft of suction lift.

35.15 BASIS OF PAYMENT

Accepted quantities of gravity sanitary sewer line shall be paid for at the Contract Unit Price per linear foot and shall be full compensation for all Work under this Section.

All labor, ancillary materials, equipment, excavation, bedding, backfilling, testing (except CCTV) and incidental items necessary to the Work shall be included in the payment for PVC Sanitary Sewer or Ductile Iron Sanitary Sewer. Items such as rock excavation, removal of existing pipe, concrete collars and removal of pavement and sidewalk are paid under other UPC bid items.

A closed circuit television (CCTV) survey will be paid for at the Contract Unit Price as described in Section 26 of these Specifications.

Bypass pumping, when required to perform the work specified, will be paid for at the Contract Unit Price per day, and shall be full compensation for all labor (including set-up and break-down), materials, ancillary equipment, and fuel. The day shall commence at start-up of the pump and end when the pump is no longer in use.

TECHNICAL SPECIFICATIONS

SECTION 36 – TWO WAY SEWER SERVICE CLEANOUT

36.1 SCOPE

Work under this Section shall include all labor, excavation, materials, equipment, bedding and backfilling in accordance with the LFUCG Standard Drawing 234 in Appendix A and all incidentals necessary to construct a Two Way Sewer Service Cleanout (including tee, pipe, plug, frame, cover and concrete pad).

Any removal of pavement and sidewalk and any rock encountered shall be paid for under appropriate Bid Items in addition to the prices for Two Way Sewer Service Cleanouts.

36.2 BASIS OF PAYMENT

Accepted quantities for Two-Way Sewer Service Cleanouts will be paid for at the Contract Unit Price as quoted and paid per each satisfactorily placed. Payment shall include all labor, materials, connections, equipment, excavation, bedding, backfilling, and incidental items necessary for providing a two-way cleanout and connecting to the existing house lateral.

Surface restoration (seeding, sod, pavement, etc.) shall be paid separately in accordance with the appropriate Bid Items. Pay limits for surface restoration shall be in accordance with the Standard Drawings.

TECHNICAL SPECIFICATIONS

SECTION 37- SANITARY SEWER TEES AND BRANCHES

37.1 SCOPE

Work for this section consists of furnishing and installing Sanitary Sewer Tees and up to six (6) feet of branch or stub line (dimensions as specified by the Purchase Order). Branches and fittings shall be provided and laid as and where directed. T-branches, placed in the sewer for property service connection, shall be located by the CONTRACTOR, as directed by the ENGINEER, at such points in the sewer so as to result in the property service connection having the shortest length possible between the sewer and property line or easement line, unless otherwise indicated on the Drawings or directed by the ENGINEER. T-branches shall be plugged in such a manner that it will facilitate convenient connection to a service line. Materials shall be as approved and accepted by the ENGINEER and correspond to the specification for the type of sanitary sewer pipe material used.

In those instances where 4 inch or 6 inch sanitary sewer pipe is used to connect a house to a sanitary sewer main, installation must be done by a Licensed Master Plumber.

37.2 BASIS OF PAYMENT FOR SANITARY SEWER TEES

Accepted quantities for Sanitary Sewer Tees will be paid for at the Contract Unit Price as quoted for various sizes and pipe materials (which shall be full compensation for all Work under this Section) and paid per specified Sanitary Sewer Tee and up to six (6) feet of related sewer satisfactorily placed. Concrete caps shall be paid under the Bid Item for unfinished concrete. Surface restoration (seeding, sod, pavement, etc.) will be paid separately under the appropriate Bid Items and the pay limits for surface restoration shall be in accordance with the appropriate Standard Drawings.

All labor, materials, equipment, excavation, bedding, and backfilling shall be incidental to the placement of Sanitary Sewer Tee.

37.3 BASIS OF PAYMENT FOR BRANCHES INCLUDING FITTINGS

Accepted quantities for Sanitary Sewer Branch or Stub line in excess of six (6) feet will be paid for at the Contract Unit Price as quoted for various sizes and pipe materials (which shall be full compensation for all Work under this Section) and paid per linear foot of specified Sanitary Sewer Branch or Stub line satisfactorily placed. Concrete caps shall be paid under the Bid Item for unfinished concrete. Surface restoration (seeding, sod, pavement, etc.) will be paid separately under the appropriate Bid Items and the pay limits for surface restoration shall be in accordance with the appropriate Standard Drawings.

All labor, materials, equipment, excavation, bedding, and backfilling shall be incidental to the placement of Sanitary Sewer.

TECHNICAL SPECIFICATIONS

SECTION 38 - FENCING

38.1 SCOPE

Work for this section consists of furnishing and installing Woven Wire, Chain Link or Privacy Fencing (type as specified by the Purchase Order). Woven Wire and Chain Link shall conform to the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, Section 721, 722, 816, and 817 current edition, and/or LFUCG Standard Drawings 308, 310, 312 and 314, (as directed by the ENGINEER), and shall include all labor, materials, equipment and incidentals necessary to complete the Work. Privacy Fencing shall match existing fencing as closely as possible and shall include all labor, materials, equipment and incidentals to complete the work.

38.2 BASIS OF PAYMENT

38.2.1 WOVEN WIRE AND CHAIN LINK FENCING

Accepted quantities for Woven Wire or Chain Link Fencing will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work required under this Section) per linear foot of Fencing satisfactorily placed. All labor, gates, materials, equipment, and excavation shall be incidental to the placement of Fencing.

38.2.2 PRIVACY FENCING

Accepted quantities for Privacy Fencing will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work required under this Section except for the cost of the posts, rails, panels, gates and gate hardware) per linear foot of Privacy Fencing satisfactorily placed. All labor, other materials not identified above, equipment, and excavation shall be incidental to the placement of Fencing.

The cost of the Privacy Fence posts, rails, panels, gates and gate hardware shall be paid for at cost plus 15% for overhead and profit (to be submitted as Contract progresses and as needed). No payments will be made for Privacy Fencing without proper invoices for materials furnished.

TECHNICAL SPECIFICATIONS

SECTION 39 - SMALL EQUIPMENT WITH OPERATOR

39.1.A SMALL BACKHOE/LOADER WITH OPERATOR - SCOPE

Work under this Section shall consist of furnishing a small rubber tire backhoe of Case 580 or equivalent with operator for excavation and loading at various locations to be determined. The backhoe shall be in good working order, and with the trained operator, be capable of completing the required Work in a timely manner. Should the ENGINEER feel that the backhoe and/or operator are not adequate, he may reject either the backhoe and/or operator and no payment will be made.

39.1.B SMALL BACKHOE/LOADER WITH OPERATOR - BASIS OF PAYMENT

Accepted equipment and operator time for a Small Backhoe/Loader with an Operator will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. No direct payment will be made for delivery time to or from the Work site.

39.2.A SKID LOADER WITH OPERATOR - SCOPE

Work under this Section shall consist of furnishing a skid loader of Case SR 250 or equivalent with operator for loading, lifting, augering, etc., at various locations to be determined. The skid loader shall be in good working order, and with the trained operator, be and capable of completing the required Work in a timely manner. Should the ENGINEER feel that the skid loader and/or operator are not adequate, he may reject either the skid loader and/or operator and no payment will be made.

39.2.B SKID LOADER WITH OPERATOR - BASIS OF PAYMENT

Accepted equipment and operator time for a Skid Loader and Operator will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. No direct payment will be made for delivery time to or from the Work site.

39.3.A JACKHAMMER WITH OPERATOR - SCOPE

Work under this Section shall consist of furnishing an excavator with a hydraulic hammer of Case CX130C or equivalent with operator for jack hammering at various locations to be determined. The backhoe shall be in good working order, and with the trained operator, be capable of completing the required Work in a timely manner. Should the ENGINEER feel that the excavator/hammer and/or operator are not adequate, he may reject either the excavator/hammer and/or operator and no payment will be made.

39.3.B JACKHAMMER WITH WORKER - BASIS OF PAYMENT

Accepted equipment and operator time for a Jackhammer with Operator will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. No direct payment will be made for delivery time to or from the Work site.

TECHNICAL SPECIFICATIONS

SECTION 40 - SINGLE OR TRIPLE AXLE DUMP TRUCK

40.1 SCOPE

Work under this Section shall consist of furnishing a single or triple axle dump truck with minimum eight (8) cubic yard capacity with driver for miscellaneous hauling of dirt and/or rock and other materials as requested by the ENGINEER. The truck and driver supplied shall be in good working order and capable of completing the Work in a timely manner. Should the ENGINEER feel that the truck and/or driver are not adequate, he may reject either the truck and/or driver and no payment will be made.

40.2 BASIS OF PAYMENT

Accepted truck and driver for a Single Axle Dump Truck or Triple Axle Dump Truck will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. Payment shall be based on accepted hours of working under the direction of the ENGINEER.

The cost of the material (such as clean fill) or tipping fees (such as excess soil disposal) if applicable, shall be paid for at cost plus 15% for overhead and profit (to be submitted as Contract progresses and as needed). LFUCG must approve the tonnage rate prior to commencement of work. Furthermore, no payments will be made without proper invoices for materials furnished or disposed.

TECHNICAL SPECIFICATIONS

SECTION 41 – EROSION AND SEDIMENT CONTROL

41.1 SCOPE

This section describes requirements for the planning and implementation of non-structural and structural best management practices (BMPs) to be used for erosion and sediment control during construction activities in Fayette County, Kentucky. Erosion control refers to efforts to maintain soil on a construction site. Sediment control refers to keeping the material that erodes from leaving the site.

The preparation of an erosion and sediment control plan integrating the non-structural and structural practices and procedures is a requirement for all construction projects that disturb one acre or more. The plan shall be submitted to the LFUCG Division of Engineering before beginning construction. Once the erosion and sediment control practices have been constructed, a grading permit can be obtained. For more information on permits, see Chapter 2 of the Storm Water Manual.

Work for this Section shall be in accordance to the Lexington-Fayette Urban County Government Standard Drawings and Chapter 11 of the Storm Water Manual and shall include all labor, excavation, materials, equipment, and incidentals necessary to complete the work.

Structural Sediment Control BMPs

Check Dam

A check dam is a small temporary dam constructed across a swale or drainage ditch. Check dams shall be installed in newly-constructed, vegetated, open channels, which drain 10 acres or less. Check dams shall be constructed prior to the establishment of vegetation.

Stone check dams shall be constructed of KYTC Class II channel lining.

Regular inspections shall be made to ensure that the measure is in good working order and the center of the dam is lower than the edges. Erosion caused by high flows around the edges of the dam shall be corrected immediately, and the dam shall be extended beyond the repaired area. Check dams shall be checked for sediment accumulation after each rainfall. Sediment shall be removed when it reaches one-half of the original height or before. Check dams shall remain in place and operational until the drainage area and channel are completely stabilized or up to 30 days after the permanent site stabilization is achieved.

Sediment Trap

A sediment trap is formed by an excavation of an area in a suitable location to retain sediment and other waterborne debris. Sediment traps shall be used where physical site conditions or other restrictions prevent other erosion control measures from adequately controlling erosion and sedimentation. Sediment traps may be used down slope from construction operations that expose areas to erosion. Sediment traps shall be removed after the exposed areas are adequately protected against erosion by vegetative or mechanical means. Sediment traps shall be installed below all disturbed areas of less than 5 acres that do not drain to a sediment pond

The area to be excavated shall be cleared of all trees, stumps, roots, brush, boulders, sod, and debris. All channel banks and sharp breaks shall be sloped to no steeper than 1:1. All topsoil containing excessive amounts of organic matter shall be removed. Seeding, fertilizing, and mulching of the material taken from the excavation shall comply with the applicable seeding sections of these specifications. Any material excavated from the trap shall be placed in one of the following ways so that it will not be washed back into the pond by rainfall:

- uniformly spread to a depth not exceeding 3 feet and graded to a continuous slope away from the trap
- uniformly placed or shaped reasonably well with side slopes assuming the natural angle of repose for the excavated material behind a berm width not less than 12 feet

Sediment shall be removed from the trap when the capacity is reduced to 50 percent of the design volume. Plans for the sediment trap shall indicate the methods for disposing of sediment removed from the trap.

Sediment Pond

A sediment pond is formed by a barrier or dam constructed across a drainage way or other suitable location to retain sediment and other waterborne debris.

Sediment ponds are appropriate where physical site conditions or other restrictions prevent other erosion control measures from adequately controlling erosion and sedimentation. Sediment ponds may be used down slope from construction operations that expose areas to erosion. Sediment ponds shall be removed after the exposed areas are adequately protected against erosion by vegetative or mechanical means. A sediment pond shall be installed at the outlet of a disturbed area of 5 acres or more. The maximum drainage area for a single pond is 100 acres. The pond shall be designed to reduce peak discharges during construction to pre-development levels for 10-year and 100-year storms.

Design and construction shall comply with all federal, state, and local laws, ordinances, rules, and regulations regarding dams.

Sediment shall be removed from the pond when the capacity is reduced to 50 percent of the design volume. Plans for the sediment pond shall indicate the methods for disposing of sediment removed from the pond.

Silt Fence

Silt fence is a temporary barrier to trap sediment that consists of a filter fabric stretched between supporting posts, with the bottom entrenched in the soil and with a wire support fence. Silt fence shall be installed down-slope of areas to be disturbed prior to clearing and grading. Silt fence must be situated such that the total area draining to the fence is not greater than one-fourth acre per 100 feet of fence. Silt fence shall be used for storm drain drop inlet protection and around soil stockpiles.

Silt fences are appropriate where the size of the drainage area is no more than one-fourth acre per 100 feet of silt fence length; the maximum slope length behind the barrier is 100 feet; and

the maximum gradient behind the barrier is 50 percent (2H:1V). Silt fences can be used at the toe of stockpiles where the slope exceeds 2H:1V, but in that case, the slope length should not exceed 20 feet.

Silt fences can be used in minor swales or ditch lines where the maximum contributing drainage area is no greater than 2 acres. Under no circumstances shall silt fences be constructed in streams or in swales or ditch lines where flows are likely to exceed 1 cubic foot per second (cfs).

Synthetic filter fabric shall be a pervious sheet of propylene, nylon, and polyester or ethylene yarn and shall be certified by the manufacturer or supplier as conforming to the following requirements:

Physical Property Requirements

- Filtering Efficiency 75% (minimum)
- Tensile Strength at 20% 50 lbs./linear inch (minimum)
- Flow Rate 0.3 gal./ sq. ft/ min. (minimum)
- Synthetic filter fabric shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of 6 months of expected usable construction life at a temperature range of 0°F to 120°F.
- Posts for synthetic fabric silt fences shall be either 2-inch by 2-inch wood or 1.33 pounds per linear foot steel with a minimum length of 5 feet. Steel posts shall have projections for fastening wire to them. Wire fence reinforcement for silt fences shall be a minimum of 36 inches in height, a minimum of 14 gauge and shall have a mesh spacing of no greater than 6 inches.

Silt fences and filter barriers shall be inspected immediately after each rainfall and at least daily during prolonged rainfall. Any required repairs shall be made immediately. Knocked down fences shall be repaired at the end of each day. Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed after each storm event or when deposits reach approximately one-half the height of the barrier. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform with the existing grade, prepared, and seeded. Silt fences shall be replaced every 6 months.

Storm Drain Inlet Protection

A sediment filter installed around a storm drain drop inlet or curb inlet is referred to as storm drain inlet protection. Curb inlet protection is not required if other soil stabilization and sediment control measures are in place to prevent sediment from entering the street. Storm drain inlet protection shall only be used around drop inlets when the up-slope area draining to the inlet has no other sediment control.

The drainage area shall be no greater than 1 acre.

The inlet protection device shall be constructed in a manner that will facilitate cleanout and disposal of trapped sediment and minimize interference with construction activities. Inlet

protection devices shall be constructed in such a manner that any resultant ponding of storm water will not cause excessive inconvenience or damage to adjacent areas or structures.

The structure shall be inspected after each rain, and repairs made as needed. Sediment shall be removed and the device restored to its original dimensions when the sediment has accumulated to one-half the design depth of the filter. If a stone filter becomes clogged with sediment so that it no longer adequately performs its function, the stone must be pulled away from the blocks, cleaned, and replaced. Structures shall be removed after the drainage area has been properly stabilized.

Filter Strips

A filter strip is a strip of vegetation for removing sediment and related pollutants from runoff. Filter strips are also called vegetative filters. Filter strips shall be used on each side of permanent constructed channels. The buffer strips described in the Storm Water Manual satisfy the filter strip requirement for streams and wetlands.

Filter strips shall only be used to remove sediment from overland flow.

Existing grass or grass/legume mixtures used as filter strips shall be dense and well established, with no bare spots. When establishing new seeding, consideration shall be given to wildlife needs and soil conditions on the site. See Storm Water Manual for seeding mixture

When planting filter strips, prepare seedbed, incorporate fertilizer, and apply mulch consistent with the seeding sections of this manual. Filter strips using areas of existing vegetation shall be over seeded, as necessary, with the above mixtures to obtain an equivalent density of vegetation. The over seeding shall be accomplished prior to the land disturbing activity.

Filter strips shall be inspected regularly to ensure that a healthy vegetative growth is maintained. Sediment shall be removed when it becomes visible in the filter. Construction traffic shall not be permitted to drive upon filter strips.

Stream Crossing

A temporary stream crossing is a temporary structural span installed across a flowing water course for use by construction traffic. Structures may include bridges, round pipes, or pipe arches. The purpose of a temporary stream crossing is to provide a means for construction traffic to cross flowing streams without damaging the channel or banks and to keep sediment generated by construction traffic out of the stream. Stream crossings shall be used in cases where construction traffic, permanent traffic, or utilities must cross existing post development floodplains. If the drainage area exceeds 1 square mile and a structure is necessary, the structure must be designed by a professional engineer licensed in Kentucky. If applicable, U.S. Army Corps of Engineers and the Kentucky Division of Water permits, as indicated in the Storm Water Manual, may be required.

Temporary stream crossings are applicable to flowing streams with drainage areas less than one square mile. Structures that must handle flow from larger drainage areas shall be designed as permanent structures by a professional engineer.

When using a culvert crossing, the top of a compacted earth fill shall be covered with six inches of KTC No. 57 stone. No. 57 stone shall also be used for the stone pads forming the crossing approaches.

Clearing and excavation of the streambed and banks shall be kept to a minimum. The structure shall be removed as soon as it is no longer necessary for project construction. The approaches to the structure shall consist of stone pads with a minimum thickness of 6 inches, a minimum width equal to the width of the structure, and a minimum approach length of 25 feet on each side.

The structure shall be inspected after every rainfall and at least once a week and all damages repaired immediately.

Pump-Around Flow Diversion

Pump-around flow diversions must be used to divert flow during excavation operations in streams. Pump-around flow diversions provide dry working conditions during construction in streams. A pump-around flow diversion shall be used to divert flow around construction activities occurring in a stream when those activities are reasonably expected to cause the erosion or deposition of sediment in the stream. Bid quotes for pump around assume a 4 inch pump.

Sandbags shall be woven polypropylene bags with approximate dimensions of 18-1/2 inches by 28 inches. Tie the ends of filled bags closed using either draw strings or wire ties.

Schedule operations such that diversion installation, in-stream excavation, in-stream construction, stream restoration, and diversion removal are completed as quickly as possible.

This control provides short-term diversion of stream flow (typically 1 day to 3 days). Additional sandbags or pumps may be required to maintain 1-foot freeboard on the sandbag checks if flow conditions change. Add sandbags as required to seal leaks in checks.

Construction Dewatering

Dewatering is the pumping of storm water or groundwater from excavation pits or trenches. The sediment-laden water must be pumped to a dewatering structure before it is discharged offsite.

The dewatering structure should be inspected frequently to ensure it is functioning properly and not overtopping. Accumulated sediment should be spread out on site and stabilized, or disposed of offsite.

41.2 BASIS OF PAYMENT

Accepted quantities for Erosion and Sediment Control will be paid for at the Contract Unit Price as quoted which shall be full compensation for all Work required under this Section: The LFUCG will make payment for the completed and accepted quantities under the following: All labor, materials (except as noted), equipment, fuel and excavation shall be

incidental to the placement and removal of Erosion and Sediment Control. Maintenance of erosion and sediment control is incidental to installation.

Check Dam	Ton
Sediment Trap (excluding geotextile)	Cubic Yard
Sediment Pond	Cubic Yard
Silt Fence	Linear Foot
Storm Water Inlet Protection	Each
Filter Strip	Square Yards
Stream Crossing (excluding pipe)	Each
Pump-Around Flow Diversion (including sand bags)	Day
Construction Dewatering	Day

Payment for a Stormwater Pollution Prevention Plan,(SWPP) a Notice of Intent (NOI-SWCA), a Notice of Termination (NOT), and a Land Disturbance Permit (LDP), will be paid in accordance with Section A.20 of these Technical Specifications.

TECHNICAL SPECIFICATIONS

SECTION 42 - GEOTEXTILE CONSTRUCTION

42.1 SCOPE

Work for this Section shall be in accordance to Kentucky Department of Highways Standard Specifications Sections 214 and 843 (Type 1 for slope protection and channel lining, Type II for underdrains, Type III for subgrade or embankment foundation stabilization, and Type IV for drainage blankets and pavement edge drains), current edition and shall include all labor, grading, materials, equipment, and incidentals necessary to complete the work.

42.2 BASIS OF PAYMENT

Accepted quantities for Geotextile Construction will be paid for at the Contract Unit Price per various types as quoted which shall be full compensation for all Work required under this Section and paid per square yard of geotextiles satisfactorily placed. All labor, materials (other than the geotextile fabric), equipment, and grading shall be incidental to the placement of geotextile fabric (Type I, Type II, Type III or Type IV).

TECHNICAL SPECIFICATIONS

SECTION 43 - EDGE KEY

43.1 SCOPE

This Work shall consist of the construction of edge keys in accordance with the Plans, Contract Documents and Specifications, and Lexington-Fayette Urban County Government (LFUCG) Standard Drawing 318 and 319, current edition.

In performing this Work, the CONTRACTOR shall furnish a neat edge along the pavement, obtained by using an approved saw to cut a smooth and straight line (approximately two (2) inches deep) in the existing pavement surface prior to breaking away the adjacent pavement. Any existing facility, which is not marked for removal by the ENGINEER, but is nevertheless removed, shall be replaced at the CONTRACTOR'S expense.

43.2 BASIS OF PAYMENT

Payment for the accepted quantity will be made at the unit bid price per linear foot, which payment shall be full compensation for all Work required by this section.

TECHNICAL SPECIFICATIONS

SECTION 44 – PIPE PLUGGING

44.1 SCOPE

Work in this section shall also conform to the Kentucky Department of Highways (KDOH) Standard Specifications, Section 708 current edition, but only to the extent that this KDOH section does not conflict with the content of the Plans, Contract Documents and Specifications.

The Work consists of construction of pipe plugs in existing storm sewer and/or gravity sanitary sewer lines, which are to be taken out of service once the corresponding new sewer lines have been put into operation. Such Work shall be performed where indicated on the Drawings and shall conform to standard practices acceptable to the Lexington-Fayette Urban County Government (Division of Engineering and Division of Water Quality).

44.2 BASIS OF PAYMENT

Accepted quantities for Pipe Plugging will be paid at the unit bid price per each as quoted for various sizes, which payment shall be full compensation for all Work required by this section.

TECHNICAL SPECIFICATIONS

SECTION 45 – FLOWABLE FILL

45.1 SCOPE

This Work shall consist of the use of flowable fill in accordance with the Plans, Contract Documents and Specifications. Work in this section shall also conform to the Kentucky Department of Highways (KDOH) Standard Specifications, Section 601 current edition, but only to the extent that this KDOH section does not conflict with the content of the Plans, Contract Documents and Specifications.

45.2 BASIS OF PAYMENT

Payment for the accepted quantity will be made at the unit bid price per cubic yard, which payment shall be full compensation for all Work required by this section. Payment shall be based on delivery tickets for flowable fill delivered and accepted for the work.

TECHNICAL SPECIFICATIONS

SECTION 46 – FIBER REINFORCED PCC PAVEMENT

46.1 SCOPE

This specification covers formed fiber-reinforced, Portland cement concrete pavement. Concrete shall be class A modified (minimum 28 day strength shall be 4,000 psi.). Thickness shall be as indicated by the bid item.

Requirements in the KDOH Standard Specifications, KDOH Standard Drawings, plans, or proposal related to Portland cement concrete pavement shall apply except that this specification has precedence in any conflict. The placement process includes mandatory 10-foot straight edge examination and surface correction during finishing. Procedures and pavement requirements are in KDOH Section 501 and its various cross references. The Work will be consider and utilize the KDOH Standard Drawings, particularly RPN-015, RPS-010 through RPS-039 (12 drawings total), RPX-010 through RPX-020 (3 drawings total), but any other standard drawing needed to successfully complete the work.

If severe drying conditions are anticipated, a pour will not be permitted unless an approved method of inhibiting drying is available.

The desired slump for slip forming is 2 inches. The slump may be as much as 7 inches when forms are used.

The typical section for the pavement and its base and location of all sawed and sealed joints shall be as established by the Purchase Order for the Work.

- All transverse contraction joints shall be at right angles to the roadway. The joints will be sawed but without dowels.
- Spacing for contraction joints shall not exceed 18 feet.
- Joints may be sawed conventionally or with a soft cut saw to a depth of 1 ½ inch. All joints shall be sawed, then sealed with Dow-Corning silicone 890SL or equivalent. Immediately prior to sealing, joints shall be thoroughly cleaned, including sand blasting in both directions. Backing strips are required. Sealing shall be in accordance with KDOH Standard Drawing RPX-020 and KDOH Section 501.03.17.
- Traffic shall not be permitted on newly sealed joints until the silicone seal is sufficiently “skinned over” to prevent tracking due to traffic. The skin-over time for silicone seals typically is one hour; however, longer times may be required, depending upon specific weather conditions. The CONTRACTOR shall be responsible for replacement/repair of damaged seals until curing is complete (21 days).

- It is anticipated that each lane will be placed in a continuous operation without transverse construction joints. Before placement of a lane commences, the CONTRACTOR shall provide assurance to the ENGINEER that the concrete supplier has committed enough equipment to accomplish a continuous pour.
- Synthetic fibers shall be added to the mixture at the plant or otherwise, as recommended by the manufacturer. Fiber length shall be $\frac{3}{4}$ -inch. The fibers shall be graded, fibrillated, polypropylene fibers and shall be added to the fresh concrete at a dosage rate of 3.0 pounds per cubic yard of concrete (or at a lesser rate if directed by the ENGINEER or the Purchase Order). The cost of the fibers and any additional labor cost shall be included in the bid unit price for Fiber-reinforced Concrete.

46.2 BASIS OF PAYMENT

Accepted quantities for Fiber-reinforced PCC Pavement will be measured to the nearest cubic yard. Payment will be made at the unit bid price per cubic yard. Payment shall be based on delivery tickets for PCCP delivered and accepted for the work. The price includes concrete and all other material, plant, labor, joint sawing, sealing and incidentals necessary to install Fiber-reinforced PCC Pavement.

TECHNICAL SPECIFICATIONS

SECTION 47 – SINGLE BLOCK MASONRY RETAINING WALL

47.1 SCOPE

This Work shall consist of furnishing all materials and construction of a modular concrete gravity retaining wall system (Keystone, VERSA-LOK or approved equal) in accordance with these specifications, manufacturer's recommendations and in reasonably close conformity with the lines, grades, design, and dimensions shown on the plans. Work includes furnishing and placing concrete blocks, caps, and pins. Work also includes excavation, preparing foundation soil, installing leveling pad, drainage fill and backfill to the lines and grades shown on the construction drawings. This modular concrete gravity retaining wall will be limited to the maximum height recommended by the manufacturer as measured from the base of the wall to the top.

47.2 BASIS OF PAYMENT

Accepted quantities of Single Block Masonry Retaining Wall will be paid at the Contract Unit Price per square foot as measured from the free face, which shall be full compensation for all Work required by this section. It does not include the material cost of drain pipe, drainage fill, backfill material brought from off-site, and materials for the leveling pad as specified in the construction drawings. Those items shall be paid for at their respective unit bid price determined elsewhere under this Contract. Where such a unit cost is not furnished, the item shall be separately negotiated.

TECHNICAL SPECIFICATIONS

SECTION 48 – EROSION CONTROL BLANKET

48.1 DESCRIPTION OF WORK

The Work covered by this specification consists of furnishing all materials, equipment, and labor for preparing the seedbed, fertilizing, seeding, and installation of permanent Erosion Control Blankets in the areas as directed by the ENGINEER.

There are two types of erosion control blankets. The Degradable Erosion Control Mat serves as a slope protector and is designed to hold seeds and soil in place until vegetation is established. The Turf Reinforcement Mat (TRM) serves as a permanent erosion control device designed to retain seed and soil using durable synthetic materials stabilized against ultraviolet degradation and inert to chemicals normally encountered in soil.

48.2 MATERIALS

Degradable Erosion Control Mat shall be woven from a chosen material and is meant to slow down the speed at which water moves across the surface. The material chosen is usually something with lots of ridges and obstructions for the water to slow down on. There are many different types of erosion control mats, some that are synthetic and some that are natural. There are even a few that are both synthetic and natural. These mats can be made out of straw, coconut fiber, aspen fiber, jute, and polypropylene (plastic).

Reinforcement shall be Contech Ero-Mat or approved equal or equivalent. The erosion control matting shall be a minimum width of 6.5 feet and approximately 1/8 inch to 1/2 inch thick. The mat shall be made with weed free chopped straw or equivalent evenly distributed on photodegradable polypropylene mesh and attached with high strength thread.

Turf Reinforcement Mat-Turf Reinforcement shall be Contech TRM C-45 or approved equal. The erosion control matting shall be a minimum width of 6.5 feet with approximately 1/2-inch x 1/2-inch mesh openings: weighing not less than 10 ounces per square yard. Mat fasteners shall be stakes or staples. Stakes shall consist of wood, shall have a minimum length of six inches, and shall be installed flush to the ground. Staples shall be U-shaped and made from steel wire. The staples shall have a minimum width of one inch and a minimum length of six inches. Turf Reinforcement Mat should be used after proper soil preparation, fertilization, and seeding. Installation of Turf Reinforcement Mat shall conform to the details shown in the drawings.

Seed-Seed shall consist of Kentucky Bluegrass sown at the rate of 12 lbs/1,000 sq. ft. or Finelawn or other turf type fescue at a rate of 3 lbs/1,000 sq. ft.; add 1/2 lb of Poa Trivialis for very heavy shade or otherwise customize as directed by ENGINEER. The desires of the owner or the species currently being used should be considered. Seed labeled in accordance with US Department of Agriculture Rules and Regulations under the Federal Seed Act shall be furnished. Seed shall be furnished in sealed, standard containers unless written exception

is granted. Seed that is wet or moldy or that has been otherwise damaged in transit or storage will not be acceptable.

Preparation of ground surface-The surface shall be suitably tilled or scraped such that the top 3 to 4 inches of soil is loose and the soil condition is acceptable to the ENGINEER. The Work shall be performed only during periods when, in the ENGINEER'S opinion, beneficial results are likely to be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed.

Fertilizer-10x10x10 fertilizer and agricultural lime will be applied at 28 lbs./1,000 sq. ft. and 150 lbs./1,000 sq. ft., respectively.

Seeding-Seed shall be broadcast either by hand or with approved hydraulic seeding equipment, as specified herein before at the rates herein before specified. Seed shall be distributed uniformly over designated areas. Half of seed shall be sown with sower moving in one direction, and the remainder with sower moving at right angles to the first sowing. Seeds shall be covered to an average depth of 1/4-inch hand rake. Seed shall not be broadcast during windy weather.

48.3 PROTECTION AND MAINTENANCE

Protection shall be provided against traffic or other use by erecting barricades immediately after treatment is completed, and by placing warning signs, as directed, on various areas.

Seeded areas shall be maintained until all seeding work or designated portions thereof have been completed and accepted. Any damage shall be repaired, and mulch material that has been removed by wind or other causes shall be replaced and secured.

48.4 ESTABLISHMENT

The CONTRACTOR shall be responsible for proper care of seeded areas while grass is becoming established. Where seeding work is done after the acceptance of other work under this Contract, the grass will be considered to be established and ready for acceptance when it reaches an average height of three inches over all seeded areas.

48.5 REPAIR

When any portion of the surface becomes eroded or otherwise damaged or treatment is destroyed, the affected portion shall be repaired to reestablish condition and grade of soil and treatment prior to injury, as directed. Repair work required because of faulty operations or negligence on the part of the CONTRACTOR shall be performed without cost to the OWNER.

48.6 MEASUREMENT AND PAYMENT

The unit of measure for Erosion Control Blanket: Degradable Erosion Control Mat or Turf Reinforcement Mat will be the square yard. Payment for Degradable Erosion Control Mat or Turf Reinforcement Mat will be the Contract Price per square yard as exposed, which shall include all costs in connection with preparation, seeding, and installation of Erosion Control Blanket: Degradable Erosion Control Mat or Turf Reinforcement Mat. Payment as specified above shall be considered full compensation for all equipment and incidentals necessary to perform the work as required.

TECHNICAL SPECIFICATIONS

SECTION 49 – PROJECT SIGN

49.1 SCOPE

The Work covered by this specification consists of furnishing all materials, equipment, and labor for erecting the Project Sign as indicated in the LFUCG Standard Drawing 323. All statements included with the drawing are pertinent with the exception of Line 1. Payment for the Project Sign will be as indicated below.

49.2 BASIS OF PAYMENT

Accepted quantities for Project Sign will be paid for at the Contract Unit Price as quoted per each (which shall be full compensation for all Work under this Section) and paid per specified Project Sign satisfactorily placed. All labor, materials, equipment, and excavation shall be incidental to the placement of Project Sign.

TECHNICAL SPECIFICATIONS

SECTION 50 - STEEL W BEAM GUARDRAIL & END TREATMENTS

50.1 SCOPE

Work for this Section shall include all labor, materials, excavations, equipment, and incidentals necessary to construct Steel W Beam Guardrail in accordance with Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, Section 719 and 814 requirements and Kentucky Department of Highways Standard Drawings, latest edition.

50.2 BASIS OF PAYMENT

Accepted quantities for Steel W Beam Guardrail will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work required under this Section) and paid per linear foot of guardrail satisfactorily placed. Unless noted otherwise in the drawings, all steel W beam guardrail shall include two (2) Type 2 Terminal Sections. All other end treatments for guardrail shall be bid separately. All labor, materials, equipment, and excavation shall be incidental to the placement of Steel W Beam Guardrail.

TECHNICAL SPECIFICATIONS

SECTION 51 – ARTICULATING CONCRETE BLOCK

51.1 SCOPE

All Work for this Section shall consist of installation of Articulating Concrete Blocks(ACB). It shall include grading and installation of geotextile filter fabric and articulating concrete blocks.

51.2 MATERIALS

ARTICULATING CONCRETE BLOCKS shall be four-inch thick blocks, and shall be **ARMORLOC™ 3510** (mfgd by Armortec of Bowling Green, KY), **ARMORFLOC™** (distributed by ConTech of Middletown, OH), **GEOLINK™ PL41216** (manufactured by PetraTech/American Concrete Products of Woodstock, IL), or approved equal. Submit cut sheets and a sample before any construction commences.

The **GEOTEXTILE FILTER FABRIC** placed under the ACB shall be a woven monofilament geotextile with a minimum weight of 4 oz./sq. yd. and shall be **MARAFI 5XT** , **MARAFI FW500**, or equal as approved by the ENGINEER.

51.3 CONSTRUCTION METHODS

ARTICULATING CONCRETE BLOCKS shall be installed according to the plans, details, and manufacturer's instructions.

51.4 BASIS OF PAYMENT

Accepted quantities shall be paid for at the Contract Unit Price per square yard as quoted as in the Bid Schedule and shall be full compensation for all Work under this Section including geotextile filter fabric. All labor, materials, equipment, excavation, and grading shall be incidental to the installation of ARTICULATING CONCRETE BLOCKS.

TECHNICAL SPECIFICATIONS

SECTION 52 – RCP PIPE AND MANHOLE REPAIRS

(REINFORCED CONCRETE PIPE (RCP) CRACK REPAIRS AND MANHOLE REHABILITATION)

52.1 SCOPE:

Aging cracked reinforced concrete pipe and manholes may require repair prior to replacement. Contractor shall be solely responsible for personnel safety during the execution of this work. Normally, unless otherwise noted, a closed circuit television video tape will be required after all pipe work is completed. See separate specification concerning this inspection.

52.2 GENERAL:

The following is a procedure for the repairs to a cracked reinforced concrete pipe or manhole. Note that the minimum pipe size to be repaired by this section shall be 30" diameter. If cracks leak with any water flow at the proposed time of repair, repairs must be delayed until water flow stops. If water flow does not stop before planned repair time, do not proceed but contact ENGINEER for revised instructions on the use of alternate but similar materials.

52.3 PRODUCTS:

All products shall be:

- Xypex Patch'n Plug as distributed by The Williams Coatings Consultants, Inc., of Nashville, TN.
- Strong Seal QSR as manufactured by Strong Seal Inc (SSI), of Pine Bluff, Arkansas.
- or ENGINEER approved equal. Note any proposed substitute must be submitted prior to any work commencement and approved in writing .

Submit product cut sheets for intended product prior to any work.

52.4 APPLICATION:

- Remove any and all debris including tree roots through out the structure. Note that wherever tree roots are encountered the top or side of the pipe must be exposed and patch materials must be applied to the top (or sides) of the pipe as well as the interior pipe face.
- Remove all loose concrete or mortar from cracks or joints.
- Apply material in strict conformance with all Manufacturer's instructions.

- With CCTV Video record the completed installation in accordance with Section 26 of these Technical Specifications.

52.5 BASIS OF PAYMENT:

Accepted quantities under this section shall be paid for at the Contract Unit Price per linear foot of pipe or manhole repaired. Payment shall be considered full compensation for all materials and labor to complete the work described in this Section.

TECHNICAL SPECIFICATIONS

SECTION 53 - SAWCUTTING WALK, CURB, PAVEMENT, ETC.

53.1 SCOPE

When sawcutting of sidewalks, curb/curb and gutter, pavement, etc. is called for in these Specifications it shall require the use of an approved saw in order to obtain a smooth, straight line. Any existing facility, which is not marked for removal by the ENGINEER, but is nevertheless removed, shall be replaced at the CONTRACTOR'S expense.

53.2 BASIS OF PAYMENT

Accepted quantities for Sawcutting will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work required under this Section) and paid per linear foot, satisfactorily performed. All labor, materials, equipment, and excavation shall be incidental to Sawcutting.

TECHNICAL SPECIFICATIONS

SECTION 54 - PRECAST REINFORCED CONCRETE BOX CULVERT

54.1 SCOPE

Work under this Section shall include all labor, excavation, materials, equipment, bedding, backfilling and legally disposing of unneeded and unsatisfactory material at site obtained by the CONTRACTOR in accordance to the Lexington-Fayette Urban County Government Standard Drawings and all incidentals necessary to construct Precast Reinforced Concrete Box Culvert (RCBC) to the sizes and types indicated. The work for this Section shall also conform to the Kentucky Department of Highways Standard Specifications for Road and Bridges Section 611, Current Edition.

54.2 LAYING

The Precast RCBC shall be laid in sections to the line and grade shown on the drawings on a compacted bedding of crushed aggregate up to $\frac{3}{4}$ inch maximum size. The compacted bedding shall be leveled with a template or straightedge to ensure uniform support throughout the entire length and width of the structure.

The Precast RCBC shall be laid by placing the sections starting at the outlet end of the culvert with the bell or groove end being laid upgrade.

Provide drainage with 4-inch weep holes, except that for side-by-side installations separated by grout, the weep holes shall be placed on the extreme outside walls only.

Openings formed between the precast sections and any side entry of pipes, or top entry of manholes shall be grouted to form a water tight joint. When manholes are to be placed directly on the top slab of the precast sections, additional steel reinforcement in the top slab shall be provided to sufficiently compensate for the section removed.

54.3 JOINTS

The Contractor shall make sure that the joints of each unit are properly fitted. The Contractor shall use rubber, flexible plastic gaskets or asphalt mastic joint sealing compound in joints between the Precast Box Sections. Regardless of the type of sealant to be used, the Contractor shall ensure proper meshing of the joints.

No sand or foreign material of any kind shall be allowed to intrude into the joints. If sand or foreign material has intruded into the joints upon joining the sections, the joints shall be thoroughly cleaned until no sand or foreign material is present, then the joints shall be resealed.

The exterior joint gap on the top of the Precast RCBC shall be filled with mortar and shall be covered with a minimum of a 15-inch double layer geotextile fabric joint wrap. The joint wrap shall be applied to all joint sections.

54.4 BACKFILLING

Backfilling of the trench for the Precast Reinforced Concrete Box culvert shall be done in accordance to the Plans, Standards and Specifications of the Lexington - Fayette Urban County Government and in accordance to Subsection 603.03 of the Kentucky Department of Highways Standards and Specifications for Highways and Bridges.

54.5 BASIS OF PAYMENT

Accepted quantities for Precast Reinforced Concrete Box culverts will be paid for at the Contract Unit Price as quoted for various sizes (which shall be full compensation for all work required under this Section) and paid per linear foot of Precast Reinforced Concrete Box Culvert according to the length specified in the Plans and satisfactorily placed. Any removal of pavement and sidewalk and any rock encountered between zero (0) and eight (8) feet shall be paid for under appropriate Bid Items in addition to the Unit Price for Precast RCBC. Concrete caps shall be paid under the Bid Item for unfinished concrete. Surface restoration (seeding, sod, pavement, etc.) will be paid separately under the appropriate Bid Items and the pay limits for surface restoration shall be in accordance with the appropriate Standard Drawings. Additional reinforcements will be paid under the Bid Item for Steel Reinforcement for Concrete. Limits of surface restoration will be those limits as shown on the plans.

All labor, joint materials (including the geotextile fabric wrap and shear connectors required for joining sections), equipment, excavation, bedding, disposal and backfilling shall be incidental to the placement of the Precast RCBC.

TECHNICAL SPECIFICATIONS

SECTION 55 – DETECTABLE WARNING SURFACE TILE

55.1 SCOPE OF WORK

This Section specifies furnishing and installing Detectable Warning Surface Tiles Overlay or Imbedded where indicated concurrent with the installation of concrete sidewalk ramps per Section 14.1 of these Specifications.

55.2 SHOP DRAWINGS

- Product Data: Submit manufacturer's literature describing products, installation procedures.
- Samples for Verification Purposes: Submit two (2) tile samples minimum 6"x8" of the kind proposed for use.
- Shop drawings are required for products specified showing fabrication details; composite structural system; plans of tile placement including joints, and material to be used as well as outlining installation materials and procedure.
- Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on a Surface Applied tactile tile system as certified by a qualified independent testing laboratory.
- Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required.

55.3 OVERLAY MODULES

A. QUALITY ASSURANCE

- Provide Surface Applied tactile tiles and accessories as produced by a single manufacturer.
- Installer's Qualifications: Engage an experienced Installer certified in writing by tactile manufacturer as qualified for installation, who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- Americans with Disabilities Act (ADA): Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
- Vitriified Polymer Composite (VPC) Surface Applied tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line dome pattern of truncated domes 0.2" in height, 0.9" diameter at the base, and 0.4" diameter at top of dome spaced 2.35" nominal as measured on a diagonal and 1.70" nominal as measured

side by side. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045" high, per square inch; "Armor-Tile" as manufactured by Engineered Plastics Inc., Tel: 800-682-2525, or approved equal.

1. Dimensions: Tiles shall be held within the following dimensions and tolerances:

			Nominal	Tile Size			
Length and Width:	12" x 12"	24" x 24"	24" x 36"	24" x 48"	24" x 60"	36" x 48"	36" x 60"
Depth	0.1875" ± 5% max.						
Face Thickness	0.1875 ± 5% max.						
Warpage of Edge	± 0.5% max.						

2. Water Absorption of Tile when tested by ASTM-D 570 not to exceed 0.35%.
 3. Slip Resistance of Tile when tested by ASTM-C 1028 the combined wet/dry static co-efficient of friction not to be less than 0.80 on top of domes and field area.
 4. Compressive Strength of tile when tested by ASTM-D 695-91 not to be less than 18,000 psi.
 5. Tensile Strength of Tile when tested by ASTM-D 638-91 not to be less than 10,000 psi.
 6. Flexural Strength of Tile when tested by ASTM - C293-94 not to be less than 24,000 psi.
 7. Chemical Stain Resistance of Tile when tested by ASTM-D 543-87 to withstand without discoloration or staining - 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum and red aerosol paint.
 8. Abrasive Wear of Tile when tested by BYK - Gardner Tester ASTM-D 2486* with reciprocating linear motion of 37± cycles per minute over a 10" travel. The abrasive medium, a 40 grit Norton Metallite sand paper, to be fixed and leveled to a holder. The combined mass of the sled, weight and wood block to be 3.2 lb. Average wear depth shall not exceed 0.030 after 1000 abrasion cycles measured on the top surface of the dome representing the average of three measurement locations per sample.
 9. Fire Resistance: When tested to ASTM E84 flame spread be less than 25.
 10. Gardner Impact to geometry "GE" of the standard when tested by ASTM-D 5420-93 to have a mean failure energy expressed as a function of specimen thickness of not less than 450 in. lbf/in. A failure is noted if a hairline fracture is visible in the specimen.
 11. Accelerated Weathering of Tile when tested by ASTM-G26-95 for 2000 hours shall exhibit the following result - no deterioration, fading or chalking of surface of tile.
- Vitrified Polymer Composite (VPC) Surface Applied tiles embedded in concrete shall meet or exceed the following test criteria:

1. Accelerated Aging and Freeze Thaw Test of Tile when tested to ASTM-D 1037 shall show no evidence of cracking, delamination, warpage, checking, blistering, color change, loosening of tiles or other defects.
2. Salt and Spray Performance of Tile and Adhesive System when tested to ASTM-B 117 not to show any deterioration or other defects after 100 hours of exposure.

B. DELIVERY, STORAGE AND HANDLING

Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number. Tiles shall be delivered to location at building site for storage prior to installation.

C. SITE CONDITIONS

Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Store tactile tile material in spaces where they will be installed for at least 48 hours before beginning installation. Subsequently, maintain minimum temperature of 40°F in areas where work is completed. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with the passengers or public. Provide barricades or screens to protect passengers or public. Disposal of any liquids or other materials of possible contamination shall be made in accordance with federal state and local laws and ordinances. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

D. EXTRA STOCK

Deliver extra stock to storage area designated by engineer. Furnish new materials from same manufactured lot as materials installed and enclose in protective packaging with appropriate identification for Surface Applied tactile tiles. Furnish not less than two (2) % of the supplied materials for each type, color and pattern installed.

E. PRODUCTS: MANUFACTURERS

- Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- The Vitrifified Polymer Composite (VPC) Surface Applied Tactile Tile specified is based on Armor- Tile manufactured by Engineered Plastics Inc. (800-682-2525). Existing engineered and field tested products which are subject to compliance with requirements, may be incorporated in the work and shall meet or exceed the specified test criteria and characteristics.

- Color: Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the tile.

F. MATERIALS

- Fasteners: Color matched, corrosion resistant, flat head drive anchor: ¼" diameter x 1 ¾" long. Armor-Drive by Engineered Plastics or equal.
- Adhesive: Armor-Bond as supplied by Engineered Plastics Inc.
- Sealants: Armor-Seal as supplied by Engineered Plastics Inc.

G. INSTALLATION – OVERLAY TILES

- During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- The application of all tile, adhesives, mechanical fasteners, and caulking shall be in strict accordance with the guidelines set by their respective manufacturers.
- Work with the Contractor or Engineer to ensure that the surfaces being prepared and fabricated to receive the tiles are constructed correctly and adequately for tile installation. Review design drawings with the Contractor prior to the construction and refer any and all discrepancies to the Engineer.
- Set the tile true and square to the curb ramp area as detailed in the design drawings, so that its location can be marked on the concrete surface. A thin permanent marker works well. Remove tile when done marking its location.
- The surface to receive the detectable warning surface tile (not recommended for asphalt) is to be mechanically cleaned with a diamond cup grinder or shot blaster to remove any dirt or foreign material. This cleaning and roughening of the concrete surface should include at least 4 inches around the perimeter of the area to receive the tile, and also along the cross pattern established by the corresponding areas on the backside of the tile. Those same areas should then be cleaned with a rag soaked in Acetone.
- Immediately prior to installing the detectable warning surface tile, the concrete surfaces must be inspected to ensure that they are clean, dry, free of voids, curing compounds, projections, loose material, dust, oil, grease, sealers and determined to be structurally sound and cured for a minimum of 30 days.
- Using Acetone, wipe the backside of the tile around the perimeter and along the internal cross pattern, to remove any dirt or dust particles from the area to receive the adhesive.
- Apply the adhesive on the backside of the tile, following the perimeter and internal cross pattern established by the tile manufacturer. Sufficient adhesive must be placed on the prescribed areas to have full coverage across the 2" width of the adhesive locator. A 3 x 4 foot tile will typically require an entire tube of adhesive.
- Set the tile true and square to the curb ramp area as detailed in the design drawings.
- Standing with both feet applying pressure around the molded recess provided in the tile, drill a hole true and straight to a depth of 3½" using the recommended

- diameter bit. Drill through the tile without hammer option until the tile has been successfully penetrated, and then with hammer option to drill into the concrete.
- Immediately after drilling each hole, and while still applying foot pressure, vacuum, brush or blow away dust and set the mechanical fastener as described below, before moving on to the next hole.
 - Mechanically fasten tiles to the concrete substrate using a hammer to set the fasteners. Ensure the fastener has been placed to full depth in the dome, straight, and flush to the top of dome. Drive the pin of the fastener with the hammer, taking care to avoid any inadvertent blows to the truncated dome or tile surface. A plastic deadblow or leather hammer is recommended.
 - Working in a sequence which will prevent buckles in the tile, proceed to drill and install all fasteners in the tile's molded recesses.
 - Following the installation of the tiles, the perimeter caulking sealant should be applied. Follow the perimeter caulking sealant manufacturer's recommendations when applying. Tape all perimeter edges of the tile and also tape the adjacent concrete back 1/2" from the tile's perimeter edge. Tool the perimeter caulking with a plastic applicator or spatula to create a straight edge in a cove profile between the tile and adjacent concrete. Remove tape immediately after tooling perimeter caulking sealant.
 - Do not allow foot traffic on installed tiles until the perimeter caulking sealant has cured sufficiently to avoid tracking.

If installing adjacent tiles, note the orientation of each tile. Careful attention will reveal that one of the long edges of the tile is different than the other, in regard to the tiny dotted texture. You may also note a larger perimeter margin before the tiny dotted texture pattern begins. Consistent orientation of each Armor-Tile is required in order that the truncated domes on adjacent tiles line up with each other.

In order to maintain proper spacing between truncated domes on adjacent tiles, the tapered edge should be trimmed off using a continuous rim diamond blade in a circular saw or mini-grinder. The use of a straightedge to guide the cut is advisable. All cuts should be made prior to installation of the tiles.

If installing adjacent tiles, care should be taken to leave a 1/8 inch gap between each.

If tiles are custom cut to size, and if pre-molded recesses (to receive fasteners) are removed by the cut, then any truncated dome can be center-drilled with a 1/4 inch through hole, and counter sunk with a suitable bit, to receive mechanical fasteners. New holes should be created no closer to the edge of the tile than any of the other perimeter fastener pre-molded recesses. Care should be taken to not countersink too deeply. Fasteners should be flush with the top of the truncated dome when countersunk properly.

Adhesive or caulking on the surface of the Armor-Tile can be removed with Acetone.

H. CLEANING AND PROTECTING

- Protect tiles against damage during construction period to comply with tactile tile manufacturer's specification.
- Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.
- Clean tactile tiles not more than four days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean tactile tile by method specified by tactile tile manufacturer.

55.4 IMBEDDED MODULES

A. SHOP DRAWINGS

- **Product Data:** Submit manufacturer's literature describing products and installation procedures.
- **Samples for Verification Purposes:** Submit two (2) 12"x12" tile samples of the kind proposed for use.
- Shop drawings are required for products specified showing fabrication details; material to be used as well as outlining installation materials and procedure.
- **Material Test Reports:** Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on a Detectable Warning Surface Tile system as certified by a qualified independent testing laboratory.

B. QUALITY ASSURANCE

- Provide Detectable Warning Surface tiles and accessories as produced by a single manufacturer.
- **Installer's Qualifications:** Engage an experienced installer who has successfully completed tile installations similar in material, design, and extent to that indicated for Project.
- **Americans with Disabilities Act (ADA):** Provide tactile warning surfaces which comply with the detectable warnings on walking surfaces section of the Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, Part 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES).
- Detectable Warning Surface Tile shall be "Access Tile", same manufacture as Amor-Tile manufactured by Engineered Plastics, Inc., Tel: 800-682-2525, **or approved equal.**
 1. Water Absorption when tested by ASTM-D 570 not to exceed 0.2%.
 2. Slip Resistance when tested by ASTM-C 1028 the combined wet/dry static coefficient of friction not to be less than 0.80 on top of domes.

3. Compressive Strength when tested by ASTM C 109 not to be less than 10,000 psi.
4. Tensile Strength when tested by ASTM-C 307 not to be less than 1,800 psi.
5. Flexural Strength when tested by ASTM – C384 not to be less than 3,000 psi.
6. Fire Resistance when tested to ASTM E84 flame spread to be less than 50.

C. DELIVERY, STORAGE AND HANDLING

Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings and tile type shall be identified by part number. Tiles shall be delivered to location at building site for storage prior to installation. All materials furnished shall be from same manufactured lot and shall be enclosed in protective packaging with appropriate identification.

D. SITE CONDITIONS

Environmental Conditions and Protection: Maintain minimum temperature of 40°F in spaces to receive tactile tiles for at least 48 hours prior to installations, during installation, and for not less than 48 hours after installation. Tiles shall be within +/- 10% of ambient temperature when placed. Subsequently, maintain minimum temperature of 40°F in areas where work is completed. The use of water for work, cleaning or dust control, etc. shall be contained and controlled and shall not be allowed to come into contact with nearby structures, fixtures, motor vehicles, pedestrians, etc. Provide barricades or screens to protect passengers or public. Disposal of any potentially hazardous liquids or other materials shall be made in accordance with federal state and local laws and ordinances. Cleaning materials shall have code acceptable low VOC solvent content and low flammability if used on the site.

F. PRODUCTS: MANUFACTURERS

- Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- The Detectable Warning Surface Tile specified is based on ADA Solutions and Access Tile as manufactured by Engineered Plastics Inc. (800-682-2525). Other engineered and field tested products compliant with these requirements may be incorporated in the work provided they meet or exceed the specified test criteria and characteristics. Alternates shall be approved by the Engineer prior to installation.
- Color: Yellow conforming to Federal Color No. 33538. Color shall be homogeneous throughout the tile.

F. INSTALLATION – IMBEDDED TILES

- During all surface preparation and tile installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- The installation of the structural embedment flange system and related materials shall be in strict accordance with the contract documents and the guidelines set by their respective manufacturers.
- The physical characteristics of the concrete shall be consistent with the contract specifications while maintaining a slump range of 4 - 7 to permit solid placement of the imbedded tiles.. An overly wet mix will cause the tile to float and will be rejected.
- The concrete pouring and finishing operations require typical mason's tools, however, a 4' long level with electronic slope readout, 25 lb. weights, and a large non-marring rubber mallet are specific to the installation of the Imbedded tiles. A vibrating mechanism such as that manufactured by Vibco or equal can be employed, if desired. The vibrating unit should be fixed to a soft base such as wood, at least 1 foot square.
- The factory-installed plastic sheeting must remain in place during the entire installation process to prevent the splashing of concrete onto the finished surface of the tile.
- When preparing to set the tile, it is important that no concrete be removed in the area to accept the tile. It is imperative that the installation technique eliminates any air voids under the tile. Holes in the tile perimeter allow air to escape during the installation process. Concrete will flow through the large holes in each embedment flange on the underside of the tile. This will lock the tile solidly into the cured concrete.
- The concrete shall be poured and finished true and smooth to the required dimensions and slope prior to the tile placement. Immediately after finishing concrete, the electronic level should be used to check that the required slope is achieved. The tile shall be placed true and square to the curb edge in accordance with the contract drawings. The Cast In Place Detectable/Tactile Warning Surface Tiles shall be tamped (or vibrated) into the fresh concrete to ensure that the field level of the tile is flush to the adjacent concrete surface. The embedment process should not be accomplished by stepping on the tile as this may cause uneven setting which can result in air voids under the tile surface. The contract drawings indicate that the tile field level (base of truncated dome) is flush to adjacent surfaces to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
- In cold weather climates it is recommended that the imbedded tiles be set deeper such that the top of domes are level to the adjacent concrete on the top and sides of ramp and that the base of domes to allow water drainage. This installation will reduce the possibility of damage due to snow clearing operations.
- Immediately after placement, the tile elevation is to be checked to adjacent concrete. The elevation and slope should be set consistent with contract drawings to permit water drainage to curb as the design dictates. Ensure that the field surface

of the tile is flush with the surrounding concrete and back of curb so that no ponding is possible on the tile at the back side of curb.

- While concrete is workable, a 3/8" radius edging tool shall be used to create a finished edge of concrete, then a steel trowel shall be used to finish the concrete around the tile's perimeter, flush to the field level of the tile.
- During and after the tile installation and the concrete curing stage, it is imperative that there is no walking, leaning or external forces placed on the tile that may rock the tile causing a void between the underside of tile and concrete.
- Following tile placement, review installation tolerances to contract drawings and adjust tile before the concrete sets. Two suitable weights of 25 lb each may be required to be placed on each tile as necessary to ensure solid contact of the underside of tile to concrete.
- Following the concrete curing stage, protective plastic wrap is to be removed from the tile surface by cutting the plastic with a sharp knife, tight to the concrete/tile interface. If concrete bled under the plastic, a soft brass wire brush will clean the residue without damage to the tile surface.
- If desired, individual tiles can be bolted together using 1/4 inch or equivalent hardware. This can help to ensure that adjacent tiles are flush to each other during the installation process. Tape or caulking can be placed on the underside of the bolted butt joint to ensure that concrete does not rise up between the tiles during installation. Any protective plastic wrap which was peeled back to facilitate bolting or cutting, should be replaced and taped to ensure that the tile surface remains free of concrete during the installation process.
- Tiles can be cut to custom sizes, or to make a radius, using a continuous rim diamond blade in a circular saw or mini-grinder. Use of a straightedge to guide the cut is advisable where appropriate.
- Any sound-amplifying plates on the underside of the tile, which are dislodged during handling or cutting, should be replaced and secured with construction adhesive. The air gap created between these plates and the bottom of the tile is important in preserving the sound on cane audible properties of the Armor-Tile system as required in various jurisdictions.

G. CLEANING AND PROTECTING

- Protect tiles against damage during construction period to comply with tactile tile manufacturer's specification.
- Protect tiles against damage from rolling loads following installation by covering with plywood or hardwood.

55.5 BASIS OF PAYMENT:

Detactable Warning Surface Tile-Overlay: Accepted quantities under this section shall be paid for at the Contract Unit Price per square foot for the appropriate size and type of Detactable Warning Surface Tile. Payment shall be considered full compensation for all materials and labor required to complete the work described in this Section.

Detactable Warning Surface Tile-Imbedded: Accepted quantities under this section shall be paid for at the Contract Unit Price per square foot for the appropriate size and type of Detactable Warning Surface Tile installed. Payment shall be considered full compensation for labor only. Any fastening hardware, tape or caulking the Contractor chooses to use shall be incidental to the cost of installation. The LFUCG will provide the Cast in Place Detactable Warning Surface Tile and CONTRACTOR is required to install the tile described in this Section.

TECHNICAL SPECIFICATIONS

SECTION 56 - UNSPECIFIED, INCIDENTAL MATERIALS

56.1 SCOPE

Work under this Section shall be for furnishing materials, not specified in this Document, to be determined as needed by the ENGINEER and delivered to the Work Site.

56.2 BASIS OF PAYMENT

Work under this Section shall be paid for at a price agreed upon between the CONTRACTOR and the ENGINEER and shall include cost plus 15% for overhead and profit (to be submitted as Contract progresses and as needed). No payments will be made under this Section without proper invoices for materials furnished.

TECHNICAL SPECIFICATIONS

SECTION 57 - UNSPECIFIED, INCIDENTAL LABOR

57.1 SCOPE

Work under this Section shall be for furnishing labor, not specified in this Document, to be determined as needed by the ENGINEER.

57.2 BASIS OF PAYMENT

Work under this Section shall be paid for at a price agreed upon between the CONTRACTOR and the ENGINEER and shall include Direct Wages Plus Certified Overhead Plus 15% Profit (to be submitted as Contract progresses and as needed). Payments under the Section shall require daily payroll sheets for the labor required.

TECHNICAL SPECIFICATIONS

SECTION 58 – THIS SECTION RESERVED

TECHNICAL SPECIFICATION

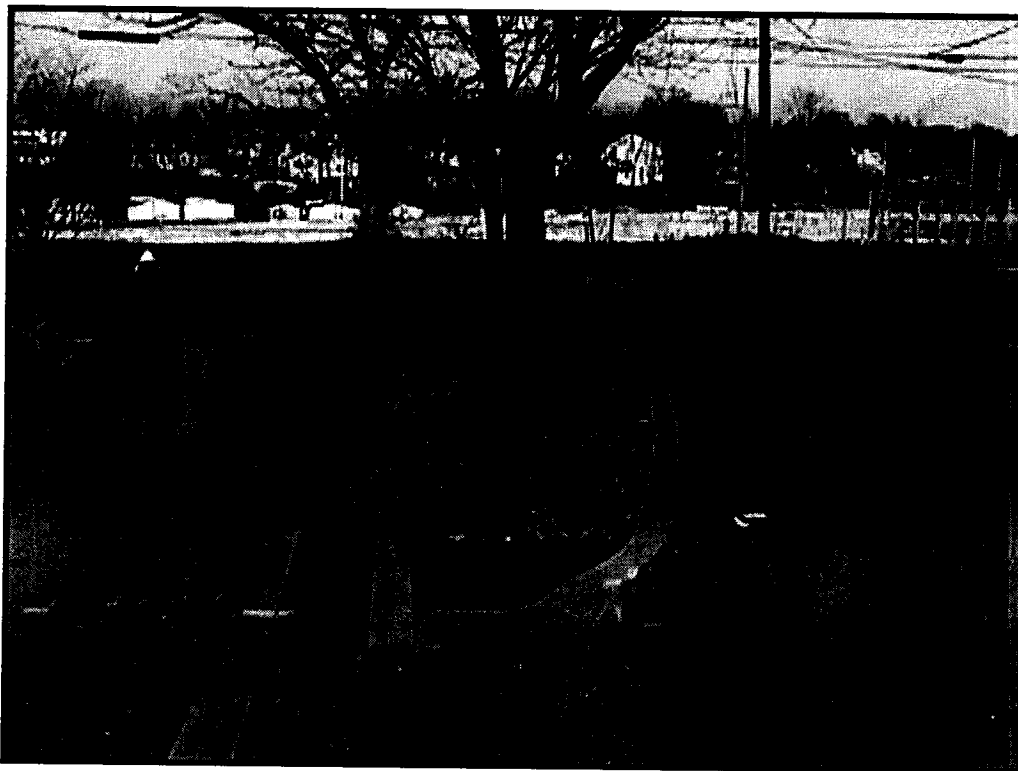
SECTION 59 – BULB-OUTS

59.1 SCOPE

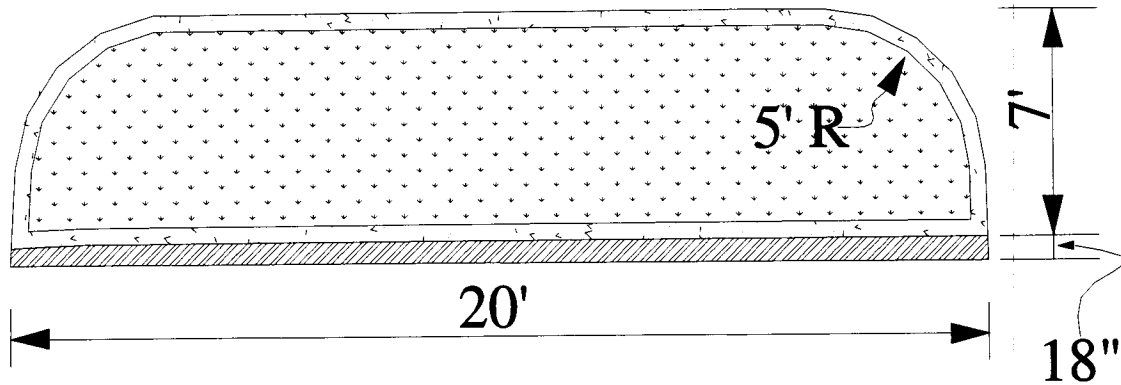
The Work shall consist of the bulb-outs as indicated on the plans. Work for this Section shall include all labor, materials, equipment, disposal, and incidentals necessary to complete Work. Excavation, header curb, asphalt repair, gutter cover, backfill (embankment), DGA, seeding and Sodding will be paid as per each item quoted in the UPC.

59.2 INSTALLATION

- The contractor will provide all labor, materials and installation equipment. Materials and workmanship are to meet LFUCG standards.
- The contractor is to provide proper traffic control to promote safe vehicular and pedestrian access.
- The contractor has 60 working days from the date of notification to complete the installation.
- The contractor is to notify the Division of Traffic Engineering of the scheduled installation date and must obtain the necessary permits to perform the work including but not limited to a Lane Blockage Permit from the Division of Traffic Engineering.
- The Division of Traffic Engineering reserves the right to have an inspector on site to insure that proper procedures are being followed and the bulbout installation meets LFUCG standards.



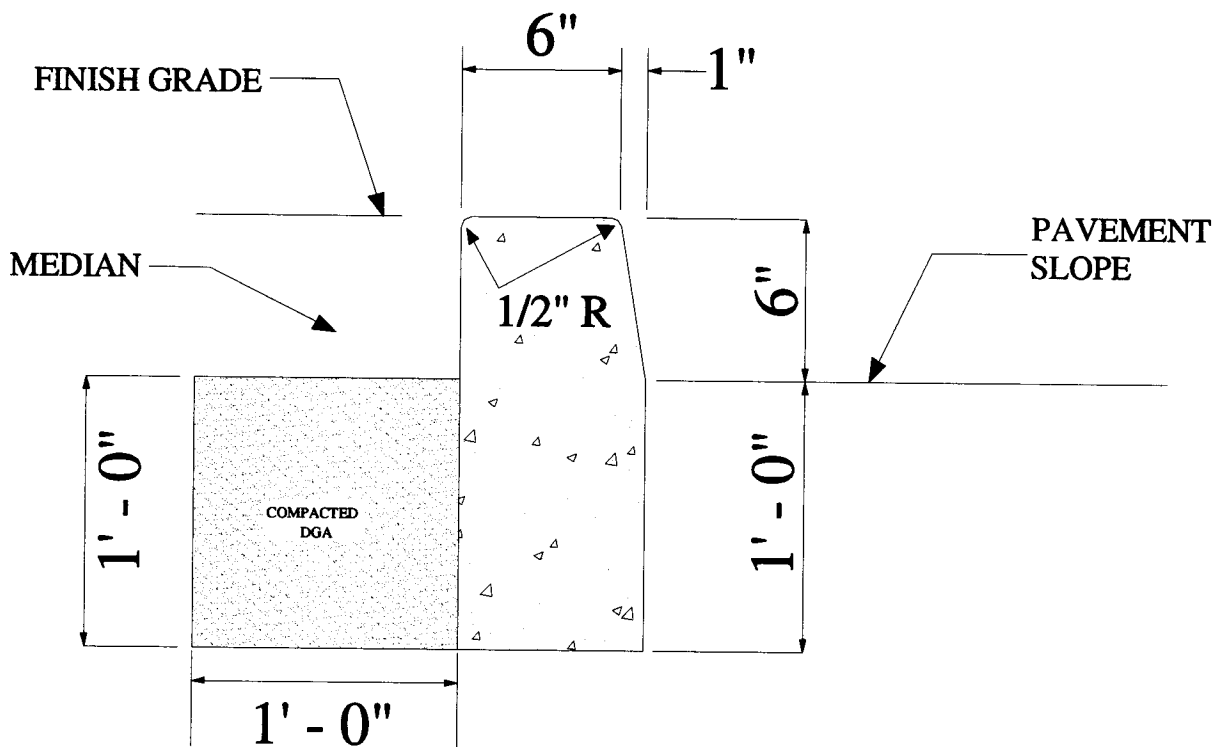
Bulb-out



NOTES:

1. HEADER CURB CONCRETE SHALL BE KDOT CLASS "A".
2. SAWED CONTRACTION JOINTS SHALL BE CONSTRUCTED EVERY 20 FEET, 3" MINIMUM DEPTH.
3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT ALL BREAKS IN ALIGNMENT, AT ALL DRAINAGE INLETS AND AT THE BEGINNING AND ENDING POINTS OF CURVES.
4. ALL CONCRETE, EXCEPT BONDING SURFACES, SHALL BE CURED WITH WHITE PIGMENTED MEMBRANE FORMING COMPOUND (AASHTO M 148, TYPE 2)
5. ALL PAVEMENT AND BASE ARE TO BE REMOVED FULL DEPTH IN AREAS WHERE BULBOUTS ARE TO BE CONSTRUCTED.
6. ALL AREAS ARE TO BE BACK FILLED TO THE TOP OF CURB WITH TOPSOIL AND ARE TO BE SEEDED TO PROVIDE ADEQUATE COVERAGE.

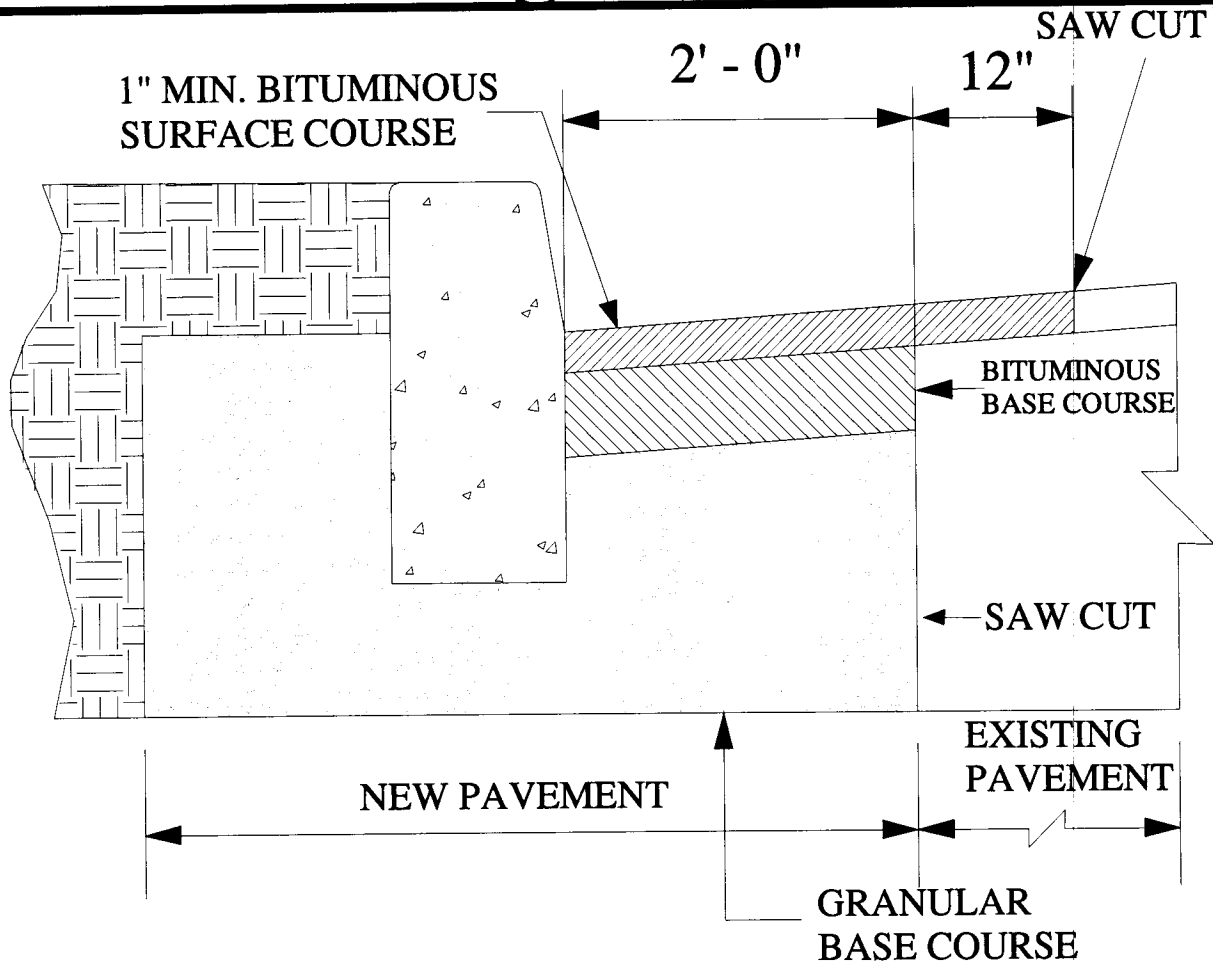
Header Curb



NOTES:

1. CONCRETE SHALL BE KDOT CLASS "A".
2. SAWED CONTRACTION JOINTS SHALL BE CONSTRUCTED EVERY 20 FEET, 3" MINIMUM DEPTH.
3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT ALL BREAKS IN ALIGNMENT, AT ALL DRAINAGE INLETS AND AT THE BEGINNING AND ENDING POINTS OF CURVES.
4. ALL CONCRETE, EXCEPT BONDING SURFACES, SHALL BE CURED WITH WHITE PIGMENTED MEMBRANE FORMING COMPOUND (AASHTO M 148, TYPE 2)

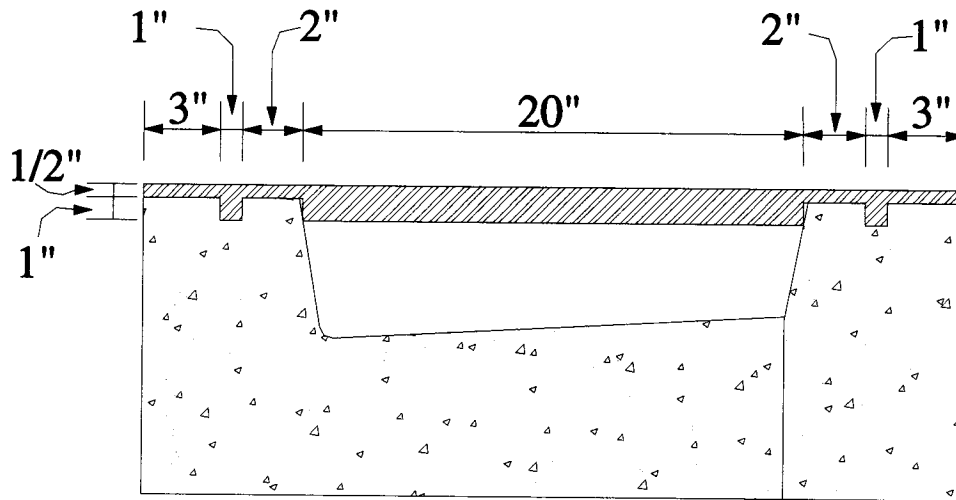
Edge Key



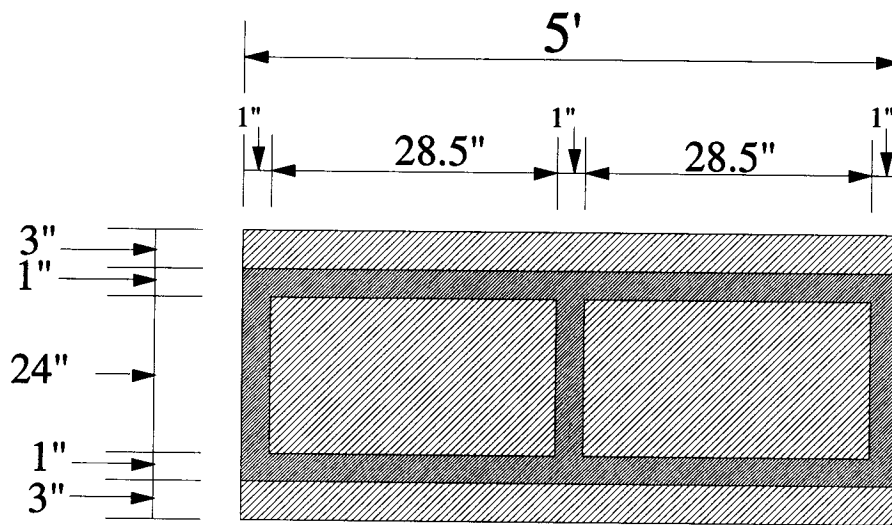
NOTES:

1. ALL SAW-CUTS SHALL BE NEAT AND STRAIGHT.
2. IMMEDIATELY BEFORE LAYING NEW BITUMINOUS COURSES, ALL SAW CUT EDGES SHALL BE CLEANED OF DUST AND DEBRIS AND SPRAYED WITH A BITUMINOUS TACK COAT.
3. EDGE KEY SHALL NOT BE REQUIRED IF BOTH EXISTING AND NEW PAVEMENT ARE TO RECEIVE AN OVERLAY AS PART OF THIS CONTRACT.

Bulbout/Gutter Cover

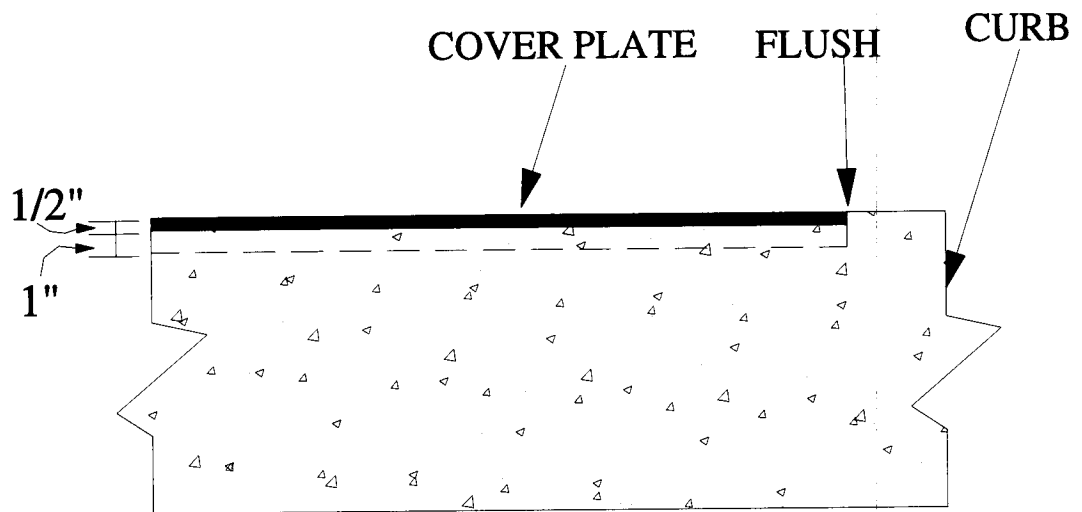


Bulbout Gutter X-section



Gutter Cover

Bulbout/Gutter Cover Notes

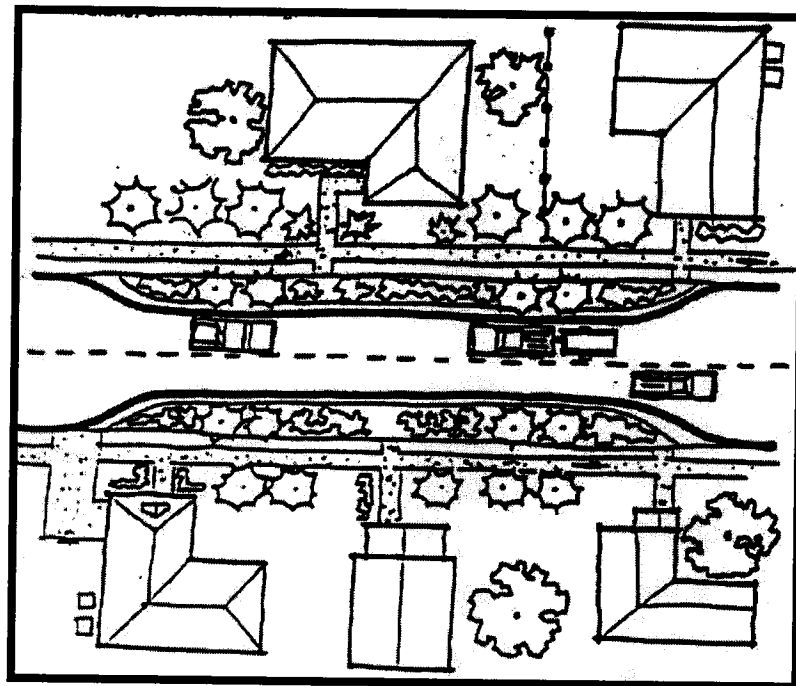
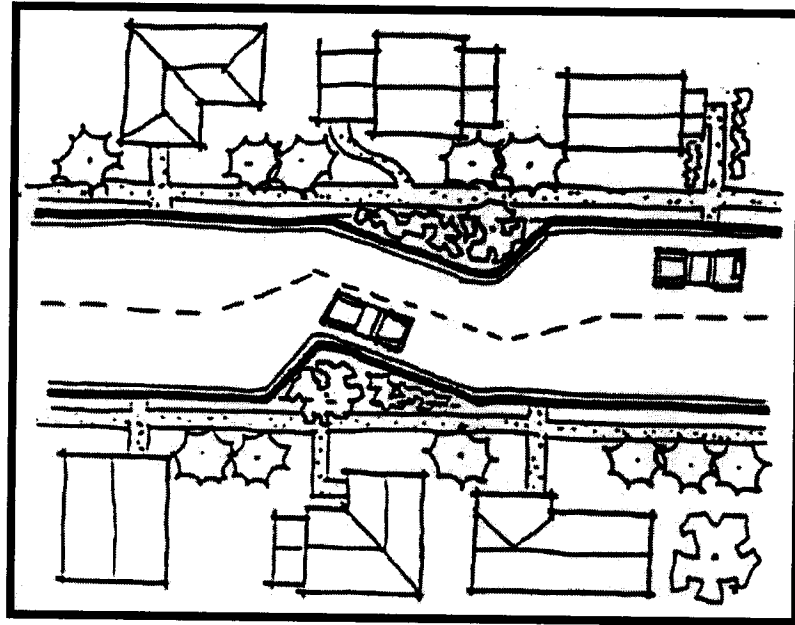


NOTES:

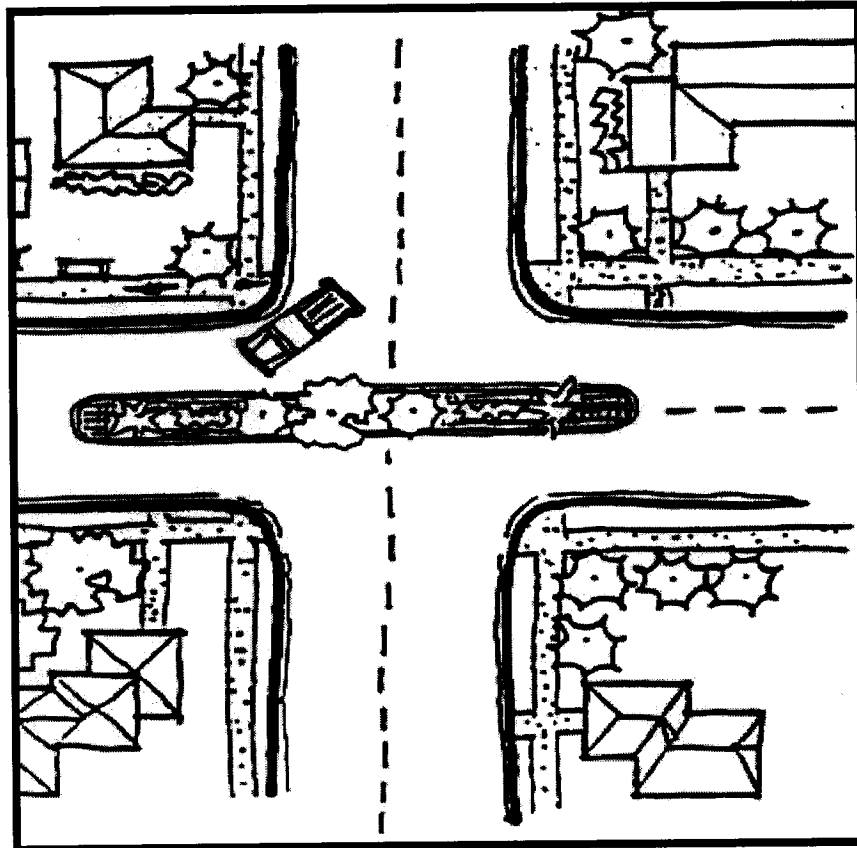
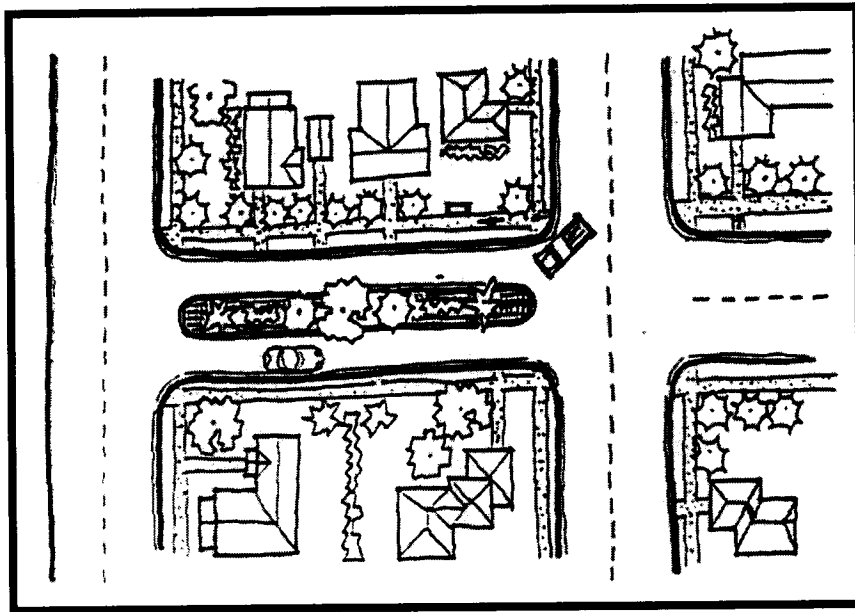
1. Gutter Covers shall be 1/2" thick weathered steel with 1" thick supports.
2. Existing curb sections and new header curb sections are to be formed or saw cut so that the steel cover sections are flush with the top of curb at each end of the bulbout.
3. Gutter Covers are to be held in place by the 1" thick notches in the curb.
4. Gutter Covers are to be 5' in length for a total of 4 sections per bulbout.
5. Gutter Covers are to be modified to account for non-parallel curb and gutter sections.

Example of non-standard bulbout types:

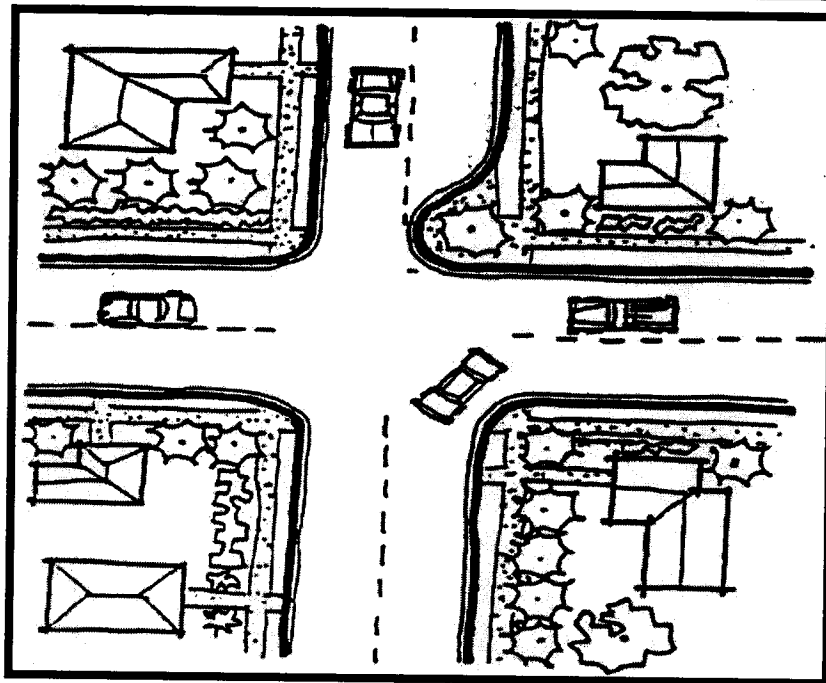
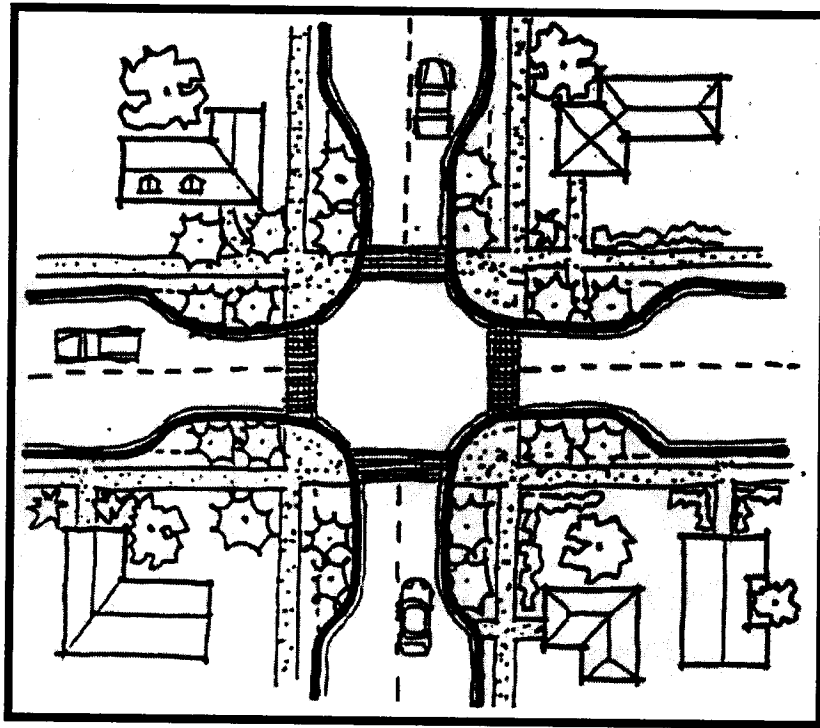
Chicanes



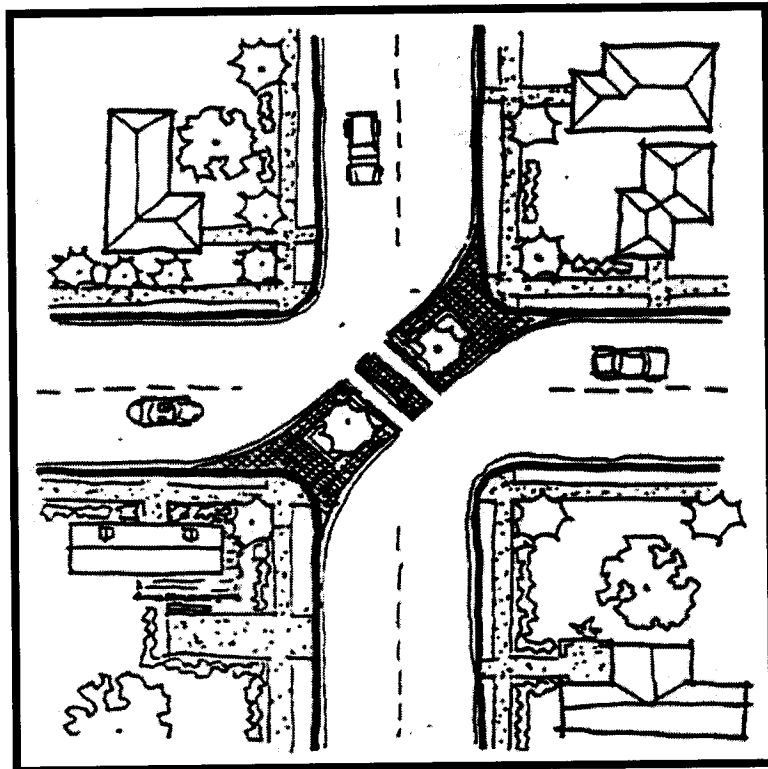
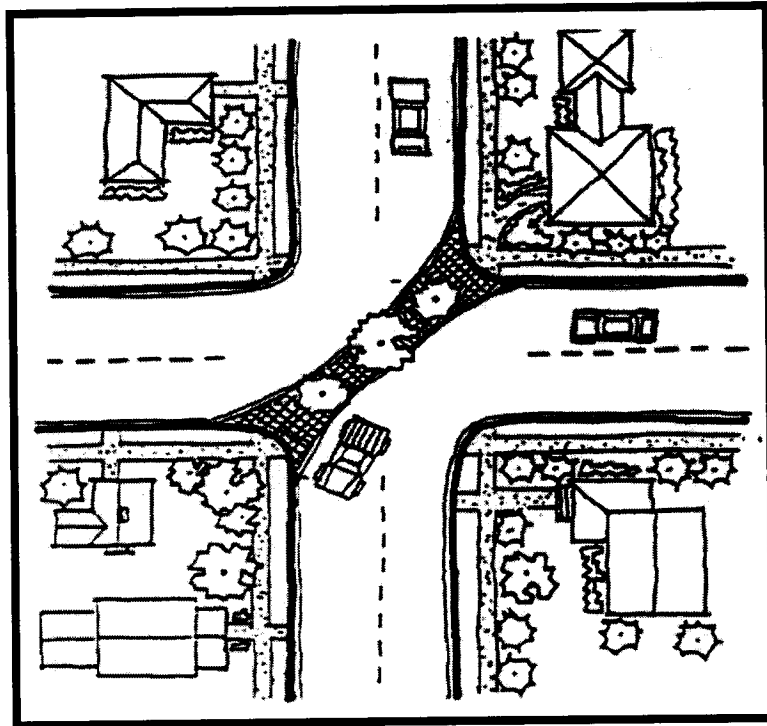
Medians



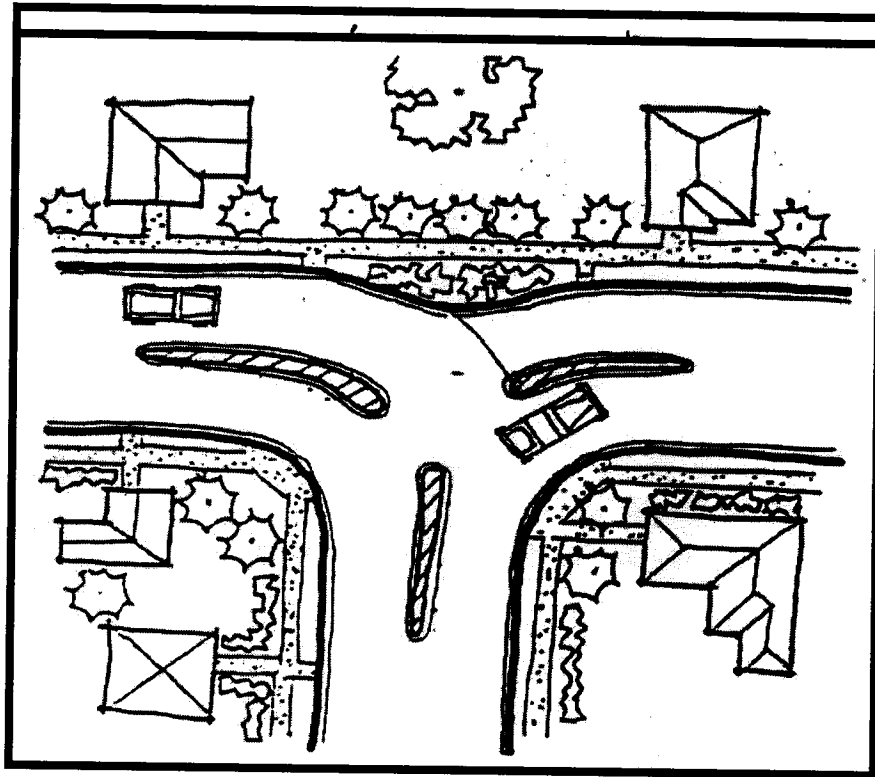
Choker/Semi-Diverter



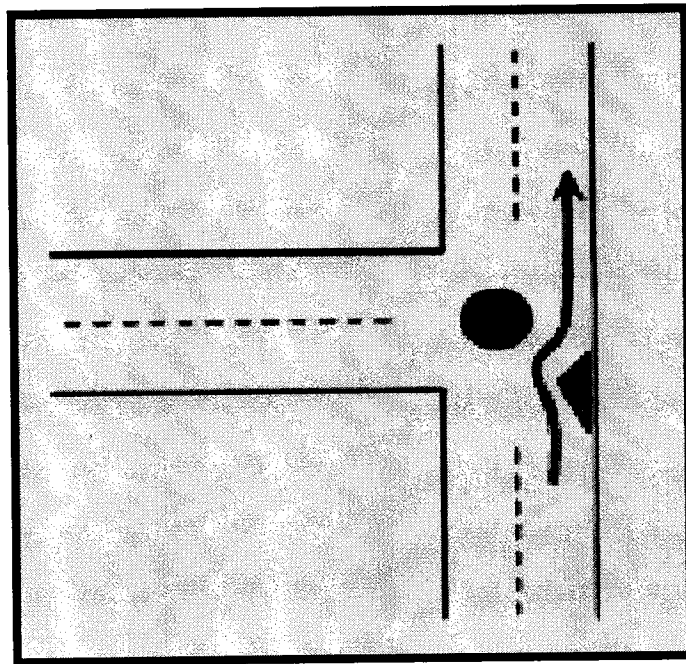
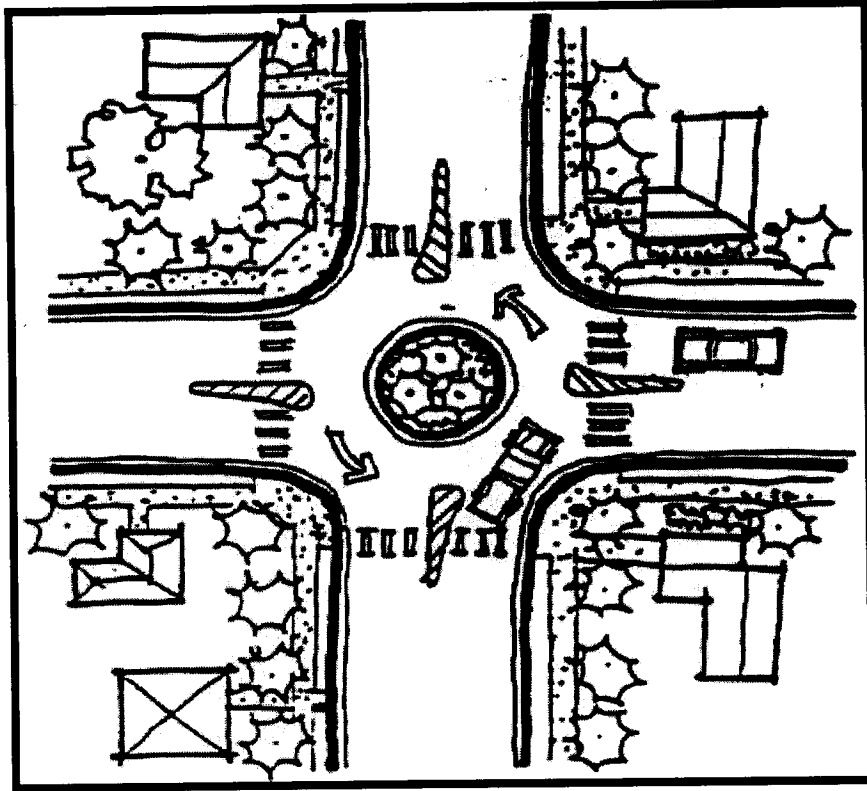
Diagonal Diverter



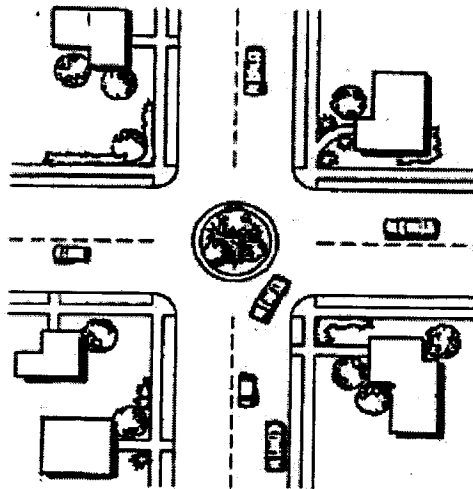
Channelization Medians



Traffic Circle



TS-121



59.3 BASIS OF PAYMENT

Accepted quantities for Bulb-Outs will be paid for at the respective Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per cubic yard for excavation, per linear foot for header curb, per square foot for asphalt repair, per linear foot for gutter cover, per cubic yard for backfill (embankment), per ton for DGA, per square yard for seeding and per square yard for sod satisfactorily installed. All labor, materials, and equipment with the exception of the items above shall be incidental to the installation of the Bulbouts.

TECHNICAL SPECIFICATIONS

SECTION 60 – GRADER WITH OPERATOR

60.1 SCOPE

Work under this Section shall consist of furnishing a grader with operator for grading at various locations to be determined. The grader supplied shall be in good working order, and with the trained operator, be capable of completing the required Work in a timely manner. Should the ENGINEER feel that the grader and/or operator are not adequate, he may reject either the grader and/or operator and no payment will be made.

60.2 BASIS OF PAYMENT

Accepted equipment and operator time for a Grader with an Operator will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. No direct payment will be made for delivery time to or from the Work site.

TECHNICAL SPECIFICATIONS

SECTION 61 – ROLLER/COMPACTOR WITH OPERATOR

61.1 SCOPE

Work under this Section shall consist of furnishing a roller/compactor with operator for work at various locations to be determined. The roller/compactor supplied shall be in good working order, and with the trained operator, be capable of completing the required Work in a timely manner. Should the ENGINEER feel that the roller/compactor and/or operator are not adequate, he may reject either the roller/compactor and/or operator and no payment will be made.

61.2 BASIS OF PAYMENT

Accepted equipment and operator time for a roller/compactor with an Operator will be paid for at the Contract Unit Price as quoted (which shall be full compensation for all Work under this Section) and paid per hour of Work satisfactorily completed. No direct payment will be made for delivery time to or from the Work site.

TECHNICAL SPECIFICATIONS

SECTION 62 - TOPSOIL PLACEMENT

62.1 SCOPE

The Work for this Section shall consist of furnishing and placing topsoil in locations as determined by the Engineer and shall include all labor, materials, equipment, excavation, and incidentals necessary to complete the Work in place, ready for use and constructed in conformance with KDOH Standard Specifications. Work for this Section shall conform to Kentucky Department of Highways Standard Specifications for Road and Bridge Construction Section 212.03.02, 827.10, Current Edition and the Lexington-Fayette Urban County Government Standard Drawings and shall include labor, excavation, materials, equipment and necessary incidentals.

62.2 WORK

Furnish and Place Topsoil: When the bid item is furnish and place topsoil, obtain topsoil conforming to Section 827 from source outside the project area. Avoid injury to existing planted growths, structures, and paved surfaces during topsoil operations.

Proper equipment and methods of operation that prevent the loading of subsoil or other unsuitable material with the topsoil. During hauling operations, keeping pavement surfaces clean. Promptly and completely remove any topsoil or other substances dropped on the surfaces before it is compacted by traffic.

Prepare areas designated to received topsoil. Then place and spread topsoil to a sufficient loose depth so that after natural settlement and rolling, the completed work conforms to the required line, grades, and elevations. Compact the topsoil and prepare the area for seeding according to Specifications.

Spreading Stockpiled Topsoil: When the bid item is spreading stockpiled topsoil, obtain the material from existing stockpiled on or near the project.

Do not spread topsoil until grading and shaping of the area to receive the topsoil has been completed and seeding and protection operations are ready to begin. Spread and lightly compact the topsoil to a uniform depth of approximately 6 inches over areas specified on the Plans or as the Engineer directs. Do not place topsoil on slopes steeper than 3:1. Compact the topsoil and prepare the area for seeding according to Specifications.

62.3 MATERIAL

Topsoil is the portion of the soil profile defined technically as the "A" horizon by the Soil Science Society of America. Use loose, friable, topsoil that is free of stones, 1 inch or greater in overall dimensions, admixture of subsoil, refuse, stumps, roots, brush, weeds, and other material that prevent the formation of a suitable seed bed. Before stripping the topsoil, inspect for existing

vegetation. Do not use topsoil from sites having Johnson Grass, Canada Thistle, Quack Grass, Nodding Thistle, or excessive amounts of noxious weeds or their rhizomes.

62.4 PAYMENT

Accepted quantities for Topsoil Placement will be paid for at the Contract Unit Price per cubic yard as quoted and this shall be full compensation for all Work required under this Section. All labor, materials, equipment, and excavation shall be incidental to the placement of Topsoil.

PART IX

ADDENDA

Addendum
Number

Title

Date

1.

Correction to Bid Date

08/06/2014

2.

3.

4.

5.



Lexington-Fayette Urban County Government
DEPARTMENT OF FINANCE & ADMINISTRATION

Jim Gray
Mayor

William O'Mara
Commissioner

ADDENDUM #1

Bid Number: **#107-2014**

Date: August 6, 2014

Subject: **Construction Unit Price Contract**

Please address inquiries to:
Theresa Maynard (859) 258-3320

TO ALL PROSPECTIVE BIDDERS:

Please be advised of the following clarifications to the above referenced bid:

Revising bid due date on Economic Engine only; the correct date is Monday, August 25th, as on the bid documents and on the Lynn Imaging website.


Todd Slatin, Director
Division of Central Purchasing

All other terms and conditions of the RFP and specifications are unchanged. This letter should be signed, attached to and become a part of your RFP.

COMPANY: _____

ADDRESS: _____

SIGNATURE OF PROPOSER: _____

APPENDIX A

**Lexington-Fayette Urban County Government
Division of Engineering
Standard Drawings**

Drawing Drawing Title

Manholes-Storm Drainage:

100	Storm Sewer Manhole Type "A" Circular Wall	
102	Storm Sewer Manhole Details	
103	Manhole Frames, Covers & Steps	
104	Storm Sewer Manhole Circular Slabs	4'-0' & 5'-0' Diameter
105	Storm Sewer Manhole Circular Slabs	6'-0' Diameter

Surface Inlets & Catch Basins:

120	Surface Inlet Type "A"		
121	Surface Inlet Type "B"		
122-1	Curb Box Inlet Type "A"	4'x4' Box	15"-18" Pipes
122-2	Curb Box Inlet Type "A"	4'x4' Box	15"-18" Pipes
123-1	Curb Box Inlet Type "B"	5'x5' Box	15"-24" Pipes
123-2	Curb Box Inlet Type "B"	5'x5' Box	15"-24" Pipes
124-1	Curb Box Inlet Type "C"	4'x3' Box	Single Pipe 15" or Less
124-2	Curb Box Inlet Type "C"	4'x3' Box	Single Pipe 15" or Less
125	Curb Box Inlet Type "D"		
128	Security Devices for Frames and Grates		

Channels & Ditches:

130-1	Aggregate Channel Lining
130-2	Aggregate Channel Lining
131	Mattress Channel Lining
132	Paved Ditch

Headwalls:

150	Straight Headwalls	
153	Pipe Culvert Headwalls-0° Skew	15"-27" Circular Pipe
154-1	Pipe Culvert Headwalls-0° Skew	30"-108" Pipe
154-2	Dimensions and Quantities-30"-108" Diameter-Circular Pipe Headwalls-0° Skew	
154-3	Bill of Reinforcement 30"-90" Diameter-Circular Pipe Headwalls-0° Skew	
162	Sloped and Flared Box Inlet-Outlet	18"-24"-30"-36" All Skews
163	Grates For Sloped and Flared Box Inlet-Outlet	
164	Impact Stilling Basin	15"-24" Pipes
165	Impact Stilling Basin	27"-48" Pipes

Trenching:

- 200 Typical Details for Sanitary Sewer Gravity Lines and Force Mains Trenching, Laying, Backfilling & Bedding Not Under Pavement
- 201-1 Pavement Replacement for Trenches Under Street Pavement
- 201-2 Pavement Replacement for Trenches Under Street Pavement Using CLSM
- 204 Sanitary Sewer Pipe: Types & Maximum Allowable Fill Height

Manholes:

- 210 Typical Precast Concrete Shallow Manhole for Pipes 24" and Larger
- 211 Typical Standard Precast Concrete Manhole for Pipe up to 24"
- 212 Typical Precast Concrete Drop Manhole for Pipes up to 36"
- 213 Standard Manhole Junction and Water Stop Details
- 214 Sewer Manhole Adjustment Grade Rings
- 216 Manhole Size Standards and General Notes for Deep Manholes
- 217 Deflection Angle Criteria for Sanitary Manholes
- 220 Standard Circular Manhole Frame & Cover
- 222 Standard Watertight Manhole Frame & Cover

Connections:

- 230 House Lateral for Greater than 6' Deep Sewer in Soil & Rock Excavation
- 231 House Lateral for Greater than 6' Deep Sewer in Soil
- 232 House Lateral for Shallow Sewer in Soil or Rock
- 233 Lateral Cleanout in Non-Paved Areas and Yards
- 234 Right of Way or Easement Lateral Cleanout in Non-paved areas and Yards
- 240 Typical Creek Crossing for Sanitary Sewer Line
- 260 Sewer Connection to Existing Manhole

Streets & Roads:

- 301 Curb & Gutter
- 302 Integral Curb, Header Curb, Monolithic Curb & Sidewalk
- 303 Sidewalk Construction Specifications
- 304 Sidewalk Ramp Type 1
- 305 Sidewalk Ramp Type 2 (sic)
- 306 Sidewalk Ramp Type 3
- 307 Residential Entrance Details
- 307-1 Commercial Entrance Details
- 308 Chain Link Fence 3'-6"
- 310 Chain Link Gate
- 312 Woven Wire Right-of-Way Fence Type 1
- 314 Woven Wire Gates

- 315 Concrete Steps
- 318 Edge Key
- 319 Typical Edge Key for Minimum Overlays, Short Projects, Low Speed
- 320 Perforated Pipe Subgrade Drainage Along Roadway
- 320-1 Perforated Pipe Subgrade Drainage for Raised Non-Paved Medians
- 321 Perforated Pipe for Subgrade Drainage
- 322 Perforated Pipe Underdrains
- 323 Public Improvement Sign

All LFUCG Division of Engineering Standard Drawings may be viewed on Division of Engineering's web site:

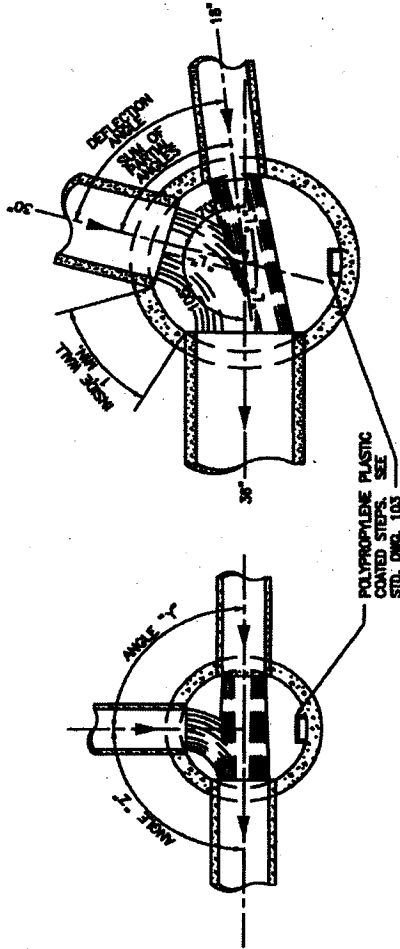
<http://www.lexingtonky.gov/Modules/ShowDocument.aspx?documentid=5036>

or,

<http://tinyurl.com/o9e6yxc>

TABLE I
OF
MINIMUM PARTIAL ANGLE

PIPE SIZE	MANHOLE SIZE									
	4'-0"	5'-0"	6'-0"	7'-0"	8'-0"	9'-0"	10'-0"	11'-0"	12'-0"	14'-0"
18"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
24"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
30"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
36"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
42"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
48"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
54"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"
60"	18"	18"	18"	18"	18"	18"	18"	18"	18"	18"



TYPE "A" MANHOLE - CIRCULAR WALLS
CAST-IN-PLACE OR PRECAST CONCRETE

NOTES:

1. PRECAST CONCRETE MANHOLE BARREL SHALL BE ASTM C-475, CLASS II PIPE TO 12' DEPTH AND C-76 CLASS III GREATER THAN 12' DEPTH.
2. BASE SECTION OF CIRCULAR MANHOLES MAY BE CAST-IN-PLACE CONCRETE, OR CUSTOM PRECAST CONCRETE WITH OPENINGS FOR PIPE.
3. BASE SECTIONS MAY BE SIMILAR TO SANITARY SEWER MANHOLE.
4. PROVIDE STEPS WITHIN 18" OF BENCH.

CIRCULAR MANHOLE NOTES:

1. THE ANGLE BETWEEN ANY TWO PIPES (6-4' ANGLE γ OR γ') MUST BE GREATER THAN THE SUM OF THE PARTIAL ANGLES FROM TABLE I FOR THE MANHOLE SIZE SELECTED. FOR SMALLER ANGLES BETWEEN PIPES, LARGE MANHOLES MUST BE SELECTED. (SEE EXAMPLE BELOW)
2. THE MAXIMUM DEFLECTION ANGLE BETWEEN ANY INCOMING PIPE AND THE DISCHARGE PIPE SHALL BE NO MORE THAN 50° FOR PIPES UP TO 24" IN DIAMETER. THE MAXIMUM DEFLECTION ANGLE FOR 27" TO 42" PIPES SHALL BE 70° AND FOR PIPES LARGER THAN 42" THE MAXIMUM DEFLECTION ANGLE SHALL BE 80°.

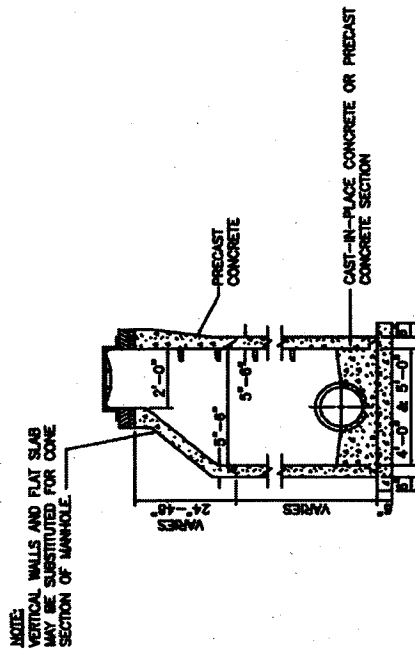
EXAMPLE FOR MANHOLE SIZE SELECTION:

FOR MANHOLE SHOWN ABOVE, THE ANGLE BETWEEN 18" AND 30" PIPE IS 70° AND THE ANGLE BETWEEN 30" AND 36" PIPE IS 110°. THE TABLE INDICATES THAT FOR A 6'-0" DIAMETER MANHOLE, THE MINIMUM PARTIAL ANGLE FOR AN 18" PIPE IS 28° AND FOR A 30" PIPE IS 42°. THE SUM OF THE PARTIAL ANGLES IS 68° THIS SUM IS LESS THAN THE 70°. THEREFORE, A 6'-0" MANHOLE DIAMETER IS ACCEPTABLE.

GENERAL NOTES:

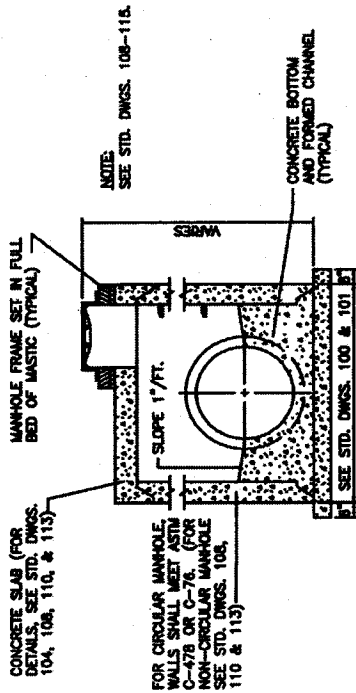
1. ALL DIMENSIONS ARE BASED ON SIZE OF LARGEST PIPE IN MANHOLE.
2. MANHOLES FOR PIPE LARGER THAN 60" SHALL BE SPECIALLY DESIGNED.
3. IN CASES WHERE DEFLECTION ANGLES EXCEED MAXIMUM SHOWN IN TABLE, MANHOLE SHALL BE INCREASED IN SIZE OR SPECIALLY DESIGNED.
4. BOTTOM SLAB OF MANHOLES SHALL BE SPECIALLY DESIGNED WITH REGARD TO AREA, THICKNESS, AND REINFORCING IN SITUATIONS WHERE HIGH WATER TABLE OR UNSTABLE SOIL CONDITIONS EXIST.
5. MANHOLE BENCH SHALL SLOPE AT LEAST 1" PER FT. FROM WALLS TO CHANNELS AND SHALL HAVE SMOOTH FLOAT AND BRUSH FINISH.
6. ELEVATIONS OF PIPES IN MANHOLES SHALL BE SUCH THAT THE TOP OF ALL INFLUENT PIPES WILL BE AT AN ELEVATION EQUAL TO OR GREATER THAN THE TOP OF THE EFFLUENT PIPE.
7. INFLUENT PIPES MAY ENTER MANHOLES AT AN ELEVATION ABOVE THE CHANNELS AS REQUIRED TO AVOID CONFLICT WITH LARGER PIPES IN THE MANHOLE.

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
STORM SEWER MANHOLE TYPE "A"- CIRCULAR WALLS			
DESIGNED BY		5/11/00	
CHECKED BY		[Signature]	
DRAWN BY		[Signature]	



NOTE:
VERTICAL WALLS AND FLAT SLAB
MAY BE SUBSTITUTED FOR CONE
SECTION OF MANHOLE.

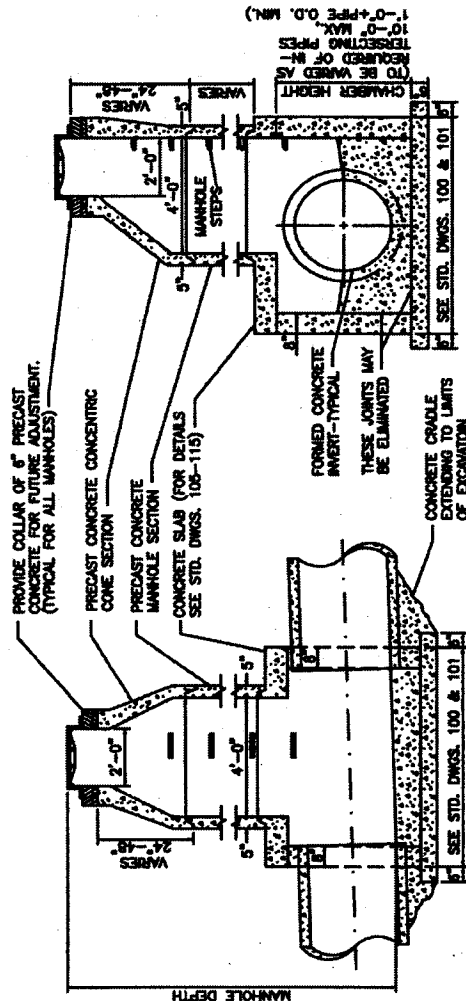
STANDARD 4'-0" DIA. & 5'-0"
CIRCULAR WALLS
(TYPE "A")



NOTE:
SEE STD. DWGS. 108-115.

CIRCULAR AND NON-CIRCULAR WALLS
(TYPE "A" & TYPE "B")

- NOTES
1. BASE SECTION OF CIRCULAR MANHOLES MAY BE CAST-IN-PLACE CONCRETE OR CUSTOM PRECAST CONCRETE WITH OPENINGS FOR PIPE.
 2. 6" OVERHANG IN BOTTOM SLAB IS NOT REQUIRED IF PRECAST MANHOLES ARE USED.
 3. FLAT SLABS IN PAVED AREAS SHALL BE USED ONLY AS APPROVED BY ENGINEER.

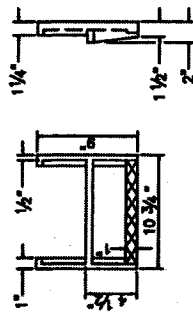


TYPICAL TRANSVERSE SECTION

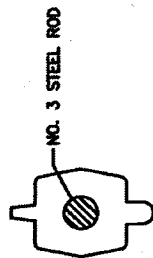
TYPICAL LONGITUDINAL SECTION

STANDARD CIRCULAR MANHOLE - 6'-0" DIAMETER & LARGER TYPE "A"
AND NON-CIRCULAR WALL MANHOLE - ALL SIZES TYPE "B"

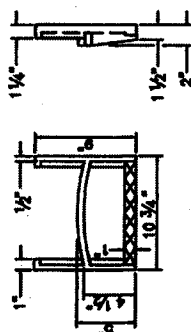
NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
STORM SEWER MANHOLE DETAILS			
DESIGNED BY	102	5/1/82	
CHECKED BY			



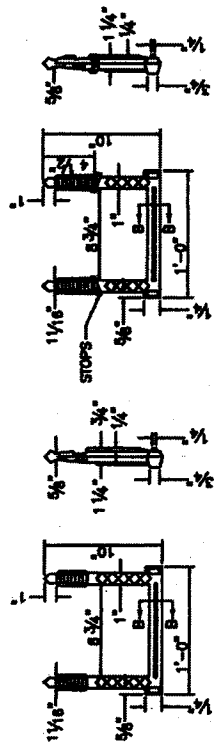
STEP TYPE NO. 1



SECTION B-B



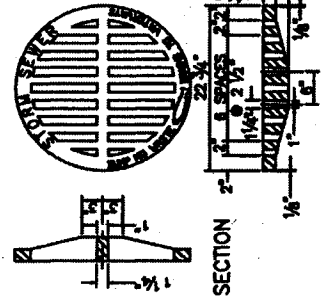
STEP TYPE NO. 2



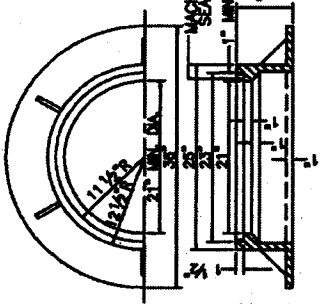
STEP TYPE NO. 3

STEP TYPE NO. 4

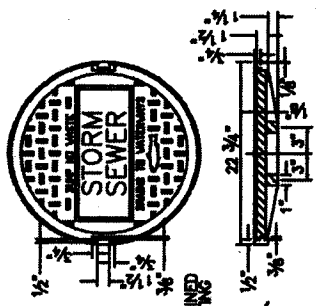
MANHOLE STEPS



GRATING COVER



FRAME



SOLID COVER

NOTES:

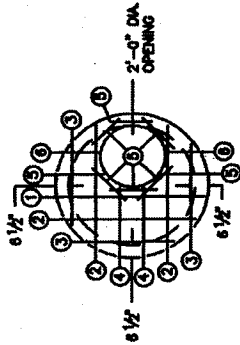
1. MINIMUM WEIGHT FOR THE 7" FRAME SHALL BE 185 LBS.
2. MINIMUM WEIGHT FOR THE SOLID COVER SHALL BE 120 LBS.
3. CASTINGS TO MEET ASTM A-48 CLASS 35.

MANHOLE FRAME AND COVERS

NOTES:

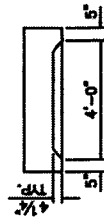
1. STEPS SHALL BE ASPHALT COATED, CAST IRON OR POLYPROPYLENE PLASTIC COATED STEEL ROD OR OF A TYPE AND SIZE APPROVED BY THE ENGINEER.
2. STEPS SHALL BE SPACED APPROXIMATELY 12" TO 16" O.C. VERTICALLY SO AS TO FORM A CONTINUOUS LADDER.
3. STEPS SHALL BE REQUIRED IN MANHOLES WHEN THE STRUCTURE IS 4 FEET AND GREATER IN DEPTH. (MEASURE FROM FLOWLINE OF LOWEST PIPE TO TOP OF STRUCTURE.)
4. THE TREADS OF ALL STEPS SHALL HAVE ANTI-SKID PROPERTIES FOR HAND AND FOOT GRIPS.
5. MANHOLE STEPS SHALL BE INSTALLED IN A VERTICAL LINE AND SHALL COMPLY WITH OSHA STANDARDS IN ALL RESPECTS.
6. FOR CAST-IN-PLACE OR PRECAST CIRCULAR AND NON-CIRCULAR MANHOLES.
7. FIRST STEP SHALL BE NO MORE THAN 18" FROM TOP OF RIM.

NO.	DATE	REVISION DESCRIBED	BY
DIVISION OF ENGINEERING			
MANHOLE FRAMES, COVERS, & STEPS			
DESIGNED DRAWN BY			
CHECKED BY			
SCALE			
PROJECT NO.			



4'-0" DIA.

SHALLOW MANHOLES



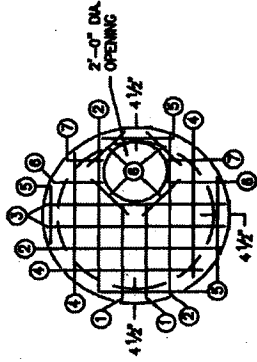
SIDE VIEW

MARKI NO.	SIZE	LENGTH	TYPE
1	4	4'-5"	STR.
2	3	4'-0"	"
3	3	2'-8"	"
4	2	2'-0"	"
5	8	1'-6"	"
6	2	1'-0"	"

NOTES:

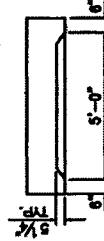
- FOR PIPE SIZES 15" TO 24".
- 9" O.C. SPACING EACH WAY.
- 8" THICK SLAB.
- 4'-10" O.D.
- 2" MIN. STEEL REINFORCEMENT COVER ALL FACES.
- CIRCULAR REBAR MAY BE USED, OR MARK 5 BARS AS SHOWN.

NOTE:
SLAB OUTER DIAMETER TO VARY WITH MANHOLE WALL THICKNESS. TO COMPLETELY COVER MANHOLE WALLS.



5'-0" DIA.

SHALLOW MANHOLES



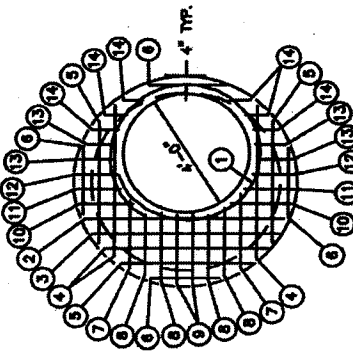
SIDE VIEW

MARKI NO.	SIZE	LENGTH	TYPE
1	2	3'-2"	STR.
2	3	5'-3"	"
3	2	5'-8"	"
4	3	4'-2"	"
5	4	2'-2"	"
6	6	1'-6"	"
7	2	1'-0"	"

NOTES:

- FOR PIPE SIZES 21" TO 33".
- 9" O.C. SPACING EACH WAY.
- 8" THICK SLAB.
- 6'-0" O.D.
- 2" MIN. STEEL REINFORCEMENT COVER ALL FACES.
- CIRCULAR REBAR MAY BE USED, OR MARK 6 BARS AS SHOWN.

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
STORM SEWER MANHOLE CIRCULAR SLABS 4'-0" & 5'-0" DIAMETER			



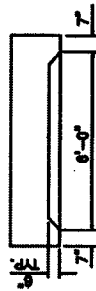
6'-0" DIA.

STANDARD MANHOLES

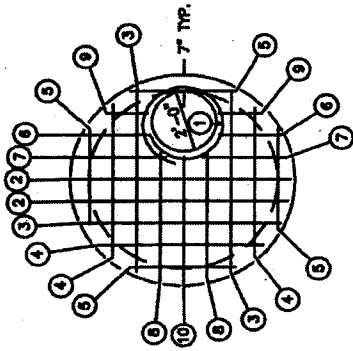
MARK NO.	SIZE	LENGTH	TYPE
1	6	15'-10"	A
2	6	6'-6"	STR.
3	1	5'-11"	-
4	3	5'-3"	-
5	3	4'-3"	-
6	4	2'-6"	-
7	2	2'-7"	-
8	4	2'-3"	-
9	2	2'-2"	-
10	2	1'-10"	-
11	2	1'-6"	-
12	2	1'-3"	-
13	4	1'-0"	-
14	6	0'-10"	-

NOTES:

- FOR PIPE SIZES 15" TO 48".
- 6" O.C. SPACING EACH WAY.
- 12" THICK SLAB.
- 7'-2" O.D.
- 2" MIN. STEEL REINFORCEMENT COVER ALL FACES.



SIDE VIEW



6'-0" DIA.

SHALLOW MANHOLES

MARK NO.	SIZE	LENGTH	TYPE
1	6	9'-6"	A ₁
2	5	6'-9"	STR.
3	3	6'-3"	-
4	3	5'-3"	-
5	4	3'-3"	-
6	2	1'-10"	-
7	2	2'-9"	-
8	2	4'-4"	-
9	2	1'-5"	-
10	1	4'-3"	-

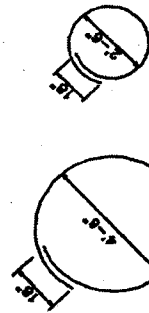
NOTES:

- FOR PIPE SIZES 15" TO 36".
- 9" O.C. SPACING EACH WAY.
- 8" THICK SLAB.
- 7'-2" O.D.
- 2" MIN. STEEL REINFORCEMENT COVER ALL FACES.



SIDE VIEW

SPECIAL BAR BENDS



NOTE:
SLAB OUTER DIAMETER TO VARY WITH MANHOLE WALL THICKNESS, TO COMPLETELY COVER MANHOLE WALLS.

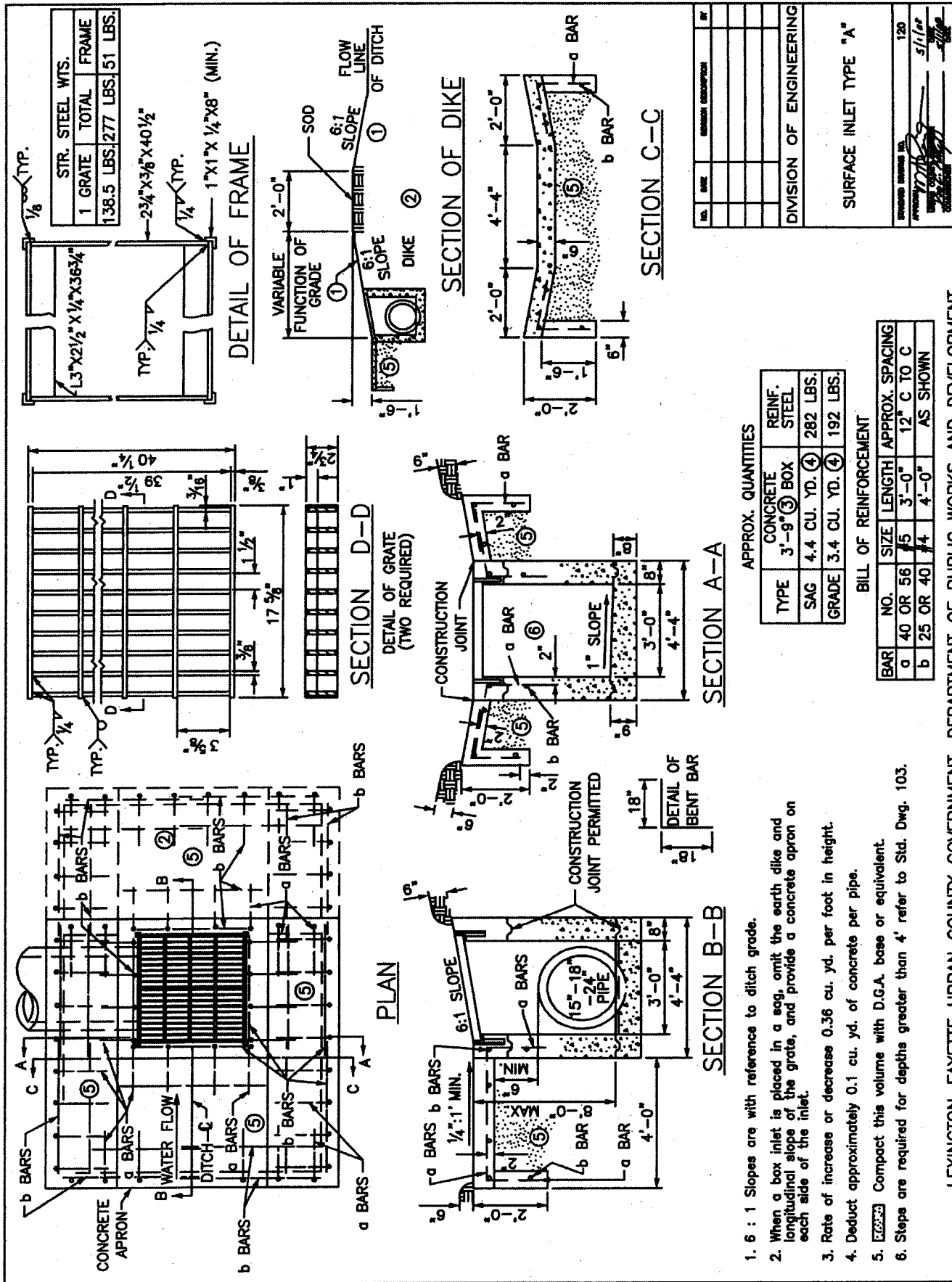
REV.	DATE	REVISION DESCRIPTION	BY

DIVISION OF ENGINEERING

STORM SEWER
MANHOLE CIRCULAR SLABS
6'-0" DIAMETER

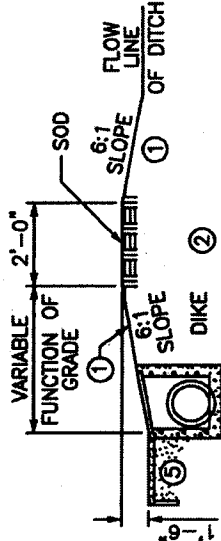
DESIGNED BY: [Signature]
CHECKED BY: [Signature]
DATE: [Signature]

105
S/1104

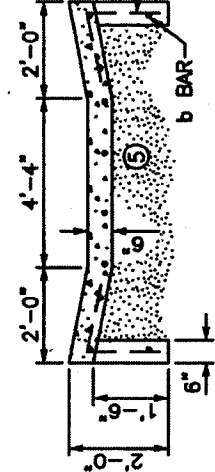


STR. STEEL WTS.	
1 GRATE	TOTAL FRAME
138.5 LBS.	277 LBS. 51 LBS.

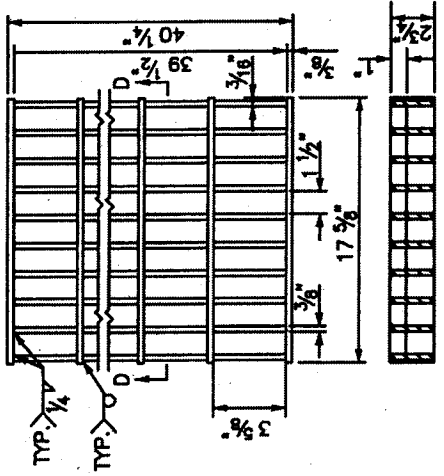
DETAIL OF FRAME



SECTION OF DIKE

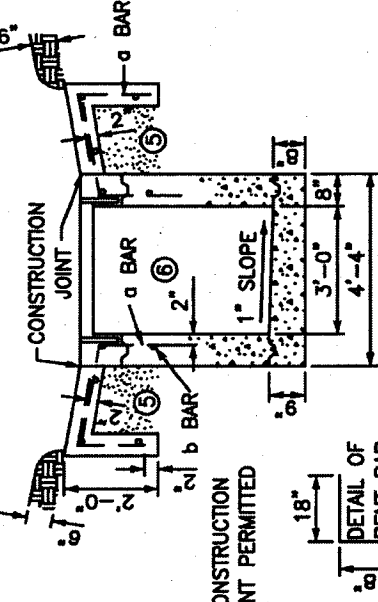


SECTION C-C

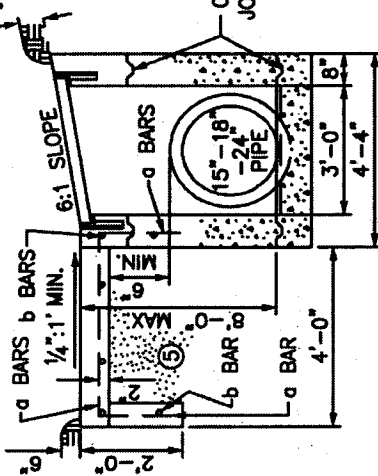


SECTION D-D

DETAIL OF GRATE (TWO REQUIRED)



SECTION A-A



SECTION B-B

APPROX. QUANTITIES

TYPE	CONCRETE	REINF. STEEL
SAG	3'-9" (3) BOX	282 LBS.
GRADE	4.4 CU. YD. (4)	192 LBS.

BILL OF REINFORCEMENT

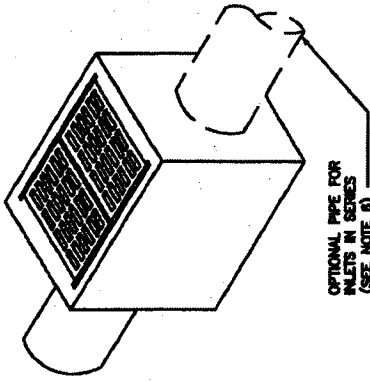
BAR	NO.	SIZE	LENGTH	APPROX. SPACING
a	40 OR 56	#5	3'-0"	12" C TO C
b	25 OR 40	#4	4'-0"	AS SHOWN

1. 6 : 1 Slopes are with reference to ditch grade.
2. When a box inlet is placed in a sag, omit the earth dike and longitudinal slope of the grate, and provide a concrete apron on each side of the inlet.
3. Rate of increase or decrease 0.36 cu. yd. per foot in height.
4. Deduct approximately 0.1 cu. yd. of concrete per pipe.
5. Compact this volume with D.G.A. base or equivalent.
6. Steps are required for depths greater than 4' refer to Std. Dwg. 103.

NO.	DATE	REVISION	DESCRIPTION
DIVISION OF ENGINEERING			
SURFACE INLET TYPE "A"			
DESIGNED BY			
CHECKED BY			
DATE			

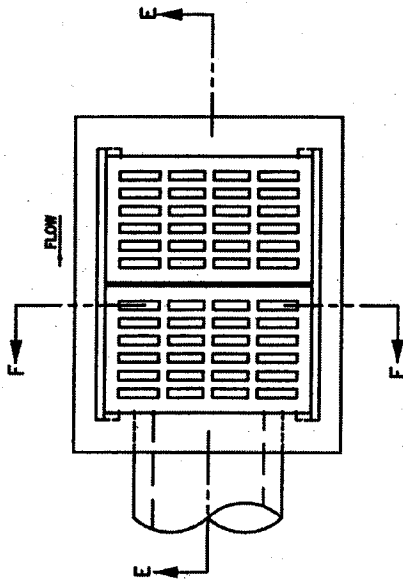
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

ISOMETRIC VIEW

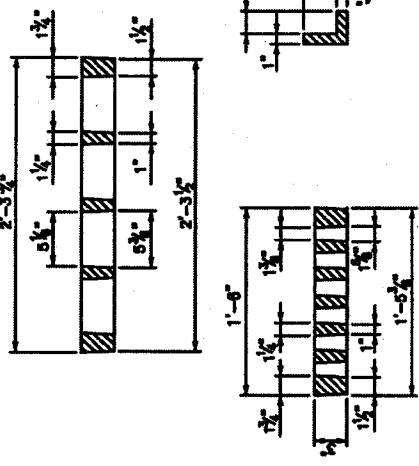


OPTIONAL PIPE FOR INLETS IN SERIES (SEE NOTE 6)

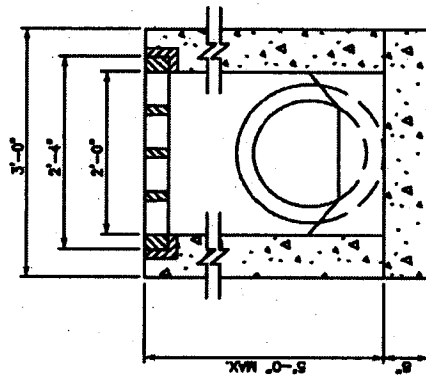
- NOTES:
1. NO. 6 STEEL SHALL BE USED THROUGHOUT ON 12" CENTERS.
 2. ALL STEEL SHALL HAVE A 2" MINIMUM CLEARANCE TO ANY CONCRETE FACE.
 3. NO STEEL IS REQUIRED IN THE BOTTOM SLAB.
 4. ALL VERTICAL STEEL SHALL EXTEND 4" INTO BOTTOM SLAB.
 5. FOR USE IN PAIRED AREAS ONLY.
 6. PROVIDE MINIMUM 0.1' SLOPE THROUGH STRUCTURE FOR PIPES IN SERIES. CARRY THROUGH THROUGH. ONLY STRAIGHT THROUGH CONNECTIONS ARE ALLOWED.



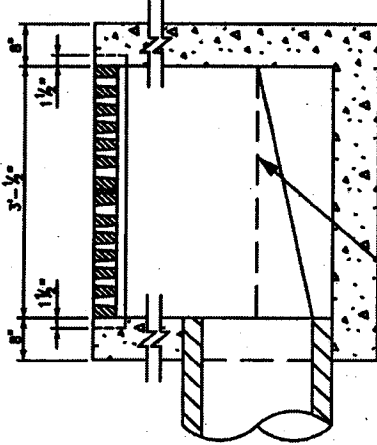
PLAN VIEW



GRATE DETAILS



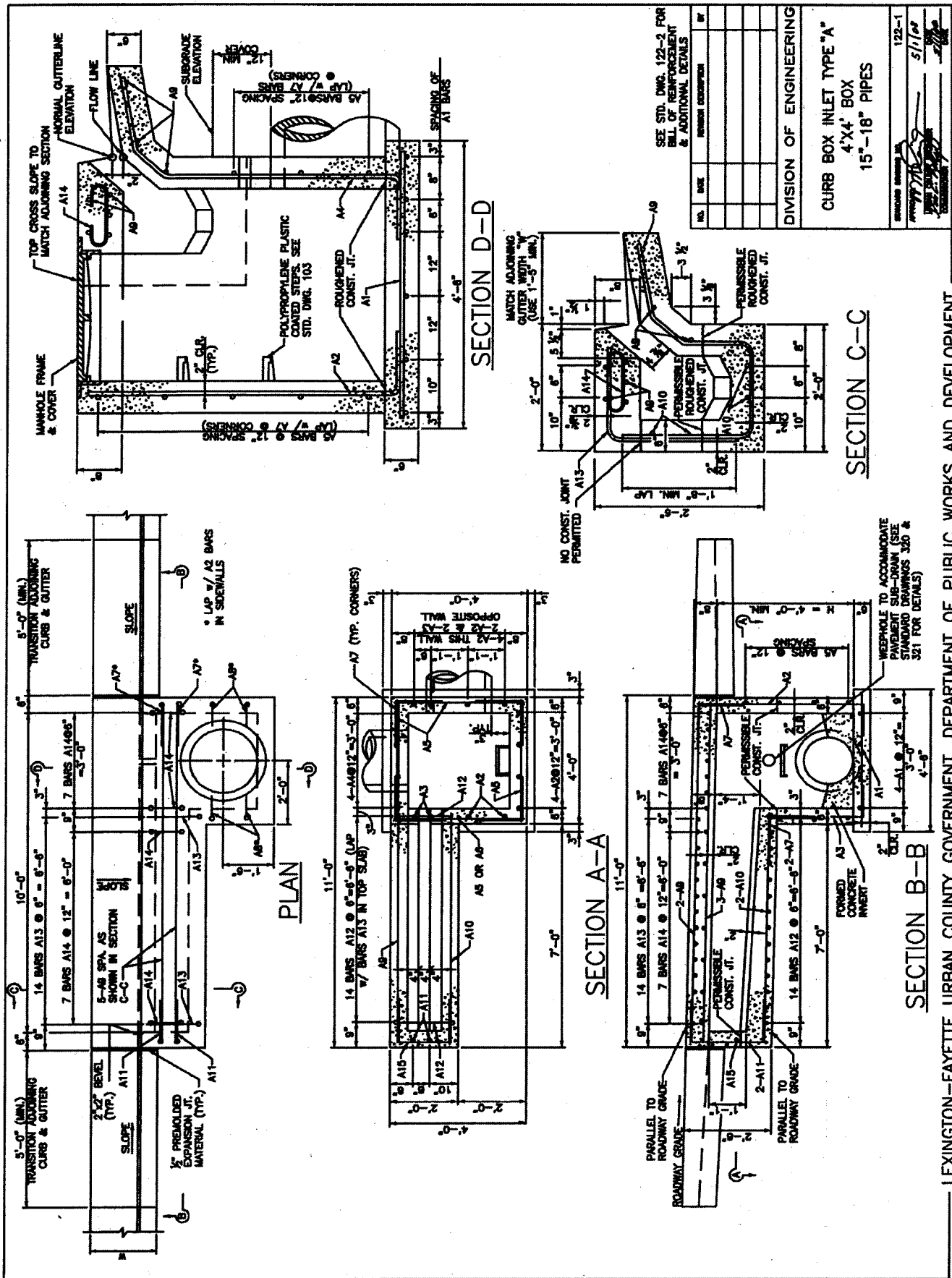
SECTION F-F



SECTION E-E

TOP OF BENCH IF PIPE RUNS STRAIGHT THROUGH INLET

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
SURFACE INLET TYPE "B"			
DESIGNED BY			
CHECKED BY			
DATE			



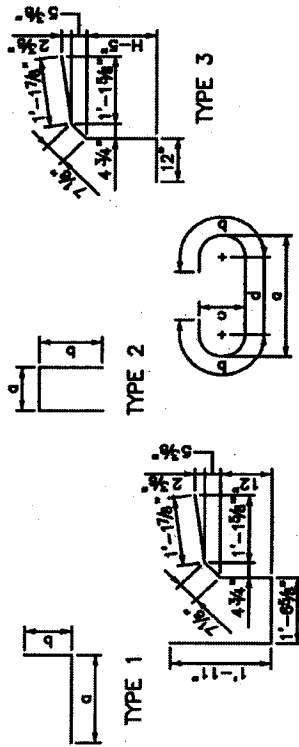
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

BILL OF REINFORCEMENT

NO.	Q ₁	Q ₂	Q ₃	LENGTH		LOCATION	g	b	c	d
				FT.	IN.					
A1	STR	#5	10	4	2	FOOTING				
A2	1	#5	10	H-(1'-10")		CHAMBER WALLS	1	0	H-10"	
A3	1	#5	2	H-4"		CHAMBER WALLS	1	0	H-(1'-4")	
A4	3	#5	4	H+(2'-4")		CHAMBER FRONT WALL				
A5	STR	#5	15*	3	8	CHAMBER WALLS				
A6	STR	#5	2	2	2	CHAMBER ABOVE THROAT				
A7	1	#5	19*	2	8	CORNERS	1	4	1	4
A8	1	#5	4	2	1	CHAMBER WALLS & TOP	1	4	0	9
A9	STR	#5	8	10	8	TOP SLAB & APRON				
A10	STR	#5	4	7	2	THROAT				
A11	2	#5	2	4	8	THROAT	2	1 1/8	1	4
A12	4	#5	14	6	1	THROAT & APRON				
A13	1	#5	14	3	5	THROAT	1	11	1	6
A14	5	#5	14	1	11	TOP SLAB	0	11 1/2	0	7
A15	2	#5	1	4	2	END THROAT	1	6	1	4

* NO. OF BARS REQUIRED FOR H=4'-0"
 ADD OR DEDUCT 4-A5 & 4-A7 FOR EACH 1'-0" INCREASE OR DECREASE IN H.

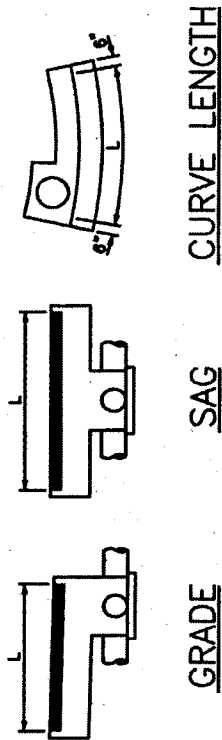
BAR TYPES



NOTES:

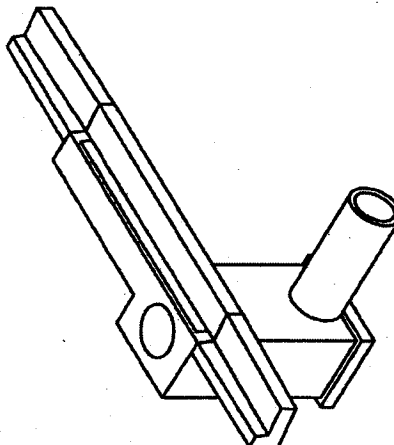
- CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3000 P.S.I. STEEL REINFORCEMENT SHALL BE ASTM A-615, GRADE 60. ALL EXPOSED EDGES SHALL BE BEVELED 3/4" UNLESS OTHERWISE SHOWN.
- THIS DRAWING DEPICTS A CURB BOX INLET IN A GRADE SITUATION. FOR CURB BOX INLET IN SAG SITUATION, DETAILS SHALL BE MODIFIED AS INDICATED IN DETAIL 'A'.
- THE STANDARD OPENING LENGTH IS 10'-0" AS DETAILED HERE. THIS LENGTH MAY BE INCREASED OR DECREASED BASED ON HYDRAULIC ANALYSIS AND APPROVAL BY THE LEXINGTON-FAYETTE COUNTY URBAN GOVERNMENT ENGINEER. MODIFICATION TO THE OPENING LENGTH WILL REQUIRE MODIFICATION OF LENGTH OF BARS A5 & A10 AND INCREASE OR DECREASE IN NUMBER OF BARS A12, A13 & A14 MAINTAINING THE SAME MAXIMUM SPACING SHOWN ON THIS DRAWING.
- MAXIMUM "H" FOR APPLICATION OF THIS DRAWING SHALL BE 10 FEET.
- FIELD BEND OR CUT BARS A2, A4, AND A6 AS NECESSARY WHERE PIPES PENETRATE CHAMBER WALLS.
- FOR CURB BOX INLET IN CURVE WITH CURB RADIUS OF LESS THAN 25', LONGITUDINAL BARS A6, A10 SHALL BE SHOP FABRICATED RADIALLY.

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT



DETAIL 'A'

APPLICABLE SITUATIONS



ISOMETRIC VIEW

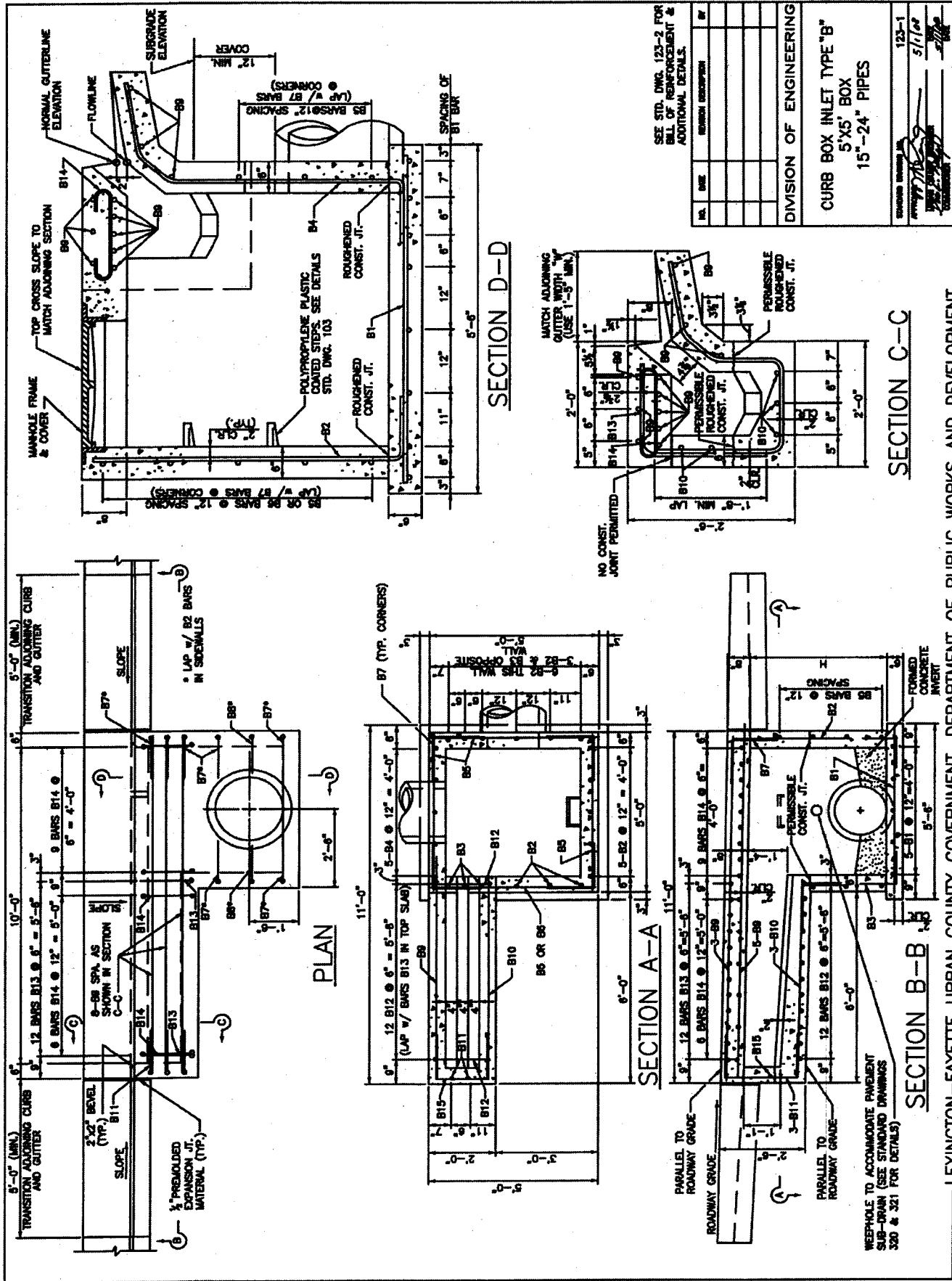
WORK THIS DWG. WITH STD. DWG. 122-1

NO.	DATE	REVISION

DIVISION OF ENGINEERING

CURB BOX INLET TYPE "A"
 4'x4' BOX
 15'-18" PIPES

122-2
 5/1/02



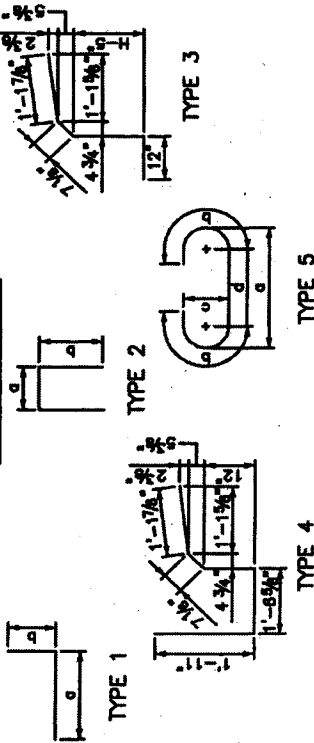
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

BILL OF REINFORCEMENT

MARK	TYPE	QZ	LENGTH		LOCATION	g	b	c	d
			FT.	IN.					
B1	STR	#5	13	5	FOOTING				
B2	1	#5	H+(1'-10")		CHAMBER WALLS	1	0	H-10"	
B3	1	#5	H-4"		CHAMBER WALLS	1	0	H-(1'-4")	
B4	3	#5	H+(2'-4")		CHAMBER FRONT WALL				
B5	STR	#5	15*	4	CHAMBER WALLS				
B6	STR	#5	2	3	CHAMBER ABOVE THROAT				
B7	1	#5	25*	2	CORNERS	1	4	1	4
B8	1	#5	2	2	CHAMBER WALLS & TOP	1	4	1	2
B9	STR	#5	11	10	TOP SLAB & APRON				
B10	STR	#5	5	6	THROAT				
B11	2	#5	3	4	THROAT	2	1 1/2	1	4
B12	4	#5	12	6	THROAT & APRON				
B13	1	#5	12	3	THROAT	1	11	1	6
B14	5	#5	15	2	TOP SLAB	1	5	0	7
B15	2	#5	1	4	END THROAT	1	6	1	4

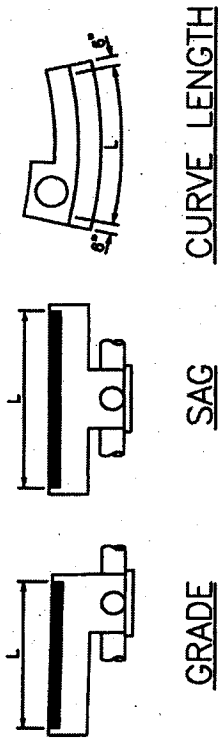
* NO. OF BARS REQUIRED FOR H=4'-0"
ADD OR DEDUCT 4-B5 & 4-B7 FOR EACH 1'-0" INCREASE OR DECREASE IN H.

BAR TYPES

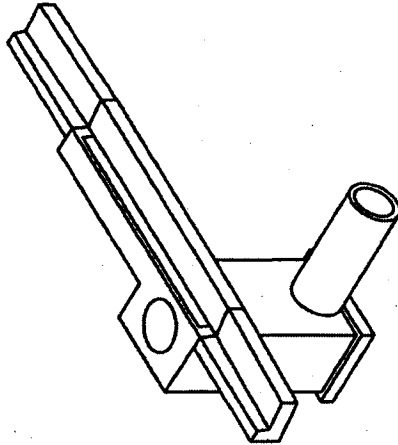


NOTES:

- CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3500 PSI. STEEL REINFORCEMENT SHALL BE ASTM A-615, GRADE 60. ALL EXPOSED EDGES SHALL BE BEVELED 3/4" UNLESS OTHERWISE SHOWN.
- THIS DRAWING DEPICTS A CURB BOX INLET IN A GRADE SITUATION. FOR CURB BOX INLET IN SAG SITUATION, DETAILS SHALL BE MODIFIED AS INDICATED IN DETAIL "A".
- THE STANDARD OPENING LENGTH IS 10'-0" AS DETAILED HERE. THIS LENGTH MAY BE INCREASED OR DECREASED BASED ON HYDRAULIC ANALYSIS AND APPROVAL BY THE LEXINGTON-FAYETTE COUNTY URBAN GOVERNMENT ENGINEER. MODIFICATION TO THE OPENING LENGTH WILL REQUIRE MODIFICATION OF LENGTH OF BARS B8 & B10 AND INCREASE OR DECREASE IN NUMBER OF BARS B12, B13 & B14 MAINTAINING THE SAME MAXIMUM SPACING SHOWN ON THIS DRAWING.
- MAXIMUM "H" FOR APPLICATION OF THIS DRAWING SHALL BE 10 FEET.
- FIELD BEND OR CUT BARS B2, B4, AND B5 AS NECESSARY WHERE PIPES PENETRATE CHAMBER WALLS.
- FOR CURB BOX INLET IN CURVE WITH CURB RADIUS OF LESS THAN 25', LONGITUDINAL BARS B8, B10 SHALL BE SHOP FABRICATED RADUALLY.
- 30" PIPE MAY BE APPROVED IF BOTH PIPES ARE INSTALLED ON THE SAME LINE.



GRADE
SAG
CURVE LENGTH

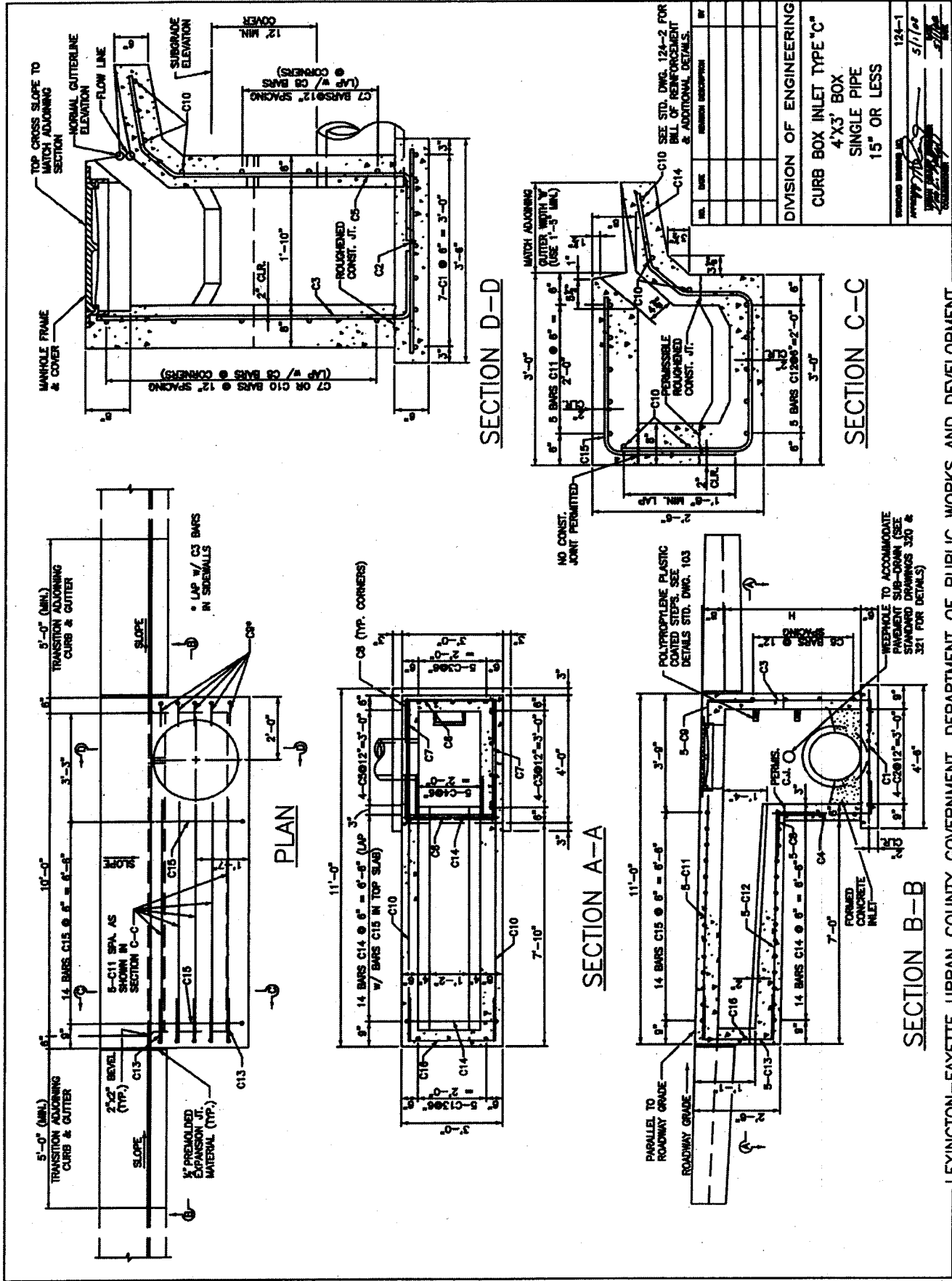


ISOMETRIC VIEW

WORK THIS DWG. WITH STD. DWG. 123-1

REV.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
CURB BOX INLET TYPE "B" 5'X5' BOX 15"-24" PIPES			
DESIGNED BY			123-2
CHECKED BY			

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

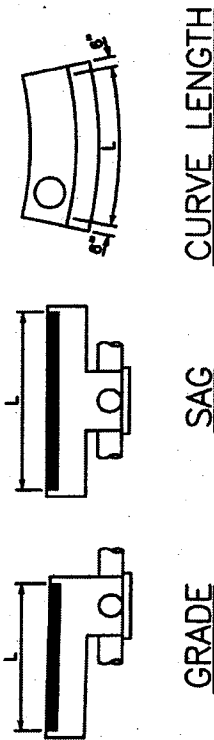
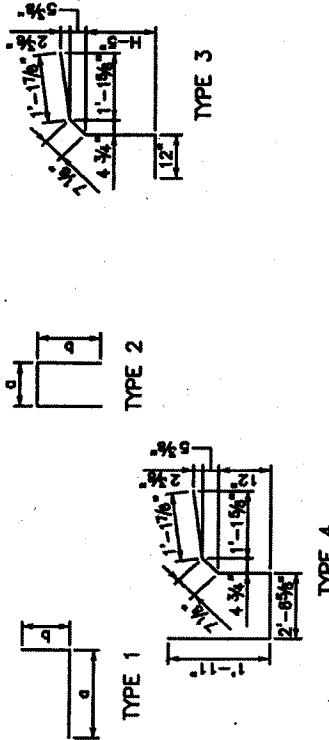


BILL OF REINFORCEMENT

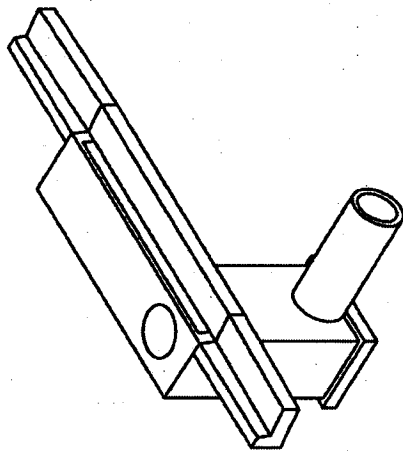
MARK	TYPE	QZ	SIZE	LENGTH		LOCATION		g	b	c	d
				FT.	IN.	FT.	IN.				
C1	STR	#5	7	4	2	FOOTING					
C2	STR	#5	4	3	2	FOOTING					
C3	1	#5	9	H+(1'-10")		CHAMBER WALLS	1	0	H+10"		
C4	3	#5	5	H+(2'-4")		CHAMBER WALLS	1	0	H+(1'-4")		
C5	STR	#5	7	2	8	CHAMBER WALLS					
C6	STR	#5	9	3	8	CHAMBER WALLS					
C7	STR	#5	19*	2	8	CORNERS	1	4	1	4	
C8	1	#5	5	2	1	CHAMBER WALLS & TOP	1	4	0	9	
C9	STR	#5	5	10	8	THROAT & APRON					
C10	STR	#5	5	7	7	TOP SLAB					
C11	STR	#5	5	7	2	THROAT					
C12	STR	#5	5	4	8	END THROAT	2	1	1	4	
C13	2	#5	14	7	1	THROAT & APRON					
C14	1	#5	14	4	5	THROAT	1	11	2	6	
C15	2	#5	1	5	1	END THROAT	2	8	1	4	

* NO. OF BARS REQUIRED FOR H=4'-0"
ADD OR DEDUCT 2-C6, 2-C7 & 4-C8 FOR EACH 1'-0" INCREASE OR DECREASE IN H.

BAR TYPES



DETAIL 'A'
APPLICABLE SITUATIONS



ISOMETRIC VIEW

WORK THIS DWG. WITH STD. DWG. 124-1

NO.	DATE	REVISION

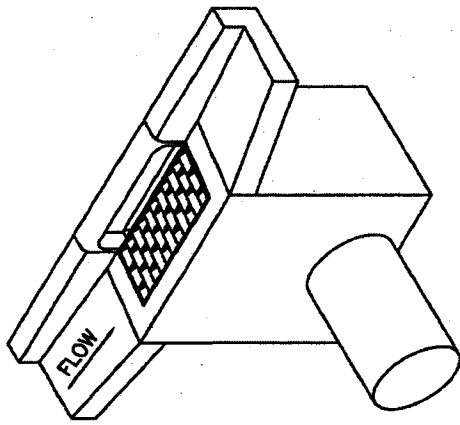
DIVISION OF ENGINEERING

CURB BOX INLET TYPE "C"
4'X3' BOX
SINGLE PIPE
15" OR LESS

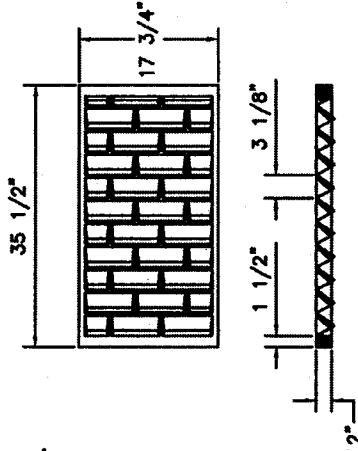
124-2
5/1/68

- NOTES:
1. CONCRETE SHALL HAVE A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 3500 PSI. STEEL REINFORCEMENT SHALL BE ASTM A-615, GRADE 60. ALL EXPOSED EDGES SHALL BE BEVELED 3/4" UNLESS OTHERWISE SHOWN.
 2. THIS DRAWING DEPICTS A CURB BOX INLET IN A GRADE SITUATION. FOR CURB BOX INLET IN SAG SITUATION, DETAILS SHALL BE MODIFIED AS INDICATED IN DETAIL 'A'.
 3. THE STANDARD OPENING LENGTH IS 10'-0" AS DETAILED HERE. THIS LENGTH MAY BE INCREASED OR DECREASED BASED ON HYDRAULIC ANALYSIS AND APPROVAL BY THE LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT ENGINEER. MODIFICATION TO THE OPENING LENGTH WILL REQUIRE MODIFICATION OF LENGTH OF BARS C10, C11 & C12 AND INCREASE OR DECREASE IN NUMBER OF BARS C14 & C15 MAINTAINING THE SAME MAXIMUM SPACING SHOWN ON THIS DRAWING.
 4. MAXIMUM "H" FOR APPLICATION OF THIS DRAWING SHALL BE 5 FEET.
 5. FIELD BEND OR CUT BARS C3, C5, C6 & C7 AS NECESSARY WHERE PIPES PENETRATE CHAMBER WALLS.
 6. FOR CURB BOX INLET IN CURVE WITH CURB RADIUS OF LESS THAN 25', LONGITUDINAL BARS C10, C11 & C12 SHALL BE SHOP FABRICATED RADIALLY.

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT



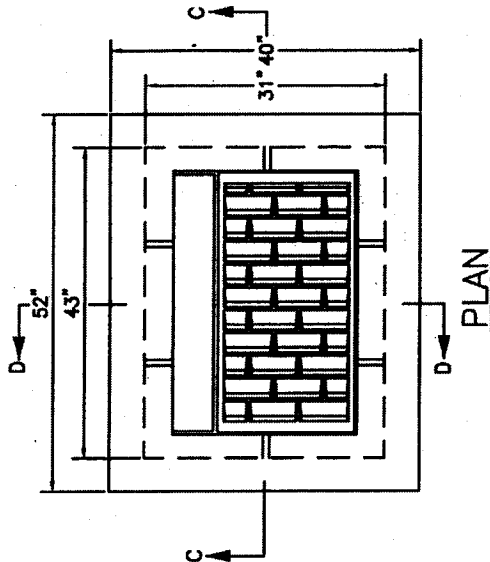
ISOMETRIC VIEW



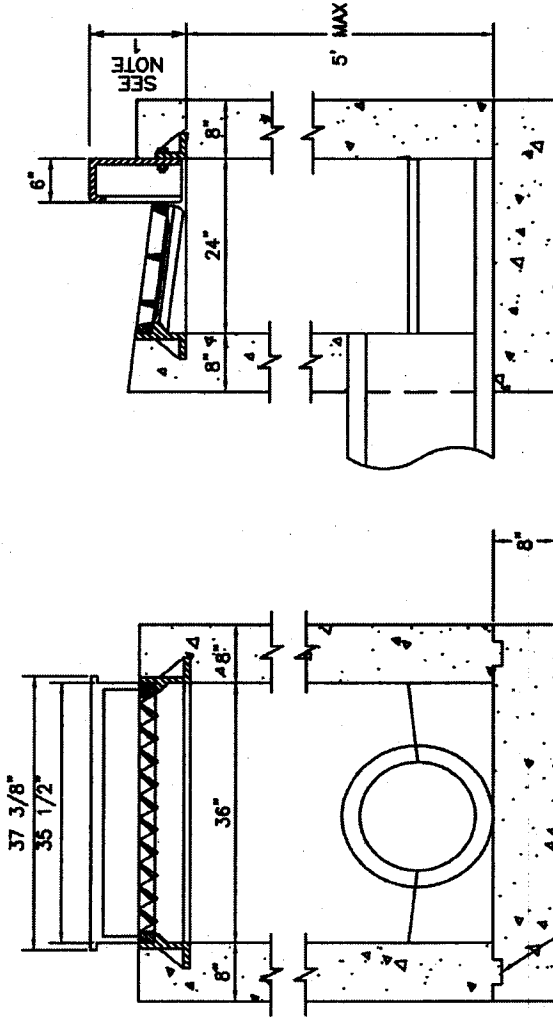
GRATE DETAIL

NOTES:

1. CURB BOX ADJUSTABLE 6" TO 9" TO MATCH TOP OF CURB.
2. NO. 5 STEEL SHALL BE USED THROUGHOUT ON 12" CENTERS. 2" CLEARANCE ON ALL EXTERIOR WALL BARS. EXTERIOR HORIZ. WALL BARS SHALL HAVE A 12" MIN. LAP AT CORNERS.
3. ALL EXPOSED FLATWORK SHALL HAVE A HAND FLOATED AND BROOMED FINISH.
4. NO STEEL IS REQUIRED IN BOTTOM SLAB.
5. ALL VERTICAL STEEL SHALL EXTEND 4" INTO BOTTOM SLAB. VERTICAL STEEL SHALL HAVE A 12" LAP INTO BOTTOM SLAB WITH 3" CLEARANCE FROM EXTERIOR BOTTOM.
6. SET BACK OF FRAME IN CONCRETE TO ANCHOR IN PLACE AFTER IT HAS BEEN ADJUSTED.
7. 18" MAX. PIPE DIAMETER.
8. EAST JORDAN IRON WORKS CATCH BASIN CURB INLET 7035 WITH TYPE M6 GRATE OR EQUIVALENT.



PLAN

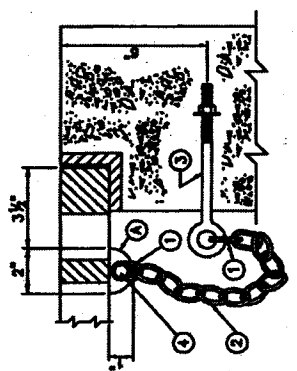


2"x4" KEY AT CONSTRUCTION JOINTS

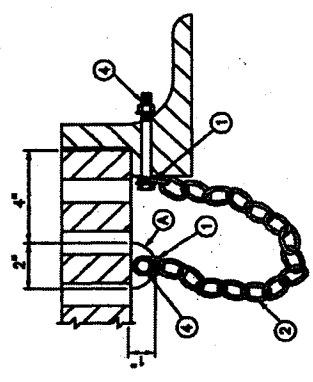
SECTION C-C

SECTION D-D

NO.	DATE	REVISION
DIVISION OF ENGINEERING		
CURB BOX INLET TYPE "D"		
DESIGNED BY	125	
CHECKED BY	5/1/68	



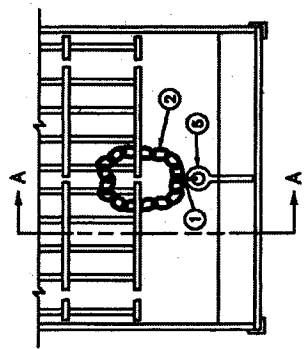
GRATE CONNECTED TO WALL



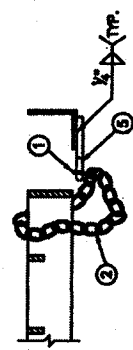
GRATE CONNECTED TO FRAME

TYPICAL ILLUSTRATIONS FOR CASTINGS

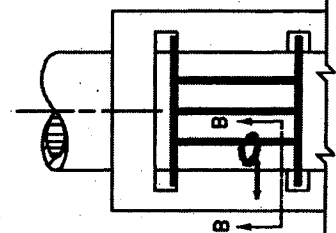
- NOTES**
1. CHAIN SHACKLE, OR COLD SHUT OF AN APPROVED TYPE.
 2. 3/4" PROOF COIL CHAIN OF SUFFICIENT LENGTH TO ALLOW REMOVAL AND DISPLACEMENT OF GRATE, 18" MIN.
 3. 3/4" x 6" EYE BOLT, NUT, AND WASHER.
 4. 3/4" HEX HEAD CAP SCREW (GRADE 2), NUT AND WASHERS. LENGTH DETERMINED BY THICKNESS OF FRAME OR GRATE.
 5. 7/16" DIA. HOLE FOR CAP SCREW. BATTER THREADS ON CAP SCREW TO PREVENT REMOVAL OF NUT.
 6. 3/4" EYE BOLT (LENGTH DETERMINED BY THE FRAME DIMENSION).
 7. ALL EYE BOLTS SHALL HAVE A CONTINUOUS OR SOLID EYE.
 8. ALL HARDWARE SHALL BE GALVANIZED AND OF COMMERCIAL QUALITY AND SHALL BE APPROVED BY THE ENGINEER.
 9. THE COST OF THE COMPLETE SECURITY DEVICE, INSTALLED, SHALL BE INCIDENTAL TO THE COST OF THE STRUCTURE.
 10. THE DESIGNS SHOWN ARE ACCEPTABLE; HOWEVER ARE SUBJECT TO CHANGE IF APPROVED IN WRITING BY THE ENGINEER.



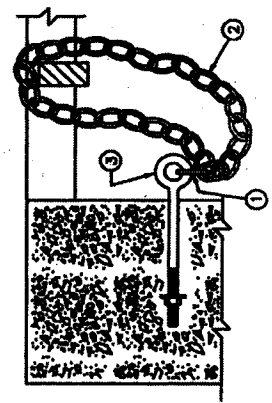
PLAN VIEW



SECTION A-A
GRATE CONNECTED TO FRAME

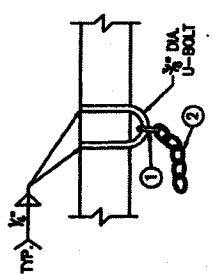


PLAN VIEW

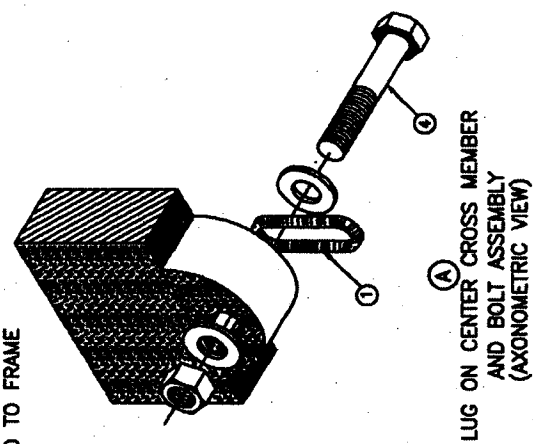


SECTION B-B

GRATE CONNECTED TO WALL



ALTERNATE FOR
STRUCTURAL STEEL
MEMBERS

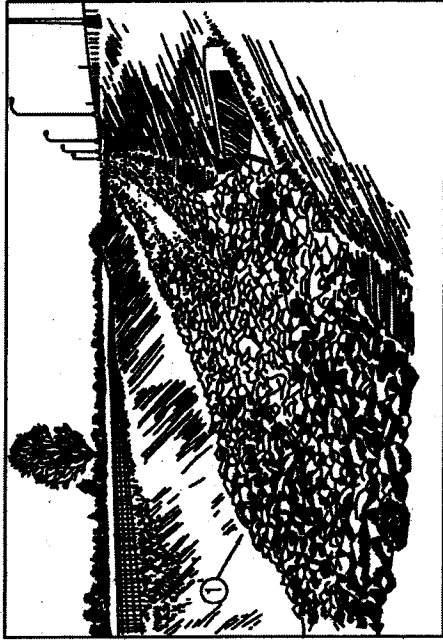
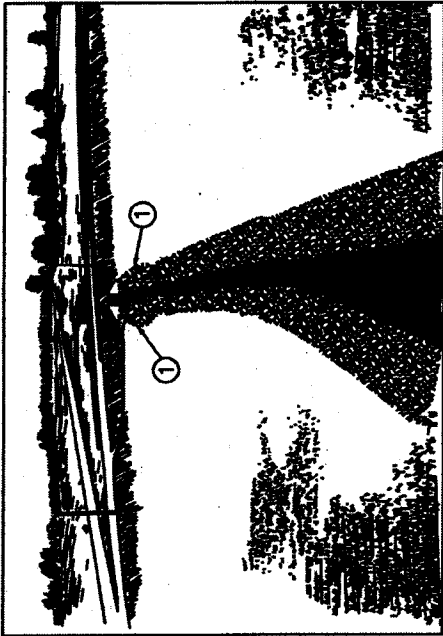


(A)
LUG ON CENTER CROSS MEMBER
AND BOLT ASSEMBLY
(AXONOMETRIC VIEW)

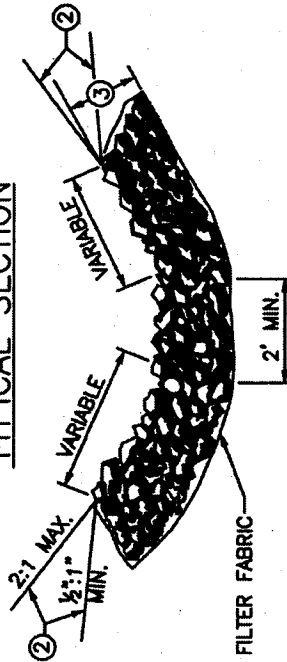
NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
SECURITY DEVICES FOR FRAMES AND GRATES			
DESIGNED BY	S. J. JARVIS		
CHECKED BY	S. J. JARVIS		
DATE	12/28		

TYPICAL ILLUSTRATIONS FOR STRUCTURAL STEEL UNITS

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT



TYPICAL SECTION



- NOTES:
1. AGGREGATE CHANNEL LINING WILL NOT BE REQUIRED IN THE BOTTOM OF THE DITCH WHERE SOLID ROCK IS ENCOUNTERED. SIDE SLOPES SHALL BE LINED.
 2. AGGREGATE ESTIMATED ON THE BASIS OF 0.50 TON/SQ. YD. PER FOOT OF DEPTH.
- SHEET NOTES:
1. WIDTH CHANNEL LINING AT STRUCTURES TO PREVENT EROSION.
 2. ALTERNATE LOCATION OF GROUNDLINE.
 3. MINIMUM DEPTH OF CHANNEL LINING SHALL BE 24". LESSER DEPTHS SHALL HAVE APPROVAL FROM THE ENGINEER. STONE SHALL BE WELL GRADED SO THAT OPENINGS BETWEEN LARGER STONES ARE FILLED WITH SMALLER STONES.

SHEET 1 OF 2

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
AGGREGATE CHANNEL LINING			
PROJECT NUMBER	130-1		
DATE	5/1/04		
DESIGNED BY			
CHECKED BY			

NOTES:

1. BEDDING MATERIAL SHOULD NOT BE SMALLER THAN KNOT NO. 2 COARSE AGGREGATE STONE. THE REQUIREMENTS FOR KNOT NO. 2 COARSE AGGREGATE STONE ARE AS FOLLOWS:

SEWE SIZE (INCHES)	PERCENT PASSING
3 1/2	100
2 1/2	70-85
1 1/2	0-10

2. BEDDING SHOULD BE AT LEAST THREE INCHES AND SPREAD UNIFORMLY.
3. PLASTIC FILTER FABRIC MAY BE USED IN PLACE OF OR IN CONJUNCTION WITH GRAVEL FILTERS. THE FOLLOWING PARTICLE SIZE RELATIONSHIPS MUST EXIST:

A. FOR FILTER FABRIC ADJACENT TO GRANULAR MATERIALS CONTAINING 50 PERCENT OR LESS (BY WEIGHT) OF FINE PARTICLES (LESS THAN 0.074 mm):

- 1.) D (PARTICLE DIAMETER) 85 BASE (mm) > 1
EOS* FILTER FABRIC (mm)

- 2.) TOTAL OPEN AREA OF FILTER IS LESS THAN 36 PERCENT.
- B. FOR FILTER FABRIC ADJACENT TO ALL OTHER SOILS:
 - 1.) EOS* LESS THAN U.S. STANDARD SIEVE NO. 70
 - 2.) TOTAL OPEN AREA OF FILTER IS LESS THAN 10 PERCENT.
4. NO FILTER FABRIC SHOULD BE USED WITH LESS THAN 4 PERCENT OPEN AREA OR AN EOS* LESS THAN U.S. STANDARD SIEVE NO. 100.
5. *EOS - EQUIVALENT OPENING SIZE TO A U.S. STANDARD SIEVE SIZE.
6. THE FOLLOWING CHART SHOWS HOW TO DETERMINE THE DIAMETER OF STONE IN RELATION TO DESIGN VELOCITY.

VELOCITY (FEET/SECOND)	STONE DIAMETER (INCHES)
4	2 1/2
6	5
8	9
10	14

SHEET 2 OF 2	
NO.	REVISION DESCRIPTION
DIVISION OF ENGINEERING	

AGGREGATE
CHANNEL LINING

DESIGNED BY	130-2
CHECKED BY	5/1/68
DATE	5/1/68
SCALE	AS SHOWN

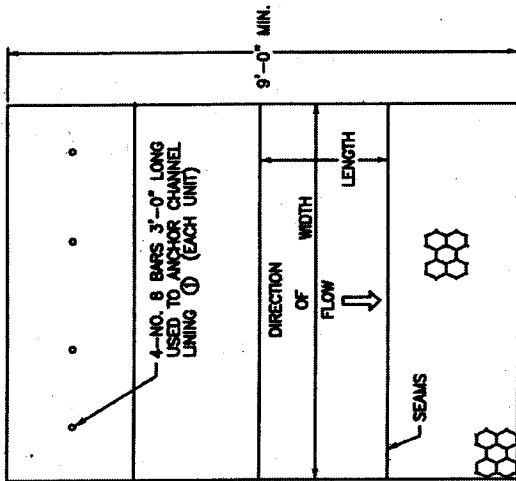
LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

SHEET NOTES: O

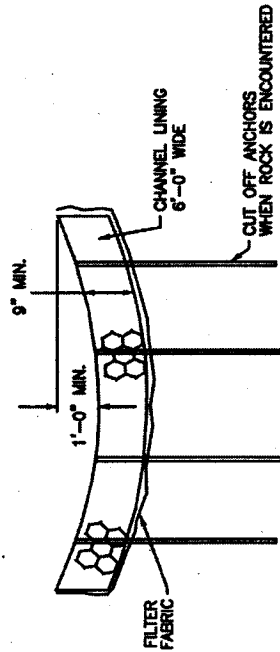
① ANCHORS REQUIRED WHEN LINING IS PLACED ON 5% GRADE OR GREATER.

NOTES:

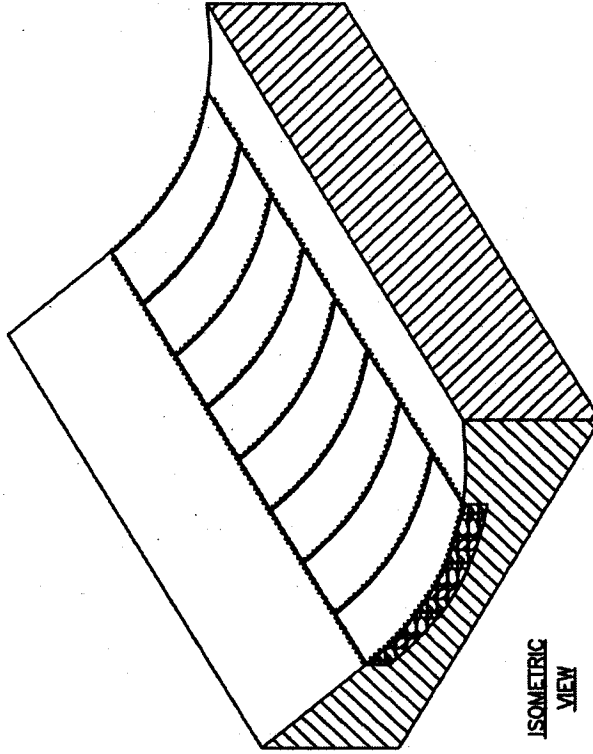
1. SECURE THE LACING WIRE AT THE CORNER OF THE BASKET BY LOOPING AND TWISTING CONTINUE LACING THROUGH-OUT WITH DOUBLE LOOPS AT APPROXIMATELY 5 INCH INTERVALS. EACH UNIT SHALL CONSIST OF LININGS SUPPLIED IN WIDTHS OF 6'-0" AS SHOWN AND LENGTHS IN MULTIPLES OF 3'-0".
2. AGGREGATE ESTIMATED ON THE BASIS OF 0.375 TONS PER SQ. YD.
3. MATTRESS SHALL BE MANUFACTURED FROM WIRE WITH A MINIMUM TENSILE STRENGTH OF 40,000 PSI.
4. STONE SIZE PER MANUFACTURER SPECIFICATIONS.



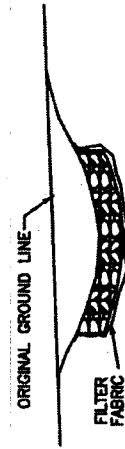
PLAN



ELEVATION



ISOMETRIC VIEW

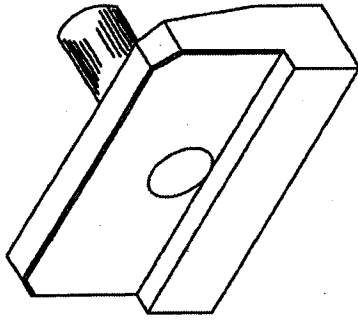


NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
MATTRESS CHANNEL LINING			
DESIGNED BY			
CHECKED BY			
DATE			

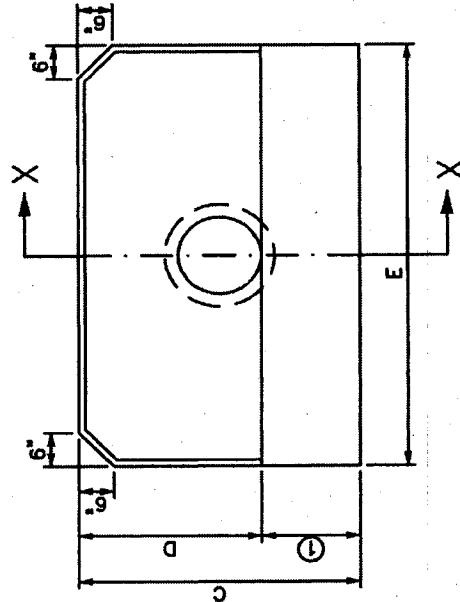
HEADWALL TYPE	DIA. OF PIPE	HEADWALL DIMENSIONS				
		A	B	C	D	E
④ STANDARD	15"	1'-8 1/2"	1'-2 1/4"	4'-3"	2'-9"	6'-9"
	18"	1'-9"	1'-3"	4'-6"	3'-0"	7'-6"
	21"	1'-9 1/2"	1'-3 1/2"	4'-9"	3'-3"	8'-3"
	24"	1'-10"	1'-4"	5'-0"	3'-6"	9'-0"
	27"	1'-10 1/2"	1'-4 1/2"	5'-3"	3'-9"	9'-9"
⑤ RAISED	15"	1'-8 1/2"	1'-2 1/2"	4'-9"	3'-3"	8'-3"
	18"	1'-9"	1'-3"	5'-0"	3'-6"	9'-0"
	21"	1'-9 1/2"	1'-3 1/2"	5'-3"	3'-9"	9'-9"
	24"	1'-10"	1'-4"	5'-6"	4'-0"	10'-6"
	27"	1'-10 1/2"	1'-4 1/2"	5'-9"	4'-3"	11'-3"

NOTES:

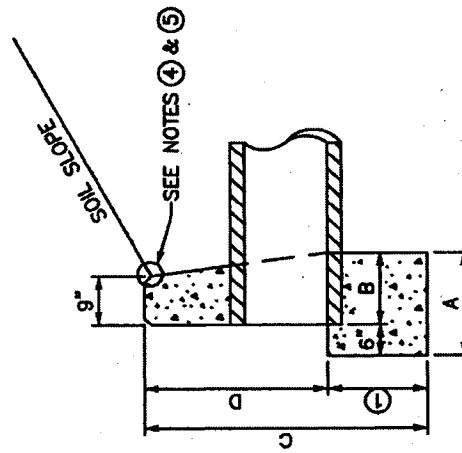
- ① HEIGHT OF FOOTER SHALL BE 18" FOR SOIL AND 12" IN ROCK.
2. ALL EXPOSED EDGES TO BE CHAMFERED 3/4".
3. ALL EXPOSED SURFACES TO HAVE A RUBBED FINISH.
- ④ STANDARD HEADWALLS ARE FLUSH WITH SOIL FILL.
- ⑤ RAISED HEADWALLS PROTRUDE 6" ABOVE SOIL FILL.
6. CHAIN LINK FENCE IS REQUIRED ON ALL HEADWALLS WHEN VERTICAL FACE 'D' IS GREATER THAN 30".



ISOMETRIC VIEW

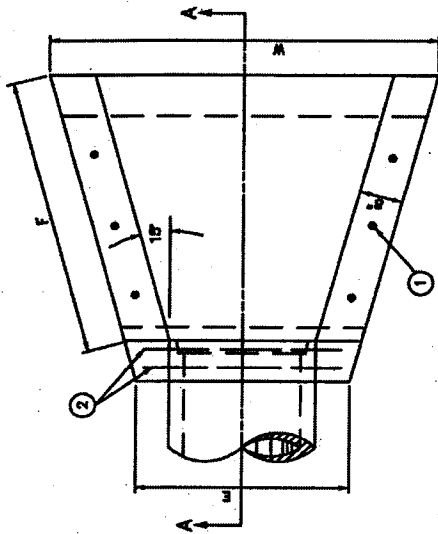


PLAN ELEVATION

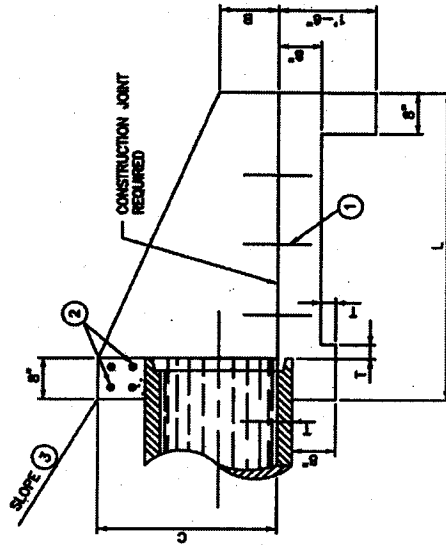


SECTION X-X

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
STRAIGHT HEADWALLS			
PROJECT NUMBER	150		
DATE	5/1/82		



PLAN VIEW



SECTION A-A

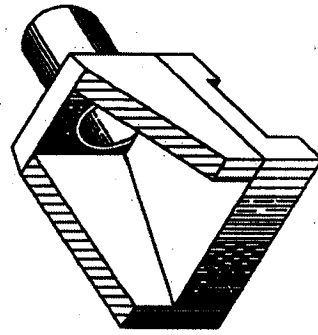
PIPE DIA.	DIMENSIONS							CLASS A CONC.	CY.	T	REIN. STEEL LBS.
	B	C	E	F	L	W					
15"	0'-7 1/2"	2'-0"	2'-8"	3'-5 3/4"	4'-0"	4'-10 3/4"	2 1/4"	0.80	10		
18"	0'-8"	2'-3"	3'-0"	3'-11 1/4"	4'-6"	5'-4 1/4"	2 1/2"	0.87	11		
21"	0'-10 1/2"	2'-6"	3'-3"	4'-5 1/4"	5'-0"	5'-11 1/8"	2 3/4"	1.17	12		
24"	1'-0"	2'-8"	3'-6"	5'-0"	5'-6"	6'-5 3/8"	3"	1.36	12		
27"	1'-1 1/2"	3'-0"	3'-8"	5'-0 3/4"	6'-0"	6'-11 1/8"	3 1/4"	1.82	13		

SHEET NOTES:

- ① 8 #4 x 1'-0" DOWELS
- ② 4 #4 x (T" DIMENSION MINUS 4')
- ③ SLOPE SHALL BE WAPPED TO FIT HEADWALL WHEN PIPE IS SKEWED AND / OR NORMAL SLOPE VARIES FROM 2%.

NOTES:

- 1. REINFORCING STEEL MINIMUM GRADE 40, EVENLY SPACED (MIN. SPACING 12" O.C.)
- 2. VOLUME COMPUTED BY PIPE COMPUTED USING INSIDE DIAMETER OF PIPE.
- 3. WING ANGLES AND / OR DIMENSIONS MAY BE ALTERED DURING CONSTRUCTION TO ACCOMMODATE FLOW OF WATER.
- 4. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE, BUT NOT TO EXCEED 5%. FRONT FACE OF HEADWALL SHALL REMAIN VERTICAL.
- 5. CHAIN LINK FENCE IS REQUIRED ON ALL HEADWALLS WHEN VERTICAL FACE C' IS GREATER THAN 36".
- 6. ALL EXPOSED EDGES ARE TO HAVE 3/4" CHAMFER.
- 7. SKEWED PIPE REQUIRES SPECIAL DESIGN.



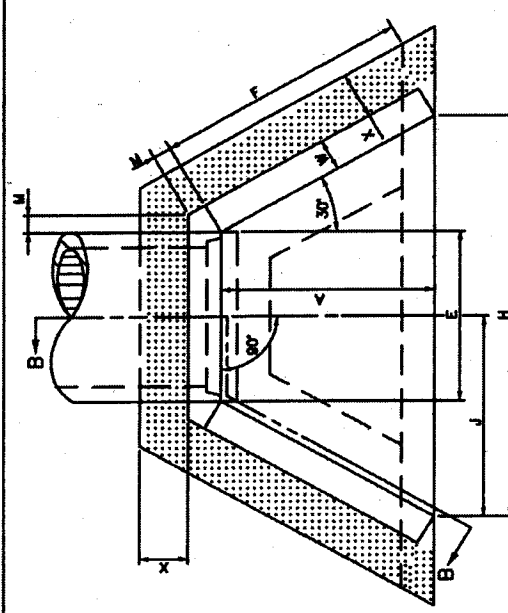
ISOMETRIC VIEW

NO.	DATE	REVISION DESCRIPTION	BY

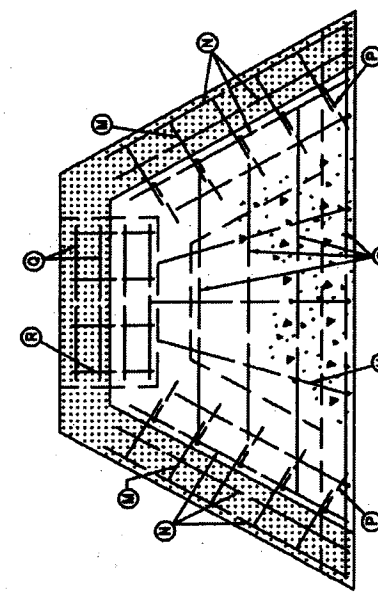
DIVISION OF ENGINEERING

PIPE CULVERT HEADWALLS
0° SKEW
15"-27" CIRCULAR PIPE

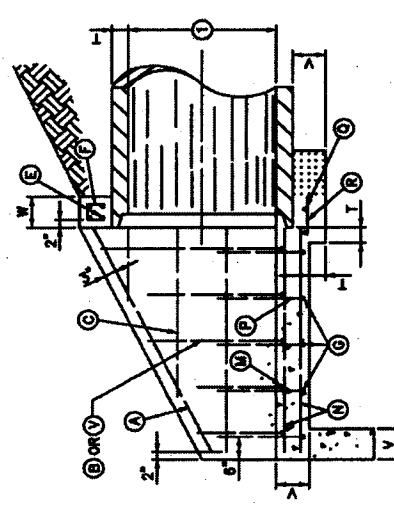
PROJECT NO. 153
DATE 5/1/68
DRAWN BY [Signature]



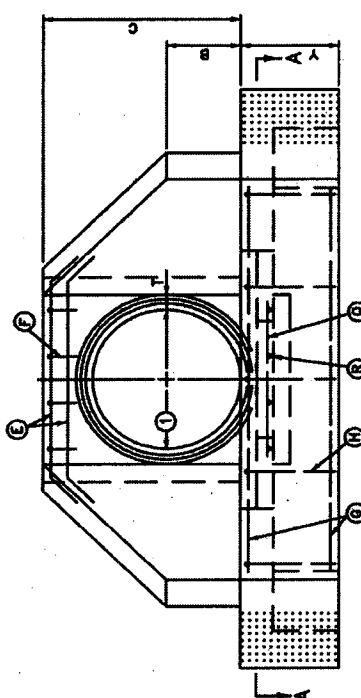
PLAN VIEW



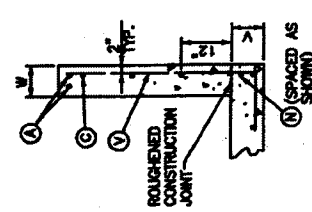
SECTION A-A



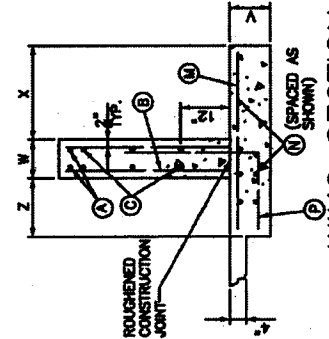
SECTION B-B



FRONT ELEVATION



WING SECTION
30"-60" CIRCULAR PIPE



WING SECTION
66"-108" CIRCULAR PIPE

- NOTES
1. [Pattern] APPLIES TO 66" DIAMETER AND GREATER. (CIRCULAR PIPE)
 2. SEE SHEETS 2, 3, AND 4 OF CURRENT STD. DWG. 154 FOR DIMENSIONS, QUANTITIES, AND BILL OF REINFORCEMENT.
 3. DIMENSIONS FROM FACE OF CONCRETE TO STEEL SHALL BE 2" CLEAR DISTANCE UNLESS OTHERWISE NOTED.
 4. ENCLOSED LETTERS O, INDICATE STEEL BAR LOCATIONS.
 5. BARS (A) (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) ARE SPACED 1'-0" O.C. ALL OTHER BARS SHALL BE EVENLY SPACED.
 6. BARS (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT THE END OF EACH WING.
 7. BARS (B) (C) (D) (E) (F) (G) (H) (I) (J) (K) (L) (M) (N) (O) (P) (Q) ARE PLACED IN ORDER OF INCREASING LENGTHS, BEGINNING AT TOP OF EACH WING.
 8. HEADWALLS LOCATED AT EDGE OF SHOULDER SHALL BE PARALLEL TO CENTERLINE OF THE ROAD.
 9. APRON BETWEEN WINGS SHALL BE SLOPED IN DIRECTION OF FLOW EQUAL TO SLOPE OF PIPE, NOT TO EXCEED 5%.
 10. FRONT OF HEADWALL AND ENDS OF WINGS SHALL REMAIN VERTICAL.
 11. FENCE AND / OR HANDRAIL IS REQUIRED FOR ALL HEADWALLS, SEE STD. DWG. 308.
 12. ALL EXPOSED EDGES ARE TO HAVE 3/4" CHAMFER.

SHEET 1 OF 4

NO.	DATE	REVISION DESCRIPTION	BY

DIVISION OF ENGINEERING

PIPE CULVERT HEADWALLS
OF SKEW
30"-108" PIPE

DESIGNED BY: 154-1
DRAWN BY: S/L/OP
CHECKED BY: S/L/OP

DIMENSION	DIAMETER OF PIPE													DIMENSION
	30"	36"	42"	48"	54"	60"	66"	72"	78"	84"	90"	96"	102"	
A	3'-9"	4'-4"	4'-11"	5'-6"	6'-1"	6'-8"	7'-5"	8'-0"	8'-7"	9'-2"	9'-9"	10'-4"	10'-11"	11'-6"
B	1'-3"	1'-6"	1'-9"	2'-0"	2'-3"	2'-6"	2'-9"	3'-0"	3'-3"	3'-6"	3'-9"	4'-0"	4'-3"	4'-6"
C	3'-6"	4'-0"	4'-7"	5'-1"	5'-8"	6'-2"	7'-0"	7'-5"	8'-0"	8'-6"	9'-1"	9'-7"	10'-2"	10'-8"
E	3'-1"	3'-8"	4'-3"	4'-10"	5'-5"	6'-0"	6'-7"	7'-2"	7'-9"	8'-4"	8'-11"	9'-6"	10'-1"	10'-8"
F	4'-4"	5'-0"	5'-8"	6'-4"	7'-0"	7'-8"	8'-7"	9'-3"	9'-11"	10'-7"	11'-3"	11'-11"	12'-7"	13'-3"
H	7'-6"	8'-8"	10'-0"	11'-2"	12'-6"	13'-8"	15'-2"	16'-6"	17'-8"	19'-0"	20'-2"	21'-6"	22'-8"	24'-0"
J	3'-9"	4'-4"	5'-0"	5'-7"	6'-3"	6'-10"	7'-7"	8'-3"	8'-10"	9'-6"	10'-1"	10'-9"	11'-4"	12'-0"
M			0'-5"							0'-6"				
T	0'-3.5"	0'-4.0"	0'-4.5"	0'-5.0"	0'-5.5"	0'-6.0"	0'-6.5"	0'-7.0"	0'-7.5"	0'-8.0"	0'-8.5"	0'-9.0"	0'-9.5"	0'-10.0"
V			0'-8"							1'-0"				
W			0'-8"							0'-10"				
X			-					2'-0"			2'-6"			
Y			2'-0"					2'-6"			3'-0"			
Z			-					1'-3"			1'-9"			
CU.YDS. CONC. HEADWALLS	3.36	4.30	5.35	6.53	7.82	9.22	18.76	20.95	23.25	25.67	31.48	34.31	37.25	40.32
LBS. STEEL HEADWALLS	281	363	430	496	583	687	1320	1571	1815	2043	2451	2753	3050	3379

SHEET 2 OF 4

NO.	DATE	REVISION DESCRIPTION	BY

DIVISION OF ENGINEERING

DIMENSIONS AND QUANTITIES
30"-108" HEADWALLS
CIRCULAR PIPE
0' SKEW

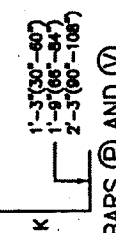
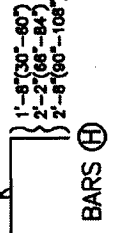
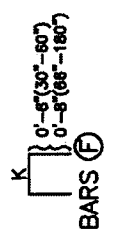
184-2
 5/1/02
 [Signature]

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

W		S		NO		L		K		W		S		NO		L		K		W		S		NO		L		K													
A	C1	C2	C3	E1	E2	F	G1	G2	H	N	Q	R	V1	V2	V3	V4	V5	V6	V7	V8	A	C1	C2	C3	E1	E2	F	G1	G2	H	N	Q	R	V1	V2	V3	V4	V5	V6	V7	V8
30"		42" (CONTINUED)		54" (CONTINUED)		60"		72"		78" (CONTINUED)		84"		90"																											
A	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
C1	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		
C2	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
C3	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
E1	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
E2	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
F	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
G1	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
G2	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
H	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
N	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
Q	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
R	4	2	2	4	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V1	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V2	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V3	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V4	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V5	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V6	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V7	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
V8	5	4	2	2	4	4	8	4	4	2	2	2	4	4	4	4	4	4	4	4	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	

NOTES:
 1. NUMBER OF BARS IN ONE HEADWALL.
 2. DIMENSIONS ARE OUT TO OUT OF BARS.
 3. ALL BARS ARE STRAIGHT EXCEPT THOSE SHOWN BELOW.

BENT BAR SHAPES



SHEET 3 OF 4

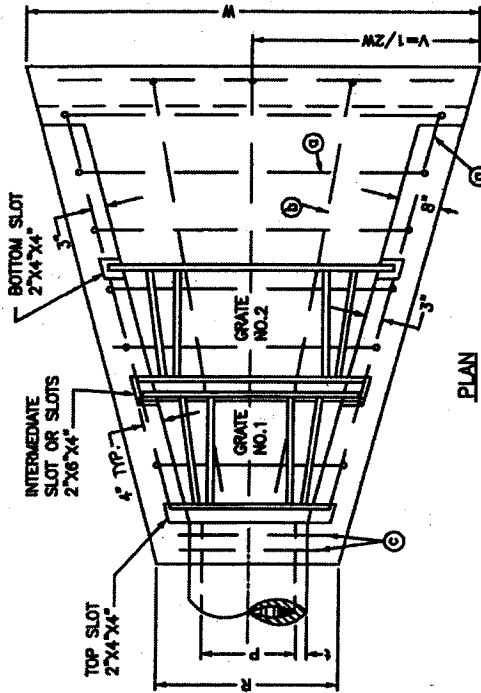
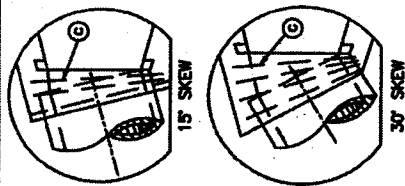
NO.	DATE	REVISION DESCRIPTION

DIVISION OF ENGINEERING

BILL OF REINFORCEMENT
 30"-90" DIAMETER
 CIRCULAR PIPE HEADWALLS
 0' SKEW

184-3
 5/1/00

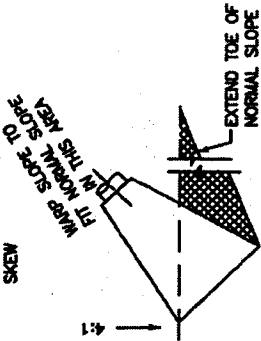
PLAN VIEW OF STRUCTURE LOCATIONS



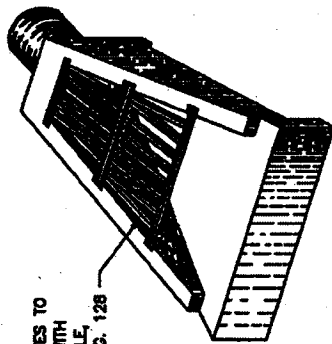
CONDITION NO. 1
0° SKEW

CONDITION NO. 2
1° TO 30° SKEW

CONDITION NO. 3
GREATER THAN 30° SKEW



SECURE GRATES TO STRUCTURE WITH CHAIN SHACKLE, SEE STD. DWG. 128



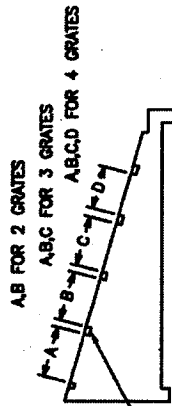
18°-24° TRIMETRIC VIEW

NOTES:
1. THE MINIMUM REQUIREMENT FOR REINFORCING STEEL SHALL BE GRADE 40. FIELD BENDING WILL BE PERMITTED.

2. ONE ADDITIONAL Ⓞ BAR WILL BE REQUIRED FOR EACH 15° SKEW.

3. t IS CONCRETE PIPE WALL THICKNESS.

DETAIL SHOWING LOCATION OF SLOTS FOR GRATES



SECURE GRATES TO STRUCTURE WITH CHAIN SHACKLE, SEE STD. DWG. 128

SEE STD. DWG. 163 FOR GRATE DETAILS.

NO.	DATE	REVISION DESCRIPTION	BY

NO. 4 REINFORCEMENT BARS			
NUMBER	LENGTH	AND WEIGHT	CL. WTD.
Ⓞ	ⓑ	ⓒ	LBS.
14 AT 6'-8"	3 AT 6'-6"	2 AT 2'-8"	81
16 AT 8'-0"	3 AT 10'-6"	2 AT 3'-3"	111
18 AT 9'-7"	3 AT 12'-9"	2 AT 3'-10"	148
20 AT 11'-4"	3 AT 15'-0"	2 AT 4'-8"	187

NO. OF GRATES REQ'D	2'	3'
2	-	-
-	2	-
1	2	-
2	2	-

DIMENSIONS										
P	H	L	S	R	V	W	A	B	C	D
18'-3-0"	8'-6"	8'-9 1/2"	2'-11 1/2"	3'-7 1/2"	7'-3"	11'-9"	11'-9"	-	-	-
24'-3'-7"	10'-8"	11'-0"	3'-8 1/2"	4'-5 1/2"	8'-11"	12'-9"	12'-9"	-	-	-
30'-4'-2 1/2"	12'-10"	13'-2 1/4"	4'-1 1/2"	5'-3 1/4"	10'-7"	12'-9"	12'-9"	-	-	-
36'-4'-9"	15'-0"	15'-5 1/2"	4'-8 1/2"	6'-1 1/4"	12'-3"	12'-9"	12'-9"	11'-9"	11'-9"	-

DIVISION OF ENGINEERING

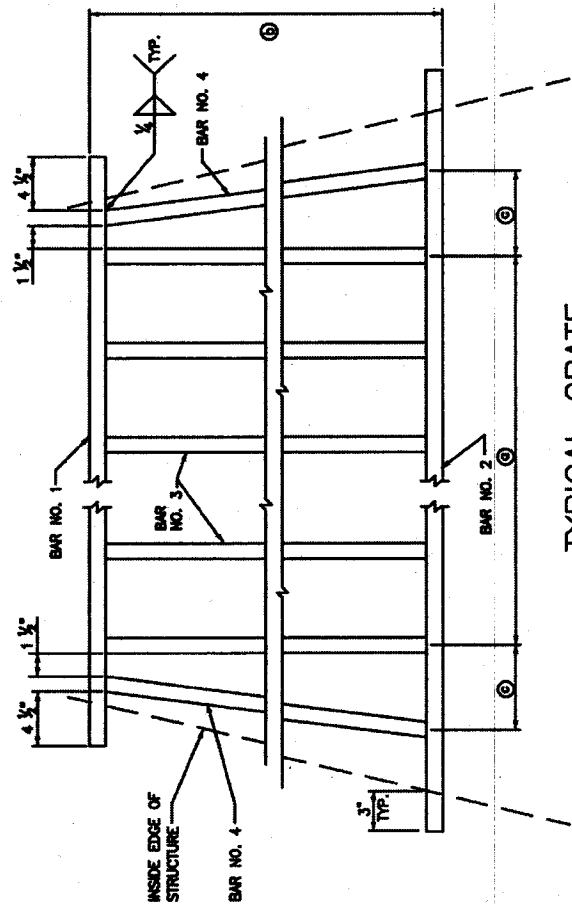
SLOPED AND FLARED BOX INLET-OUTLET
18°-24°-30°-36° ALL SKEWS

DATE: 1/62
BY: S/J/62

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT, DEPARTMENT OF PUBLIC WORKS AND DEVELOPMENT

BOX INLET-OUTLET SIZE	GRATE		BAR NO. 1		BAR NO. 2		BAR NO. 3		BAR NO. 4		LBS. STRUCTURAL STEEL	
	NO. SIZE	LENGTH	LENGTH	LENGTH	LENGTH	NO. BARS	LENGTH	LENGTH	LENGTH	LENGTH	EACH GRATE	TOTAL
18"	1 2'-0"	2'-6 1/2"	3'-5 3/4"	1'-10"	4	1'-10 1/4"	116	272	272	272	116	272
	2 2'-0"	3'-7 3/4"	4'-8 3/4"	1'-10"	6	1'-10 1/4"	156					
24"	1 3'-0"	3'-1 1/2"	4'-6 3/4"	2'-10"	5	2'-10 3/8"	187	484	484	187	484	484
	2 3'-0"	4'-8 1/2"	6'-1 3/4"	2'-10"	8	2'-10 3/8"	287					
30"	1 3'-0"	3'-0 1/2"	5'-1 1/2"	2'-10"	6	2'-10 3/8"	215	768	768	215	768	768
	2 3'-0"	5'-3 1/2"	6'-8 3/4"	2'-10"	9	2'-10 3/8"	294					
	3 2'-0"	6'-10 1/2"	7'-8 3/4"	1'-10"	13	1'-10 1/4"	287					
36"	1 3'-0"	4'-3 1/2"	5'-8 1/4"	2'-10"	7	2'-10 3/8"	242	1218	1218	242	1218	1218
	2 3'-0"	5'-10 1/2"	7'-3 3/4"	2'-10"	10	2'-10 3/8"	321					
	3 2'-0"	7'-6 1/2"	8'-4 1/2"	1'-10"	14	1'-10 1/4"	308					
	4 2'-0"	8'-8 3/4"	9'-8 3/4"	1'-10"	18	1'-10 1/4"	347					

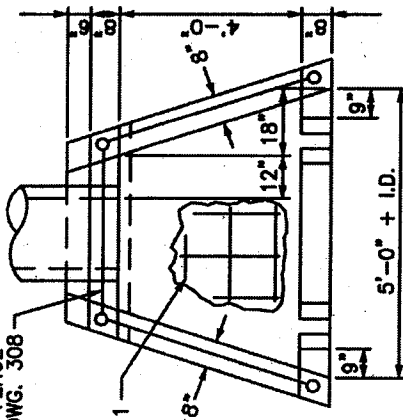
- NOTES:
- ① EQUALLY SPACE BARS NO. 3.
 - ② SIZE OF GRATE EITHER 2'-0" OR 3'-0".
 - ③ 5 1/2" FOR 2'-0" GRATE, 7" FOR 3'-0" GRATE.
- ALL COMPONENTS ARE 1" x 2" STRUCTURAL STEEL BARS.
- 1. SEE STD. DWG. 182.
 - 2. SECURE GRATE TO STRUCTURE WITH CHAIN SHACKLE, SEE STD. DWG. 12B.



TYPICAL GRATE

NO.	DATE	REVISION DESCRIPTION	BY
DIVISION OF ENGINEERING			
GRATES FOR SLOPED AND FLARED BOX INLET-OUTLET			

CHAIN LINK FENCE
SEE STD. DWG. 308

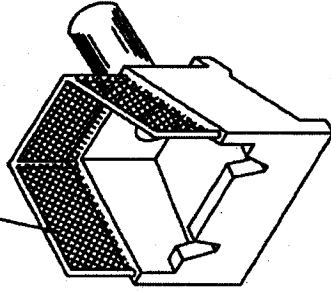


PLAN ELEVATION

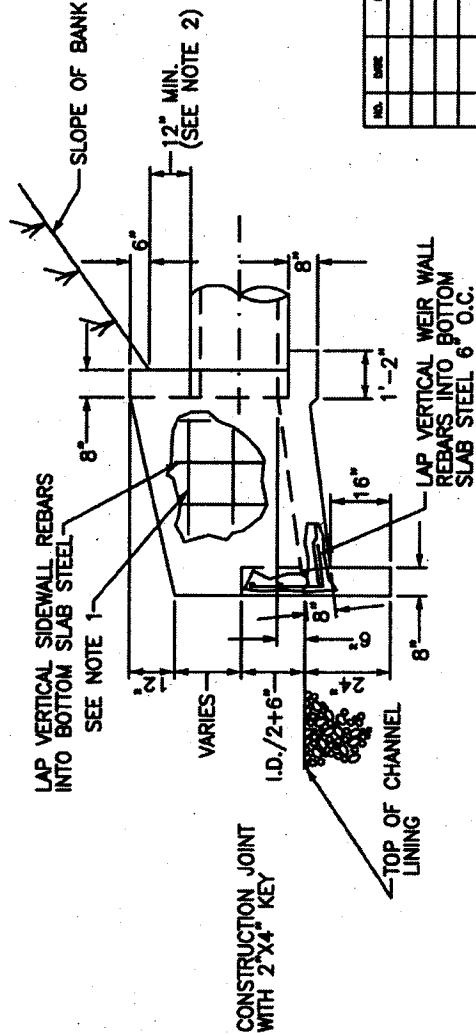
NOTES:

1. NO. 5 STEEL BARS TO BE USED THROUGHOUT ON 12" CENTERS.
2. HEIGHT OF WALL SHALL BE DETERMINED BY THE AMOUNT OF FILL BEHIND PIPE. TOP OF WALL SHALL BE 18" ABOVE TOP O.D. OF PIPE.
3. TOP OF END SILL SHALL BE LEVEL WITH CENTERLINE OF PIPE.
4. CHANNEL LINING TO BE WIDTH OF END SILL, 18" MINIMUM THICKNESS, AND COMPOSED OF CLASS III CHANNEL LINING.
5. ALL VERTICAL OR SLOPED EXPOSED SURFACES SHALL HAVE A RUBBED FINISH.
6. ALL EXPOSED FLAT WORK TO HAVE A HAND FLOATED AND BROOMED FINISH.
7. ALL EXPOSED EDGES SHALL HAVE A 3/8" CHAMFER.
8. ALL STEEL SHALL HAVE 2" MINIMUM CLEARANCE TO THE CONCRETE FACE ON THE BACKFILL SIDE OF THE WALLS.
9. FENCES REQUIRED ON HEADWALLS.

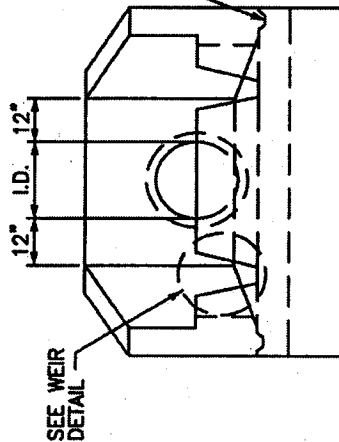
-CHAIN LINK FENCE
SEE STD. DWG. 308



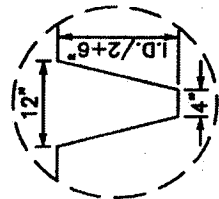
ISOMETRIC VIEW



SIDE ELEVATION



FRONT ELEVATION



WEIR DETAIL

NO.	DATE	REVISION DESCRIPTION	BY

DIVISION OF ENGINEERING

IMPACT STILLING BASIN
15"-24" PIPES

164

5/1/68

1/1/68

1/1/68