

SECTION 02240 - DEWATERING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor and equipment required to dewater all excavations.
- B. Dewatering of all excavations shall be the responsibility of the Contractor, and no additional compensation will be allowed for same.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

- A. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, backfill or other material or structure in the excavation.
- B. Dewatering shall include proper removal of any and all liquid, regardless of its source, from the excavation.
- C. The site shall be kept free of surface water at all times. The Contractor shall install drainage ditches, dikes and shall perform all pumping and other work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations. The diversion and removal of surface water shall be performed in a manner that will prevent flooding and/or damage to other locations within the construction area where it may be detrimental. The Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose piping, well points, deep wells, etc., necessary to depress and maintain the ground water level below the base of the excavation during all stages of construction operations.
- D. No groundwater from the excavated area shall be discharged into the sanitary sewer system.
- E. Dewatering shall be in accordance with all state and local regulations/permits/plans.
- F. Trench shall be dewatered as required and never shall the trench accumulate groundwater to a depth that will cause pipe to float.

END OF SECTION

SECTION 02371 – STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

(NOT USED)

PART 1 - GENERAL

1.01 GENERAL

- A. The Contract Documents include a SWPPP that has been approved by LFUCG Division of Water Quality. This SWPPP shall be used for establishing quantities and a lump sum price for providing the Erosion and Sediment Control Measures.
- B. The Contractor may use this SWPPP to obtain the required permits, i.e. Land Disturbance Permit. If Contractor chooses to use this SWPPP, the Contractor takes sole responsibility for the content of the SWPPP and the implementation of the SWPPP during construction.
- C. Contractor may also choose to prepare its own SWPPP and submit to LFUCG Division of Water Quality for approval. No additional payment will be allowed for the Erosion and Sediment Control and conformance with SWPPP pay item.

SECTION 02372 - EROSION AND SEDIMENT CONTROL

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, and equipment required for installing, maintaining, amending, and removing temporary soil erosion, sediment, and pollutant controls as shown in the Stormwater Pollution Prevention Plan (SWPPP) and as specified herein and as required by the LFUCG Land Disturbance Permit, Chapter 16-Article X, Division 5 of the LFUCG Code of Ordinances, and the KPDES General Permit for Stormwater Discharges Associated with Construction Activities (KYR10).
- B. The Contractor shall take all site management measures necessary to minimize erosion and contain sediment, construction materials (including excavation and backfill), and pollutants (such as chemicals, fuels, lubricants, bitumen, raw sewage, and other harmful waste) and prevent them from being discharged into or alongside any body of water or into natural or man-made channels leading thereto.
- C. The Contractor shall at all times minimize disturbance and the period of time that the disturbed area is exposed without stabilization practices. In "critical areas" (within 25 feet of a stream) erosion prevention measures such as erosion control mats/blankets, mulch, or straw blown in and stabilized with tackifiers or by treading, etc shall be implemented on disturbed areas within 24 hours or "as soon as practical" after completion of disturbance/grading or following cessation of activities.
- D. Temporary erosion controls include, but are not limited to grassing, mulching, seeding, providing erosion control and turf reinforcement mats on all disturbed surfaces including waste area surfaces and stockpile and borrow area surfaces; scheduling work to minimize erosion and providing interceptor ditches at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits.
- E. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, and appurtenances on sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits.
- F. Contractor is responsible for providing and maintaining effective temporary erosion and sediment control measures prior to and during construction or until final controls become effective.
- G. Prior to construction, the Contractor shall obtain a LFUCG Land Disturbance Permit and shall obtain coverage under the KPDES General Permit for Stormwater Discharges Associated with Construction Activities (KYR10) (see Article 3.24 in this Section). The Contractor shall be responsible for placement of pollutant, erosion, and sedimentation controls as shown in the Stormwater Pollution Prevention Plan (SWPPP) prior to excavation, fill or grade work. If during the course of construction, the state and/or LFUCG determine additional controls are required, the Contractor shall furnish, install and maintain additional mulch, blankets, sediment barriers, and/or other controls as necessary to control pollution, erosion, and sedimentation to the satisfaction of the regulatory agency.
- H. The Contractor shall inspect and repair all erosion and sedimentation controls as follows:
 - 1. At least once every seven (7) calendar days, and
 - 2. Within 24 hours after any storm event of 0.5 inch or greater.
- I. Final stabilization practices on those portions of the project where construction activities have permanently ceased shall be initiated within fourteen (14) days of the date of cessation of

construction activities. Temporary stabilization practices on those portions of the project where construction activities have temporarily ceased shall be initiated within fourteen (14) days of the date of cessation of construction activities.

- J. **Erosion and Sediment Control prevention measures shall be installed prior to removal of vegetation and/or stripping of topsoil.** The Contractor is responsible for preparing and submitting the state Notice of Intent and attachments and obtaining state permit approval prior to the beginning of any construction activities.

1.02 PERMITS AND NOTIFICATION REQUIREMENTS

- A. The Contractor is responsible to prepare a Stormwater Pollution Prevention Plan (SWPPP) for inclusion with permit submittals. The Contractor may elect one of the following options to meet this requirement:
1. Utilize the SWPPP (which includes the Erosion and Sediment Control Plan) provided in the Construction Drawings and prepared by the Owner's Engineer and take sole responsibility for implementing the SWPPP, or
 2. Provide a SWPPP, including an Erosion and Sediment Control Plan, prepared by a professional engineer licensed in the Commonwealth of Kentucky, meeting all of the requirements of KYR10 and Chapter 16-Article X, Division 5 of the LFUCG Code of Ordinances.
- B. The Contractor shall submit a Notice of Intent specifically for Construction Activities (NOI-SWCA) before beginning any site disturbance, and shall implement erosion, sediment and pollution control measures as may be required by state, local and federal agencies. Contractor shall submit a signed Notice of Intent form and required attachments to the Division of Water at least seven (7) days, if an electronic submittal or thirty (30) days if a written submittal, prior to beginning of construction activity. **See Article 3.24 in this Section for detailed requirements.**
- C. A Land Disturbance Permit shall be obtained from the Lexington-Fayette Urban County Government. **See Article 3.25 in this Section for detailed requirements.**
- D. The Contractor shall comply with all additional requirements of LFUCG. It is the Contractor's responsibility to provide evidence to the Owner that all permits have been obtained prior to initiation of construction.

1.03 RELATED WORK

- A. Section 02371 – Storm Water Pollution Prevention Plan (SWPPP)
- B. Section 02373 – Stream Crossings, Streambank Restoration, and Stream Buffer Restoration
- C. Applicable LFUCG Storm Water Manual Standard Drawings are included at the end of this Section 02372.

PART 2 – PRODUCTS

2.01 MULCH

- A. Mulch shall be used as a soil stabilization measure for any disturbed area inactive for 14 days or longer. Areas requiring stabilization during December through February shall receive only mulch held in place with bituminous material. Mulching shall be used whenever permanent or temporary seeding is used. The anchoring of mulch shall be in accordance with the

Construction Drawings except all mulch placed in December through February shall be anchored with bituminous materials regardless of the slope. Permanent mulches shall be used in conjunction with planting trees, shrubs, and other ground covers that do not provide adequate soil stabilization.

- B. Straw shall come from wheat, rye, or barley and may be spread by hand or machine. Straw shall be anchored. Straw shall be applied at two tons per acre or 90 pounds per 1,000 square feet. Straw shall be free from weeds and coarse matter.
- C. Wood chips do not require tacking. Wood chips shall be applied at 40 cubic yards per acre or 1 cubic yard per 1,000 square feet and approximately 2 inches deep. Wood chips shall be treated with 20 pounds of nitrogen per acre or shall be treated with 12 pounds slow-release nitrogen per ton to prevent nutrient deficiency in plants.
- D. Bark chips or shredded bark shall be applied at 70 cubic yards per acre or 1.5 to 2 cubic yards per 1,000 square feet and about one-half inch thick. Bark does not require additional nitrogen fertilizer.
- E. Manufacturer's recommendations shall be followed during application of manufactured wood fiber and recycled paper sold as mulch materials applied in a hydroseeder slurry with binders/tackifiers. Recycled paper (newsprint) or wood fiber shall be mixed at 50 pounds per 100 gallons of water and applied according to manufacturer's recommendations and model of hydroseeder in use.
- F. Liquid mulch binders/tackifiers shall be applied according to manufacturer's recommendations. Chemical soil stabilizers or soil binders/tackifiers/emulsions shall not be used alone.
- G. Netting and mats shall be used in critical areas such as waterways where concentrated flows are expected.
- H. Before the gravel or crushed stone is applied, it shall be washed. Aggregate cover shall only be used in relatively small areas and shall be incorporated into an overall landscaping plan.

2.02 TEMPORARY SEED

- A. Temporary seeding shall be used for soil stabilization when grades are not ready for permanent seeding, except during December through February. The seed shall be applied within 14 days after grading has stopped. Only rye grain or annual rye grass seed shall be used for temporary seeding.

2.03 PERMANENT SEED

- A. Permanent seeding shall be applied within 14 days after final grade has been reached, except during December through February. Permanent seeding shall also be applied on any areas that will not be disturbed again for a year even if final grades have not been reached. The use of mulch and erosion matting and netting with permanent seeding shall be in accordance with applicable sections of this Specification. "Seed mats" may be used for permanent seeding in accordance with manufacturers' recommendations.
- B. Permanent seeding shall be used on disturbed areas where permanent, long-lived vegetative cover is needed to stabilize the soil and on rough graded areas that will not be brought to final grade for one year or more.
- C. The area to be seeded shall be protected from excess runoff as necessary with diversions, grassed waterways, terraces, or sediment ponds.

D. Contractor shall use the following Permanent Seed Mix, with the following exceptions:

- a. If a property owner landscaping agreement differs from this specification, the property owner landscaping agreement shall be followed on that property, or
- b. The area to be seeded is within 25 feet of a stream bank, in which case Contractor shall follow the seed mix provided in Section 02373, or
- c. The Construction Drawings identify a different seed mix.

The Permanent Seed Mix shall consist of the following mix spread at a rate of 12.5 pounds/1,000 square feet:

| Common Name | % | lbs per 1,000 sq. ft. |
|---------------------------|------|-----------------------|
| Bluegrass | 24% | 3 |
| Perennial ryegrass (turf) | 16% | 2 |
| + bluegrass | 20% | 2.5 |
| Tall fescue (turf type) | 32% | 4 |
| + bluegrass | 8% | 1 |
| TOTAL | 100% | 12.5 |

- E. Vegetative cover alone shall not be used to provide erosion control cover and prevent soil slippage on a soil that is not stable due to its structure, water movement, or excessive slope.
- F. Permanent seeding may be done at any time except December through February.
- G. Soil material shall be capable of supporting permanent vegetation and have at least 25 percent silt and clay to provide an adequate amount of moisture holding capacity. An excessive amount of sand will not consistently provide sufficient moisture for good growth regardless of other soil factors.
- H. Fertilizer shall be applied at a rate of 800 pounds per acre of 10-10-10 analysis or equivalent, unless soil test results indicate a different rate is appropriate. Lime shall be applied at a rate of 100 pounds per 1,000 square feet or two tons per acre of agricultural ground limestone, unless soil test results indicate differently.

2.04 SOD

- A. Sod shall be used for disturbed areas that require immediate vegetative cover, e.g., the area surrounding a drop inlet in a grassed waterway, the design flow perimeter of a grassed waterway that will convey flow before vegetation can be established, and the inlet of a culvert. Sod may be installed throughout the year. "Seed mats" and seed with geotextiles may be used in place of sod when done in accordance with manufacturers' recommendations.
- B. Contractor shall use tall fescue sod, unless another species is specified in the Construction Drawings or unless the property owner landscaping agreement differs from this specification.
- C. Sod shall not be used to provide erosion control and prevent soil slippage on a soil that is not stable due to its structure, water movement, or excessive slope.
- D. Sod shall be installed within 36 hours of digging and removal from the field. Sod should not be used on slopes steeper than 2H:1V. If it is to be mowed, installation should be on slopes no greater than 3H:1V.

- E. Soil material shall be capable of supporting permanent vegetation and shall consist of at least 25 percent silt and clay to provide an adequate amount of moisture holding capacity. An excessive amount of sand will not consistently provide sufficient moisture for the sod regardless of other soil factors.
- F. Fertilizer shall be applied at a rate of 1,000 pounds per acre of 10-10-10 analysis or equivalent, unless soil test results indicate a different rate is appropriate. Lime shall be applied at a rate of 100 pounds per 1,000 square feet or two tons per acre of agricultural ground limestone, unless soil test results indicate differently.
- G. The sod shall consist of strips of live, vigorously growing grasses. The sod shall be free of noxious and secondary noxious weeds and shall be obtained from good, solid, thick-growing stands. The sod shall be cut and transferred to the job in the largest continuous pieces that will hold together and are practical to handle.
- H. The sod shall be cut with smooth clean edges and square ends to facilitate laying and fitting. The sod shall be cut to a uniform thickness of not less than three-fourth inch measured from the crown of the plants to the bottom of the sod strips for all grasses except bluegrass. Bluegrass sod shall be cut to a uniform thickness of not less than one and one-half inches.
- I. The sod shall be mowed to a height of not less than two inches and no more than four inches prior to cutting.
- J. The sod shall be kept moist and covered during hauling and preparation for placement on the sod bed.

2.05 ROAD/PARKING STABILIZATION

- A. Gravel or paved material shall be used to stabilize permanent roads or parking areas or roads or parking areas used repeatedly by construction traffic. Stabilization shall be accomplished within 14 days of grading or initiation of use for construction traffic. Unstabilized roads are not acceptable except in instances where the road will be used less than one month.
- B. Road/parking stabilization shall be used wherever roads or parking areas are constructed, whether permanent or temporary, for use by construction traffic.
- C. Stabilization shall be accomplished with a minimum depth of six inches of crushed stone. Stabilized construction roadbeds shall be at least 14 feet wide for one-way traffic and at least 20 feet wide for two-way traffic.
- D. Temporary roads shall follow the contour of the natural terrain to the extent possible. Slopes shall not exceed 10 percent.
- E. Temporary parking areas shall be located on naturally flat areas to minimize grading. Grades shall be sufficient to provide drainage but shall not exceed 4 percent.
- F. All cuts and fills shall be 2H:1V or flatter.
- G. Drainage ditches shall be provided as needed.
- H. Crushed stone shall be KYTC aggregate No. 2 (1.5 to 3 inches in diameter), or equivalent.

2.06 CONSTRUCTION ENTRANCE

- A. A stabilized construction entrance shall be constructed wherever vehicles are leaving a construction site to enter a public road or at any unpaved entrance/exit location where there

is a risk of transporting mud or sediment onto paved roads. A construction entrance shall be constructed at the beginning of the project before construction traffic begins to enter and exit the site.

- B. A stabilized construction entrance shall be constructed of crushed stone a minimum of 6 inches thick laid over geotextile (filter fabric).
- C. The width shall be at least 20 feet and as wide as the entire width of the access. At sites where traffic volume is high, the entrance shall be wide enough for two vehicles to pass safely. The length shall be at least 50 feet, and where practical, shall be extended to 100 feet. The entrance shall be flared where it meets the existing road to provide a turning radius.
- D. Stormwater and wash water runoff from a stabilized construction entrance shall drain to a sediment trap or sediment pond. If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the gravel, then the tires of the vehicles shall be washed before entering a public road.
- E. Pipe placed under the entrance to handle runoff shall be protected with a mountable berm.
- F. Dust control shall be provided in accordance with the applicable sections of this Specification.
- G. Crushed stone shall be KYTC aggregate No. 2 (1.5 to 3 inches in diameter), or equivalent.
- H. Geotextile filter fabric shall be KYTC Type III.

2.07 DUST CONTROL

- A. Dust control measures shall be implemented on the site.
- B. Construction activities shall be phased to minimize the total area unstabilized at any given time, thereby reducing erosion due to air and water movement.
- C. Construction roads shall be watered as needed to minimize dust.
- D. Existing trees, shrubs, and ground cover shall be retained as long as possible during the construction. Initial land clearing should be conducted only in those areas to be regraded or where construction is to occur. Areas to be cleared only for new vegetation or landscaping shall be stabilized with seed and mulch immediately following clearing.
- E. Vegetative cover is the most effective means of dust and erosion control, when appropriate. See sections on Temporary Seed, Permanent Seed, Mulch, and Sod of this Specification.
- F. When areas have been regraded and brought to final grade, they shall be stabilized using temporary or permanent seed and mulch or other measures.
- G. Mulch with mulch binders may be used as an interim dust control measure in areas where vegetation may not be appropriate.
- H. See sections on Temporary Seed, Permanent Seed, Sod, Mulch, Road/Parking Stabilization, and Construction Entrance of this Specification.

2.08 NETS AND MATS

- A. Mulch netting, erosion control matting, or turf reinforcement matting (TRM) shall be used on sloping areas as indicated in the Construction Drawings. Mats or nets and permanent seeding may be used as an alternate to sod for culvert entrances and grassed waterways.

TRMs shall be used at the water line to control wave action in wet ponds. TRMs shall be used in accordance with manufacturer's recommendations. Erosion control matting may be used to stabilize channels and swales and on recently planted slopes to protect seedlings until they become established.

- B. Effective netting and matting shall require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil and erosion will occur underneath the material.
- C. Nets and mats shall be suitable for their intended purpose and shall be as indicated in the Construction Drawings.

2.09 TEMPORARY DIVERSION DITCH

- A. Temporary diversion ditches shall be used to collect sediment-laden runoff from disturbed areas and direct it to a sediment pond where applicable. Temporary ditches are those expected to be in use for less than one year. Temporary diversion ditches do not require stabilization, unless otherwise indicated on the Construction Drawings.
- B. Temporary diversion ditches shall have stable outlets. The combination of conditions of site, slopes, and soils should be so that the ditch can be maintained throughout its planned life.
- C. Temporary diversion ditches shall not be constructed below high sediment-producing areas unless land treatment practices or structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with or before the diversion.
- D. A typical diversion cross section consists of a channel and a supporting ridge. In the case of an excavated-type diversion, the natural ground serves as the diversion ridge. Diversion cross sections shall be adapted to the equipment that will be used for their construction and maintenance.
- E. The channel may be parabolic or trapezoidal in shape. V-shaped ditches shall not be constructed.
- F. Diversions shall be located so that water will empty onto an established area such as a stable watercourse, waterway, or structure.
- G. Any high sediment-producing area above a diversion shall be controlled by good land use management or by structural measures to prevent excessive sediment accumulation in the diversion channel.
- H. Temporary diversions above steep slopes or across graded rights-of-way shall have a berm with a minimum top width of 2 feet, side slopes of 2:1 or flatter and a minimum height of 18 inches measured from the channel bottom.
- I. Diversions installed to intercept flow on graded rights-of-way shall be spaced 200 to 300 feet apart.
- J. A level lip spreader shall be used at diversion outlets discharging onto areas already stabilized by vegetation.

2.10 LEVEL SPREADER

- A. Level spreaders shall be constructed at the outlets of temporary diversion ditches. Level spreaders shall also be constructed at outlets of permanent constructed waterways where they terminate on undisturbed areas.

- B. The length of the level spreader shall be constructed as shown on the Construction Drawings.

2.11 PERMANENT CONSTRUCTED WATERWAY

- A. Permanent constructed waterways shall be used to divert stormwater runoff from upland undisturbed areas around or away from areas to be disturbed during construction. A waterway expected to be in place for at least one year shall be considered permanent. Permanent waterways shall be lined with sod or permanent seeding and nets, mats, or TRMs.

2.12 PIPE SLOPE DRAIN

- A. Pipe slope drains shall be used whenever it is necessary to convey water down a steep slope, which is not stabilized or which is prone to erosion, unless paved ditch (flume) is installed.
- B. Contractor shall use a 10-inch diameter pipe or larger to convey runoff from areas up to one-third acre; 12-inch or larger pipe for up to half-acre drainage areas; and 18-inch pipe for areas up to one acre, unless otherwise specified in the Construction Drawings. Multiple pipes shall be required for large areas, spaced as shown on the Construction Drawings.
- C. The pipe shall be heavy duty flexible tubing designed for this purpose, e.g., non-perforated, corrugated plastic pipe, or specially designed flexible tubing.
- D. A standard flared end section or a standard T-section fitting secured with a watertight fitting shall be used for the inlet.
- E. Extension collars shall be 12-inch long sections of corrugated pipe. All fittings shall be watertight.

2.13 IMPACT STILLING BASIN

- A. Impact stilling basins shall be used at the outlet of culverts and storm sewers with calculated exit velocities greater than 15 feet per second when flowing full.

2.14 CHECK DAM

- A. Check dams shall be limited to use in small, open channels that drain 10 acres or less.
- B. Check dams shall not be used in streams.
- C. Check dams can be constructed of stones, coir logs, or wood fiber logs.
- D. Check dams shall be constructed prior to the establishment of vegetation.
- E. The maximum height of a check dam shall be three feet above the ground on which the rock is placed.
- F. The center of the portion of the check dam above the flat portion of the channel shall be at least 1 foot lower than the outer edges. The outer edges of the check dam shall extend up the side slopes of the channel to a point 3 feet in elevation above the center portion of the check dam or to the top of the side slopes.
- G. The maximum spacing between rock check dams in a ditch should be such that the toe of the

upstream dam is at the same elevation as the top of the next downstream dam.

- H. The spacing of coir and wood fiber check dams is one log every 100 feet for velocities of 5 fps, 50 feet for velocities between 5 and 7.5 fps, and 25 feet for velocities greater than 10 fps, unless otherwise shown in the Construction Documents.
- I. Stone check dams shall be constructed of KYTC Class II channel lining.
- J. Coir log or wood fiber log check dams shall be constructed of a single log with a diameter of at least 20 inches.

2.15 SEDIMENT TRAP

- A. Sediment traps shall be installed below all disturbed areas of less than 5 acres that do not drain to a sediment pond.
- B. Erosion control practices such as seeding, mulching, sodding, diversion dikes, etc., shall be used in conjunction with sediment traps to reduce the amount of sediment flowing into the trap. The amount of sediment entering a trap can be reduced by the use of stabilized diversion dikes and ditches.
- C. The trap shall not be located in a stream. It shall be located to trap sediment-laden runoff before it enters the stream.
- D. Trap depth shall be at least 2 feet at the inlet and 4 feet at the outlet. Effective trap width shall be at least 10 feet and trap length shall be at least 30 feet.
- E. The Construction Drawings shall indicate the final disposition of the sediment trap after the upstream drainage area is stabilized. The Construction Drawings shall indicate methods for the removal of excess water lying over the sediment, stabilization of the pond site, and the disposal of any excess material.

2.16 SEDIMENT POND

- A. 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.
- B. Design and construction shall comply with all federal, state, and local laws, ordinances, rules, and regulations regarding dams.
- C. Erosion control practices such as seeding, mulching, sodding, diversion dikes, etc., shall be used in conjunction with sediment ponds to reduce the amount of sediment flowing into the pond.
- D. The pond shall not be located in a stream. It shall be located to trap sediment-laden runoff before it enters the stream.
- E. Contractor shall construct the sediment pond as shown on the Construction Drawings.
- F. Permanent ponds designed for stormwater detention or water quality treatment may serve as temporary sediment ponds if site conditions make the use of these structures desirable. At the time of conversion from a sediment pond to a permanent stormwater management pond, excess sediment shall be cleaned from the pond. If the pond is converted to a water quality basin, the sand in the sand filter outlet shall be replaced with clean sand unless it is shown to be clean.
- G. The Construction Drawings shall indicate the final disposition of the sediment pond after the

upstream drainage area is stabilized. The Construction Drawings shall indicate methods for the removal of excess water lying over the sediment, stabilization of the pond site, and the disposal of any excess material.

- H. Vegetation shall be established upon completion of construction of the embankment, emergency spillway and other areas disturbed by construction.

2.17 SILT FENCE

- A. Silt fence shall be installed down-slope of areas to be disturbed prior to clearing and grading. Silt fence shall 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.
- B. Under no circumstances shall silt fences be constructed in streams or in swales or ditch lines or any area of concentrated flow where discharge rates are likely to exceed 1 cubic foot per second (cfs).
- C. 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:

| <u>PHYSICAL PROPERTY</u> | <u>REQUIREMENTS</u> |
|--------------------------|----------------------------------|
| Filtering Efficiency | 80% (minimum) |
| Tensile Strength at 20% | 50 lbs./linear inch (minimum) |
| Flow Rate | 0.3 gal./ sq. ft/ min. (minimum) |

- D. 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.
- E. 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.
- F. 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.

2.18 STORM DRAIN INLET PROTECTION

- A. Storm drain inlet protection may be utilized on drop inlets and curb inlets.
- B. Storm drain inlet protection shall only be used around drop inlets when the up-slope area draining to the inlet has no other or inadequate sediment control.
- C. The drainage area shall be no greater than 1 acre.
- D. 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.
- E. Inlet protection devices shall be constructed in such a manner that any resultant ponding of stormwater will not cause flooding or excessive inconvenience or damage to adjacent areas, roadways, properties, or structures.
- F. Inlet protection devices are low flow filter devices, and as such shall be constructed in such a manner as to allow for higher flows to bypass into the storm drain system to prevent flooding of the roadway or downstream properties.

2.19 FILTER STRIP

- A. Filter strips shall be used on each side of permanent constructed channels.
- B. Filter strips shall only be used to remove sediment from overland flow. Filter strips are not effective in removing sediment from concentrated flows.
- C. If vegetative filters are proposed as a sediment control device and they do not already exist, they shall be planted and established prior to initiating land disturbing activities.
- D. The minimum filter strip width shall be 50 feet for streams, wetlands, and sinkholes. The minimum filter strip width shall be ten feet for constructed waterways.
- E. Where a post development floodplain or wet weather conveyance is being protected, filter strips shall be provided on each side. When a wetland or sinkhole is being protected, filter strips shall be provided around the perimeter.
- F. Contractor shall construct the filter strips as shown on the Construction Drawings.
- G. 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. The following chart provides a list of alternative grass and grass/legume mixtures:

SEEDING MIXTURE AND SITE SUITABILITY CHART

| Seeding Mixture | Rate lbs/acre | Soil Suitability |
|--|------------------------|---------------------|
| Alfalfa Or Red Clover Plus Timothy Or Orchardgrass Or Bromegrass | 6 10 4 6 6 | Well Drained |
| Landino Plus Timothy Or Orchardgrass Or Bromegrass | .05 4 6 8 | Wet or Well-Drained |

Notes:

- 1. All seeding shall be in accordance with the seeding sections of this Specification.
- 2. Well drained sites include sites that are drained with tile as well as naturally well drained and droughty sites. Wet sites include sites that are excessively wet only a portion of the growing season.

2.20 STREAM CROSSING

- A. 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, and shall be considered a permanent structure.
- B. Temporary stream crossings are applicable to flowing streams with drainage areas less than one square mile. Temporary stream crossings shall be planned to be in service for the shortest practical period of time and to be removed as soon as their function is completed.
- C. All such structures, whether temporary or permanent, are subject to the rules and regulations of the U.S. Army Corps of Engineers for in-stream modifications (404 Permitting) and the Kentucky Division of Water (401 Certification). No stream crossing shall be installed without first obtaining all applicable local, state, and federal permits.

Where culverts are to be installed, compacted soil or rock shall be used to form the crossing. The depth of soil or rock cover over the culvert shall be equal to one-half the diameter of the culvert or 12 inches, whichever is greater. The sides of the fill shall be protected from erosion using the mulching and seeding erosion control measures specified in this Specification.

- D. All stream crossings shall be constructed in such a manner as to avoid flooding or excessive inconvenience or damage to adjacent areas, roadways, properties, or structures.
- E. When using a culvert crossing, the top of a compacted earth fill shall be covered with six inches of KYTC No. 57 stone.
- F. KYTC No. 57 stone shall also be used for the stone pads forming the crossing approaches.

2.21 PUMP AROUND FLOW DIVERSION

- A. 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 of sediment or deposition of sediment in the stream.
- B. Check dams to form the diversion shall span the banks of the stream. Maintain 1-foot freeboard (minimum) on the upstream and downstream checks.
- C. Check dams may be constructed of sandbags or may be a water-filled bladder such as an Aqua-Barrier.
- D. The dewatering flow from the work area shall be treated in a sediment-trapping device prior to discharge to the stream.
- E. Sandbags shall be woven polypropylene bags with approximate dimensions of 18-1/2 inches by 28 inches. Contractor shall tie the ends of filled bags closed using either draw strings or wire ties.

2.22 CONSTRUCTION DEWATERING

- A. Sediment-laden water shall be pumped to a dewatering structure before it is discharged.

PART 3 – EXECUTION

3.01 GENERAL

- A. Erosion and sediment control practices shall be consistent with the requirements of the state and local regulatory agencies and in any case shall be adequate to prevent erosion of disturbed and/or regraded areas.
- B. Contractor is responsible for notifying the state regulatory agency concerning inclusion under the KPDES General Permit for Storm Water Discharges Associated with Construction Activities.
- C. Gravity sewer lines, force mains and water lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to reentering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the line excavation shall not be allowed to enter the flowing portion of the stream. The provisions of this condition shall apply to all types of utility line stream crossings.
- D. Removal of riparian vegetation in the utility line right-of-way shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures shall be employed at all times during the project to prevent degradation of waters of the Commonwealth. Site regrading and reseeding shall be accomplished with 14 days after disturbance.

3.02 MULCH

- A. Seed shall be applied prior to mulching except where seed is to be applied as part of a hydroseeder slurry containing mulch.
- B. Lime and fertilizer shall be incorporated and surface roughening accomplished as needed prior to mulching in accordance with applicable sections of this Specification.
- C. Mulch materials shall be spread uniformly by hand or mechanically so the soil surface is covered. During or immediately following application, the mulch shall be anchored or otherwise secured to the ground according to one of the following methods:
 - 1. Mechanical – Use a disk, crimper, or similar type tool set straight to punch or anchor the mulch material into the soil.
 - 2. Mulch Tackifiers/Nettings/Emulsions – Use according to the manufacturer's recommendations. This is a superior method in areas of water concentration to hold mulch in place.
 - 3. Wood Fiber – Wood fiber hydroseeder slurries may be used to tack straw mulch. This combination treatment is well suited to steep slopes and critical areas, and severe climate conditions.
- D. Mulch shall be anchored using a mulch anchoring tool, a liquid binder/tackifier, or mulch nettings. Nets and mats shall be installed to obtain firm, continuous contact between the material and the soil. Without such contact, the material is useless and erosion occurs.
- E. A mulch anchoring tool is a tractor-drawn implement that is typically used for anchoring straw and is designed to punch mulch approximately two inches into the soil surface. Machinery shall be operated on the contour and shall not be used on slopes steeper than 3H:1V.

- F. When using liquid mulch binders and tackifiers, application shall be heaviest around edges of areas and at crests of ridges and banks to prevent wind blow. Remainder of area shall have binders/tackifiers spread uniformly in accordance with manufacturer's recommendations.
- G. When using a mulch net, it shall be used in conjunction with an organic mulch and shall be installed immediately after the application and spreading of the mulch. Mulch net shall be installed over the mulch except when the mulch manufacturer recommends otherwise.
- H. Excelsior blankets and mats with mulch are considered protective mulches and may be used alone on erodible soils and during all times of year. Erosion control mats shall be installed in accordance with manufacturer's recommendations.
- I. Mulched areas shall be inspected at least weekly and after each rainfall of one-half inch or more. When mulch material is found to be loosened or removed, the mulch cover shall be replaced within 48 hours.

3.03 TEMPORARY SEED

- A. The site shall be graded as needed to permit the use of conventional equipment for seedbed preparation, seeding, mulch application, and anchoring.
- B. The needed erosion control practices, such as diversions, temporary waterways for diversion outlets, and sediment ponds, shall be installed prior to seeding.
- C. Prior to seeding, lime and fertilizer shall be worked into the soil with a disk harrow, springtooth harrow, or similar tools to a depth of two inches. On sloping areas, the final operation shall be on the contour.
- D. The seed shall be applied uniformly with a cyclone seeder, drill, cultipacker, seeder, or hydroseeder (slurry may include seed and fertilizer) preferably on a firm, moist seedbed. Seed shall be sown no deeper than one-fourth inch to one-half inch.
- E. The seedbed shall be firmed following seeding operations with a cultipacker, roller, or light drag.
- F. On sloping land, seeding operations shall be on the contour wherever possible.
- G. Mulch shall be applied, in the amounts described in the mulch section of this Specification, to protect the soil and provide a better environment for plant growth.
- H. New seed shall have adequate water for growth, through either natural means or irrigation, until plants are firmly established.
- I. Seeded areas shall be inspected at least weekly after planting and after each rainfall of one-half inch or more. Areas requiring additional seed and mulch shall be repaired within 48 hours.
- J. If vegetative cover is not established within 21 days, the area shall be reseeded.

3.04 PERMANENT SEED

- A. During site preparation, topsoil shall be stockpiled for use in establishing permanent vegetation.
- B. The site shall be graded as needed to permit the use of conventional equipment for seedbed preparation, seeding, mulch application, and anchoring.

- C. The needed erosion control practices, such as diversions, temporary waterways for diversion outlets, and sediment ponds, shall be installed prior to seeding.
- D. Prior to seeding, lime and fertilizer shall be worked into the soil with a disk harrow, springtooth harrow, or similar tools to a depth of four inches. On sloping areas, the final operation shall be on the contour.
- E. Where compacted soils occur, they shall be broken up sufficiently to create a favorable rooting depth of six to eight inches.
- F. The seed shall be applied uniformly with a cyclone seeder, drill, cultipacker, seeder, or hydroseeder (slurry may include seed and fertilizer) preferably on a firm, moist seedbed. Seed shall be sown no deeper than one-fourth inch to one-half inch.
- G. The seedbed shall be firmed following seeding operations with a cultipacker, roller, or light drag.
- H. On sloping land, seeding operations shall be on the contour wherever possible.
- I. Mulch shall be applied, in the amounts described in the mulch section of this Specification, to protect the soil and provide a better environment for plant growth.
- J. New seed shall have adequate water for growth, through either natural means or irrigation, until plants are firmly established.
- K. Seeded areas shall be inspected at least weekly after planting and after each rainfall of 0.5 inches or more. Areas requiring additional seed and mulch shall be repaired within 48 hours.
- L. If vegetative cover is not established (>70%) within 21 days, the area shall be reseeded. If 40 to 70 percent groundcover is established, seed and fertilize, using half of rates originally applied, and mulch. If less than 40 percent groundcover is established, follow original seedbed preparation methods, seeding and mulching specifications, and apply lime and fertilizer as needed according to soil tests.

3.05 SOD

- A. The area to be sodded shall be protected from excess runoff, as necessary, with appropriate BMPs.
- B. Prior to sodding, the soil surface shall be cleared of all trash, debris, and stones larger than one and one-half inches in diameter, and of all roots, brush, wire, and other objects that would interfere with the placing of the sod.
- C. Compacted soils shall be broken up sufficiently to create a favorable rooting depth of six to eight inches.
- D. Lime and fertilizer shall be worked into the soil with a disk harrow, springtooth harrow, or other suitable field equipment to a depth of four inches.
- E. After the lime and fertilizer have been applied and just prior to the laying of the sod, the soil in the area to be sodded shall be loosened to a depth of one inch. The soil shall be thoroughly dampened immediately after the sod is laid if it is not already in a moist condition.
- F. No sod shall be placed when the temperature is below 32°F. No frozen sod shall be placed nor shall any sod be placed on frozen soil.

- G. When sod is placed during the periods of June 15 to September 1 or October 15 to March 1, it shall be covered immediately with a uniform layer of straw mulch approximately one-half inch thick or so the green sod is barely visible through the mulch.
- H. Sod shall be carefully placed and pressed together so it will be continuous without any voids between the pieces. Joints between the ends of strips shall be staggered.
- I. On gutter and channel sodding, the sod should be carefully placed on rows or strips at right angles to the centerline of the channel (*i.e.*, at right angles to the direction of flow). The edge of the sod at the outer edges of all gutters shall be sufficiently deep so that surface water will flow over onto the top of the sod.
- J. On steep graded channels, each strip of sod shall be staked with at least two stakes not more than 18 inches apart.
- K. On slopes 3H:1V or steeper, or where drainage into a sod gutter or channel is one-half acre or larger, the sod shall be rolled or tamped and then chicken wire, jute, or other netting shall be pegged over the sod for protection in the critical areas. The netting and sod shall be staked with at least two stakes not more than 18 inches apart. The netting shall be stapled on the side of each stake within two inches of the top of the stake. The stake should then be driven flush with the top of the sod.
- L. When stakes are required, the stakes shall be wood and shall be approximately ½ inch by ¾ inch by 12 inches. They shall be driven flush with the top of the sod with the flat side against the slope and on an angle toward the slope.
- M. Sod shall be tamped or rolled after placing and then watered. Watering shall consist of a thorough soaking of the sod and of the sod bed to a depth of at least 4 inches. The sod should be maintained in a moist condition by watering for a period of 30 days.
- N. In the absence of adequate rainfall, watering shall be performed daily or as often as necessary during the first week to maintain moist soil to a depth of 4 inches. Watering shall be done during the heat of the day to prevent wilting. After the first week, sod shall be watered as necessary to maintain adequate moisture content.
- O. The first mowing of sod shall not be attempted until the sod is firmly rooted. No more than one-third of the grass leaf shall be removed by the initial and subsequent cuttings. Grass height shall be maintained between 2 inches and 3 inches.
- P. Where sod does not establish properly, the sod should be replaced immediately. Areas requiring resodding should be prepared in the same manner as the original installation.

3.06 ROAD/PARKING STABILIZATION

- A. The roadbed or parking surface shall be cleared of all vegetation, roots, and other objectionable material.
- B. All roadside ditches, cuts, fills, and disturbed areas adjacent to parking areas and roads shall be stabilized with appropriate temporary or permanent vegetation according to the applicable sections of this Specification.
- C. Geotextile filter fabric may be applied beneath the stone for additional stability in accordance with fabric manufacturer's specifications.
- D. Both temporary and permanent roads and parking areas may require periodic top dressing with new gravel. Seeded areas adjacent to the roads and parking areas shall be checked regularly to ensure that a vigorous stand of vegetation is maintained. Roadside ditches and

other drainage structures shall be checked once each week to ensure that they do not have silt or other debris that reduces their effectiveness.

3.07 CONSTRUCTION ENTRANCE

- A. Vegetation, roots, and all other obstructions shall be cleared in preparation for grading. Prior to placing geotextile (filter fabric), the entrance shall be graded and compacted to 80% of standard proctor density.
- B. To reduce maintenance and loss of aggregate, the geotextile shall be placed over the existing ground before placing the stone for the entrance. Stone shall be placed to depth of 6 inches or greater for the entire width and length of the stabilized construction entrance.
- C. If wash racks are used, they shall be installed according to manufacturer's specifications.
- D. The stabilized construction entrance shall be inspected once each week and after there has been a high volume of traffic or a storm event greater than 0.2 inches.
- E. The entrance shall be maintained in a condition that will prevent tracking or flow of sediments onto public rights-of-way. This may require periodic top dressing with additional stone, as conditions demand, and repair and/or cleanout of any structures used to trap sediment.
- F. All materials spilled, dropped, washed, or tracked from vehicles onto roadways or into storm drains must be removed immediately.

3.08 DUST CONTROL

- A. See Articles on Temporary Seed, Permanent Seed, Sod, Mulch, Road/Parking Stabilization, and Construction Entrance of this Specification Section.
- B. When construction is active on the site, dust control shall be implemented as needed.
- C. When using tillage as a dust control measure, Contractor shall begin plowing on windward side of area. Chisel-type plows spaced about 12 inches apart, spring-toothed harrow, and similar plows are examples of equipment that may produce the desired effect.
- D. The site shall be observed daily for evidence of windblown dust and reasonable steps shall be taken to reduce dust whenever possible. When construction on a site is inactive for a period, the site shall be inspected at least weekly for evidence of dust emissions or previously windblown sediments. Dust control measures shall be implemented or upgraded if the site inspection shows evidence of wind erosion.

3.09 NETS AND MATS

- A. Nets and mats shall be installed according to the manufacturer's recommendations. In the event that the manufacturer's recommendations conflict with any requirement of this Specification, the most conservative requirement, in terms of protection of public health and the environment, shall govern.

3.10 TEMPORARY DIVERSION DITCH

- A. All dead furrows, ditches or other depressions to be crossed shall be filled before construction begins or as part of construction, and the earth fill used to fill the depressions shall be compacted using the treads of the construction equipment. All old terraces,

fencerows, or other obstructions that will interfere with the successful operation of the diversion shall be removed.

- B. The base for the diversion ridge shall be prepared so that a good bond is obtained between the original ground and the fill material. Vegetation shall be removed and the base shall be thoroughly disked prior to placement of fill.
- C. The earth materials used to construct the earth fill portions of the diversions shall be obtained from the diversion channel or other approved source.
- D. The earth fill materials used to construct diversions shall be compacted by running the construction equipment over the fill in such a manner that the entire surface of the fill will be traversed by not less than one tread track of the equipment.
- E. When an excess of earth material results from cutting the channel cross section and grade, it shall be deposited adjacent to the supporting ridge unless otherwise directed.
- F. The completed diversion shall conform to the cross section and grade shown on the Construction Drawings.
- G. Temporary or permanent seeding and mulch shall be applied to the berm or ditch immediately following its construction. Contractor shall triple-seed areas below the flow line, and shall use erosion control blankets or turf reinforcement mats as needed.
- H. Bare and vegetated diversion channels shall be inspected regularly to check for points of scour or bank failure; rubbish or channel obstruction; rodent holes, breaching, or settling of the ridge; and excessive wear from pedestrian or construction traffic.
- I. Damaged channels or ridges shall be repaired at the time damage is detected. Sediment deposits shall be removed from diversion channels and adjoining vegetative filter strips regularly.
- J. Diversions shall be reseeded and fertilized as needed to establish vegetative cover.

3.11 LEVEL SPREADER

- A. The minimum acceptable width shall be 6 feet. The depth of the level spreader as measured from the lip shall be at least 6 inches and the depth shall be uniform across the entire length of the measure.
- B. The grade of the channel for the last 15 feet entering the level spreader shall be less than or equal to 1%.
- C. The level lip of the spreader shall be constructed on zero percent grade to insure uniform conversion of channel flow to sheet flow.
- D. Level spreaders shall be constructed on undisturbed soil.
- E. The entrance to the spreader shall be graded in a manner to insure that runoff enters directly onto the zero percent graded channel.
- F. Storm runoff converted to sheet flow shall discharge onto undisturbed areas stabilized with vegetation.
- G. All disturbed areas shall be stabilized immediately after construction is completed in accordance with the mulching and vegetation requirements of this Specification.

- H. The level spreader shall be inspected after each storm event and at least once each week. Any observed damage shall be repaired immediately.

3.12 PERMANENT CONSTRUCTED WATERWAY

- A. All ditches or other depressions to be crossed shall be filled before construction begins or as part of construction, and the earth fill used to fill the depressions shall be compacted using the treads of the construction equipment. All old terraces, fence rows, or other obstructions that will interfere with the successful operation of the channel shall be removed.
- B. The earth materials used to construct the earth fill portions of the channel shall be obtained from the excavated portion of the channel or other approved source.
- C. The earth fill materials used to construct the channel shall be compacted by running the construction equipment over the fill in such a manner that the entire surface of the fill will be traversed by at least one tread track of the equipment.
- D. The completed channel shall conform to the cross section and grade shown on the Construction Drawings.
- E. Channels shall be inspected regularly to check for points of scour or bank failure; rubbish or channel obstruction; rodent holes; breaching; and excessive wear from pedestrian or construction traffic.
- F. Channels shall be repaired at the time damage is detected. Sediment deposits shall be removed from adjoining vegetative filter strips when they are visible.
- G. Channels shall be reseeded and fertilized as needed to establish vegetative cover.
- H. The subgrade of paved channels shall be constructed to the required elevations. All soft sections and unsuitable material shall be removed and replaced with suitable material. The subgrade shall be thoroughly compacted and shaped to a smooth, uniform surface. The subgrade shall be moist when pouring concrete.
- I. Before permanent stabilization of the slope, the structure shall be inspected after each rainfall. Any damages to the paved channel or slope shall be repaired immediately.

3.13 PIPE SLOPE DRAIN

- A. The pipe slope drain shall be placed on undisturbed or well-compacted soil.
- B. Soil around and under the entrance section shall be hand-tamped in 4-inch to 8-inch lifts to the top of the dike to prevent piping failure around the inlet.
- C. Filter fabric shall be placed under the inlet and extended 5 feet in front of the inlet and be keyed in 6 inches on all sides to prevent erosion.
- D. Backfilling around and under the pipe with stable soil material hand compacted in lifts of 4 inches to 8 inches shall be done to ensure firm contact between the pipe and the soil at all points.
- E. The pipe slope drain shall be securely staked to the slope using grommets provided for this purpose at intervals of 10 feet or less.
- F. All slope drain sections shall be securely fastened together and have watertight fittings.
- G. The pipe shall be extended beyond the toe of the slope and discharged at a non-erosive velocity into a stabilized area or to a sediment trap or pond.

- H. The pipe slope drain shall have a minimum slope of 3 percent or steeper.
- I. The height at the centerline of the earth dike shall range from a minimum of 1.0 foot over the pipe to twice the diameter of the pipe measured from the invert of the pipe. It shall also be at least 6 inches higher than the adjoining ridge on either side. At no point along the dike will the elevation of the top of the dike be less than 6 inches higher than the top of the pipe.
- J. All areas disturbed by installation or removal of the pipe slope drain shall be immediately stabilized.
- K. The pipe slope drain shall be inspected after every rainfall and at least weekly. Any necessary repairs shall be made immediately.
- L. Contractor shall check to see that water is not bypassing the inlet and undercutting the inlet or pipe. If necessary, Contractor shall install headwall or sandbags.
- M. Contractor shall check for erosion at the outlet point and shall check the pipe for breaks or clogs. Contractor shall install additional outlet protection if needed and immediately repair the breaks and clean any clogs.
- N. Contractor shall not allow construction traffic to cross the pipe slope drain and shall not place any material on it.
- O. If a sediment trap has been provided, it shall be cleaned out when the sediment level reaches 1/3 the design volume.
- P. The pipe slope drain shall remain in place until the slope has been completely stabilized or up to 30 days after permanent slope stabilization.

3.14 IMPACT STILLING BASIN

- A. Construction specifications for impact stilling basins are provided in the Construction Drawings.

3.15 CHECK DAM

- A. Stone shall be placed by hand or mechanically as necessary to achieve complete coverage of the ditch and to ensure that the center of the dam is at least 1 foot lower than the outer edges. Stone shall also be placed to extend 3 feet in elevation above the center portion of the check dam or to the top of the channel side slopes.
- B. Coir and wood fiber logs shall be laid on the channel bottom.
- C. Check dams shall be removed when their useful life has been completed. In temporary ditches and swales, check dams shall be removed and the ditch filled in when it is no longer needed. In permanent channels, check dams shall be removed when a permanent lining can be installed. In the case of grass-lined ditches, check dams shall be removed when the grass has matured sufficiently to protect the ditch or swale. The area beneath the check dams shall be seeded and mulched or sodded (depending upon velocity) immediately after check dams are removed.
- D. If stone check dams are used in grass-lined channels that will be mowed, care shall be taken to remove all stone from the channel when the dam is removed. This shall include any stone that has washed downstream.
- E. Regular inspections shall be made to ensure that the check dam 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.

- F. Check dams shall be checked for sediment accumulation after each rainfall. Sediment shall be removed before or when it reaches one-third of the original height.
- G. 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.

3.16 SEDIMENT TRAP

- A. 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.
- B. Seeding, fertilizing, and mulching of the material taken from the excavation shall comply with the applicable soil stabilization sections of this Specification.
- C. Construction specifications for sediment traps are provided in the Construction Drawings.
- D. 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 trap by rainfall:
 - 1. uniformly spread to a depth not exceeding 3 feet and graded to a continuous slope away from the trap
 - 2. 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.
- E. Sediment shall be removed from the trap when the capacity is reduced to one third of the design volume. Contractor shall follow the methods for disposing of sediment removed from the trap as shown in the Construction Drawings.

3.17 SEDIMENT POND

- A. The foundation area 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. The surface of the foundation area shall be thoroughly scarified before placement of the embankment material.
- B. A cutoff trench shall be backfilled with suitable material. The trench shall be kept free of standing water during backfill operations.
- C. The pipe conduit barrel shall be placed on a firm foundation. Selected backfill material shall be placed around the conduit in layers, and each layer shall be compacted to at least the same density as the adjacent embankment. All compaction within 2 feet of the pipe spillway shall be accomplished with hand-operated tamping equipment.
- D. All borrow areas outside the pond and in the drainage area shall be graded and left in such a manner that water will not be ponded.
- E. The material placed in the fill shall be free of all sod, roots, frozen soil, stones more than 6 inches in diameter, and other objectionable material. The placing and spreading of the fill material shall occur in approximately 6-inch horizontal layers or of such thickness that the required compaction can be obtained with the equipment used. Each layer shall be compacted in a way that will result in achieving 95 percent of the maximum standard dry

density.

- F. The distribution and gradation of materials throughout the fill shall be such that there will be no lenses, pockets, stakes, or layers of material differing substantially in texture or gradation from the surrounding material. Where it is necessary to use materials of varying texture and gradation, the more impervious material shall be placed in the upstream and center portions of the fill.
- G. The moisture content of fill material shall be such that the required degree of compaction can be obtained with the equipment used.
- H. Fill shall not be placed on frozen, slick, or saturated soil.
- I. The topsoil material saved in the site preparation shall be placed as a top dressing on the surface of the emergency spillways, embankments, and borrow areas. It shall be evenly spread.
- J. A protective cover of herbaceous vegetation shall be established on all exposed surfaces of the embankment, spillway, and borrow areas to the extent practical under prevailing soil and climatic conditions.
- K. Seedbed preparation, seeding, fertilizing, and mulching shall comply with the applicable sections of this Specification.
- L. Any material excavated from the pond shall be placed in one of the following ways so that its weight will not endanger the stability of the side slopes and where it will not be washed back into the pond by rainfall:
 - 1. uniformly spread to a depth not exceeding 3 feet and graded to a continuous slope away from the pond.
 - 2. 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.
- M. Sediment shall be removed from the pond when the capacity is reduced to one third of the design volume. Contractor shall follow the methods for disposing of sediment removed from the pond as shown in the Construction Drawings.

3.18 SILT FENCE

- A. This Article provides construction specifications for silt fences using synthetic fabric. See the Construction Drawings for additional detail.
- B. Posts shall be spaced a maximum of 10 feet apart at the barrier location and driven securely into the ground (minimum of 12 inches). When necessary because of rapid runoff, post spacing shall not exceed 6 feet.
- C. A trench shall be excavated at least 6 inches wide and 6 inches deep along the line of posts and upslope from the barrier.
- D. A wire mesh support fence shall be fastened securely to the upslope side of the posts using heavy-duty wire staples at least 1 inch long, tie wires or hog rings. The wire shall extend into the trench a minimum of 2 inches and shall not extend more than 36 inches above the original ground surface.
- E. The filter fabric shall be stapled or wired to the fence, and 12 inches of the fabric shall be extended into the trench. The fabric shall not extend more than 30 inches above the original ground surface. Filter fabric shall not be stapled to existing trees.

- F. At joints, filter fabric shall be lapped with terminating posts with a minimum overlap of 3 feet.
- G. The trench shall be backfilled and soil compacted over the filter fabric.
- H. Silt fences shall be removed when they have served their useful purpose, but not before the upslope area has been permanently stabilized.
- I. 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.
- J. Should the fabric on a silt fence or filter barrier decompose or become ineffective prior to the end of the expected usable life and if the barrier is still necessary, the fabric shall be replaced promptly.
- K. Sediment deposits shall be removed after each storm event or when deposits reach approximately one-third the height of the barrier.
- L. Any sediment deposits remaining in place after the silt fence or filter barrier is no longer required shall be dressed to conform to the existing grade, prepared, and seeded.
- M. Silt fences shall be replaced every 6 months.

3.19 STORM DRAIN INLET PROTECTION

- A. For silt fence drop inlet protection, the following specifications apply:
 1. For stakes, Contractor shall use 2 x 4-inch wood (preferred) or equivalent metal with a minimum length of 3 feet.
 2. Stakes shall be evenly spaced around the perimeter of the inlet a maximum of 3 feet apart and securely driven into the ground, approximately 18 inches deep.
 3. To provide needed stability to the installation, Contractor shall frame with 2 x 4-inch wood strips around the crest of the overflow area at a maximum of 1.5 feet above the drop inlet crest and shall brace diagonally.
 4. Contractor shall place the bottom 12 inches of the fabric in a trench and backfill the trench with at least 4 inches of crushed stone or 12 inches of compacted soil.
 5. Contractor shall fasten fabric securely to the stakes and frame. Joints shall be overlapped to the next stake.
- B. For sod drop inlet protection, sod shall be placed to form a turf mat covering the soil for a distance of 4 feet from each side of the inlet structure. Soil preparation and sod placement shall be in accordance with the section entitled Sod.
- C. For gravel curb inlet protection, the following specifications apply:
 1. Wire mesh with ½-inch openings shall be placed over the curb inlet opening so that at least 12 inches of wire extends across the concrete gutter from the inlet opening.
 2. KYTC No. 2 Coarse Aggregate shall be piled against the wire so as to anchor it against the gutter and inlet cover and to cover the inlet opening completely.
 3. This type of device must never be used where overflow may endanger an exposed fill slope. Consideration shall also be given to the possible effects of ponding on traffic movement, nearby structures, working areas, and adjacent property.

- D. For block and gravel curb inlet protection, the following specifications apply:
1. Two concrete blocks shall be placed on their sides abutting the curb at either side of the inlet opening to act as spacer blocks.
 2. A 2-inch by 4-inch stud shall be cut and placed through the outer holes of each spacer block to help keep the front blocks in place.
 3. Concrete blocks shall be placed on their sides across the front of the inlet and abutting the spacer blocks.
 4. Wire mesh shall be placed over the outside of the concrete blocks to prevent stone from being washed through the holes in the blocks. Wire with ½-inch openings shall be used.
 5. KYTC No. 2 Coarse Aggregate shall be piled against the wire to the top of the barrier.
- E. For stone-filled corrugated pipe curb inlet protection, the following specifications apply:
1. Two concrete "L" blocks shall be placed on their sides, with one leg fitting into the mouth of the curb opening.
 2. A 6-inch corrugated pipe shall be filled with stone and covered with a filter sock.
 3. The stone-filled pipe will be placed in front of the two concrete "L" blocks, and extend a minimum of the width of the curb inlet opening on either side. The total length of the stone filled pipe shall be three times the width of the curb inlet opening.
- F. The structure shall be inspected after each rain, and repairs made as needed.
- G. Sediment shall be removed and the device restored to its original dimensions when the sediment has accumulated to one-third the design depth of the filter. Removed sediment shall be deposited in a suitable area and in such a manner that it will not erode.
- H. 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.
- I. Structures shall be removed after the drainage area has been properly stabilized.

3.20 FILTER STRIP

- A. When planting filter strips, Contractor shall prepare seedbed, incorporate fertilizer, and apply mulch consistent with the seeding sections of this Specification. Filter strips using areas of existing vegetation shall be over seeded, as necessary, with the specified mixtures to obtain an equivalent density of vegetation. The over seeding shall be accomplished prior to any land disturbing activities.
- B. Filter strips shall be inspected regularly to ensure that a healthy vegetative growth is maintained. Any bare spots or spots where sediment deposition could lead to the destruction of vegetation shall be repaired.
- C. Filter strips shall be fertilized once each year in the fall.
- D. Irrigation shall be used as necessary to maintain the growth of the vegetation in the filter strip.
- E. Sediment shall be removed when it becomes visible in the filter.
- F. Construction traffic shall not be driven on or over filter strips.

3.21 STREAM CROSSING

- A. Clearing and excavation of the streambed and banks shall be kept to a minimum.
- B. The structure shall be removed as soon as it is no longer necessary for project construction.
- C. Upon removal of the structure, the stream shall immediately be reshaped to its original cross section and properly stabilized.
- D. 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.
- E. The structure shall be inspected after every rainfall and at least once a week and all damages repaired immediately.

3.22 PUMP-AROUND FLOW DIVERSION

- A. Operations shall be scheduled such that diversion installation, in-stream excavation, in-stream construction, stream restoration, and diversion removal are completed as quickly as possible. Contractor shall not construct in a stream when rainfall is expected during the time excavation will be occurring in the stream.
- B. Check dams shall be installed across the stream during low flow conditions.
- C. Stream flow shall be pumped around the check dams. Outlet protection shall be installed as required at the discharge point.
- D. Contractor shall dewater the work area and pump into a sediment trapping device.
- E. Contractor shall complete construction activities across the stream.
- F. Contractor shall restore the streambed and banks.
- G. Contractor shall remove sandbags and shut down pumping operation. (Salvage sandbags for future use if multiple stream crossings are required on the project.) Contractor shall remove all sandbags from the stream, including damaged and empty bags.
- H. Pumps shall be manned around-the-clock when the pump-around diversion is in the stream.
- I. 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.
- J. Contractor shall add sandbags as required to seal leaks in checks.

3.23 CONSTRUCTION DEWATERING

- A. Contractor shall follow the specifications for sediment traps and basins. The manufacturer's recommendations shall be followed for commercial products.
- B. The dewatering structure shall be inspected frequently to ensure it is functioning properly and not overtopping. Accumulated sediment shall be spread out on site and stabilized or disposed of offsite.

3.24 KPDES GENERAL PERMIT FOR STORM WATER DISCHARGES FROM CONSTRUCTION ACTIVITIES

- A. The Contractor is responsible for filing the appropriate state Notice of Intent (NOI-SWCA) letter at least seven (7) days prior to start of construction activity for an electronic submittal, and at least thirty (30) days prior to start for a paper submittal. The Notice of Intent (NOI) is a Kentucky Pollution Discharge Elimination System (KPDES) permit application as provided by the Kentucky Revised Statutes, Chapter 224. This application is required to be submitted for construction projects that disturb one or more acres of land. A permit application form is included in this specification Section.
- B. The NOI requires the inclusion of the descriptions of (but is not limited to) the following items:
1. Names and designated uses of any receiving waters
 2. Anticipated number and locations of discharge points
 3. Identification of planned construction in or along a water body
- C. A topographic map showing project boundaries, areas to be disturbed, locations of anticipated discharge points and receiving waters is also required to be submitted with the NOI.
- D. If the construction site is near a designated "High Quality/Impaired Waters" or a "Cold Water Aquatic Habitat Waters, Exceptional Waters, Outstanding National/State Resource Waters," additional items and/or individual permits will be required.
- E. The NOI form requires an SIC code. The link to the SIC codes is <http://www.osha.gov/pls/imis/sicsearch.html>. The following are the typical construction SIC codes utilized:
- 1542 – Building Construction, nonresidential, except industrial and warehouses
 - 1623 – Water Main Construction, Sewer Construction
 - 1629 – Water and Wastewater Treatment Plant Construction
 - 1711 – Water Pump Installation
 - 1781 – Drilling Water Wells
- F. The Contractor is responsible for implementing the approved Stormwater Pollution Prevention Plan (SWPPP) prior to commencement of site disturbance. The SWPPP shall include erosion prevention measures and sediment and pollutant control measures which are installed and maintained to minimize discharges of sediments and other pollutants from a 2-year, 24-hour storm event. The SWPPP must be kept at the site and available for review by LFUCG and state officials.
- G. The Contractor is responsible for the description of procedures to maintain erosion and sediment control measures during the period of construction.
- H. The Contractor is responsible for identifying each Contractor and Subcontractor who will install each SWPPP erosion and sediment control measure.
- I. Each Contractor and Subcontractor shall sign a statement certifying the awareness of the requirements of the SWPPP related documents. Certification is attached at the end of this section.
- J. The Contractor shall not start land disturbing activities until written permit coverage is obtained from the Kentucky Division of Water.
- K. The inspection by qualified personnel, **provided by the Contractor**, of the site as follows:

1. at least once every seven (7) calendar days, and
 2. within 24 hours after any storm event of 0.5 inch or greater
- L. The Contractor is responsible for completing and maintaining the required Self-Inspection Forms. A sample is included in this specification Section.
- M. Amendments to the approved SWPPP shall be made and implemented as necessary through the course of the construction project if inspections or investigations by the Contractor's inspector, site staff, or by local, state, or federal officials determine that the existing sediment control measures, erosion control measures, or other site management practices are ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the construction site. All plan amendments shall be noted on the copy of the SWPPP maintained at the project site.
- N. Upon completion of the project and establishment of all permanent erosion and sediment control structures and devices, the Contractor shall submit the Notice of Termination (NOT) form to the Kentucky Division of Water, the LFUCG Division of Water Quality, and the LFUCG Division of Engineering. This form is included at the end of this specification section.
- O. All subcontractors shall be required to comply with the requirements of the state permit and the Stormwater Pollution Prevention Plan (SWPPP).
- P. Where to submit:
1. Submit Notice of Intent (NOI) Form to: Operational Permits Section, SWP Branch, Division of Water, 200 Fair Oaks Lane, Frankfort, Kentucky 40601.
 2. For an electronic submittal, go to:
<https://dep.gateway.ky.gov/eForms/Default.aspx?FormID=3>
 3. Do not initiate work until receiving approval from the Kentucky Division of Water.
 4. A complete copy of the NOI submittal shall also be provided to:

Division of Water Quality
125 Lisle Industrial Avenue, Suite 180
Lexington, KY 40511

Division of Engineering
Lexington-Fayette Urban County Government
101 E. Vine St.
4th Floor
Lexington, KY 40507

3.25 LFUCG Land Disturbance Permit

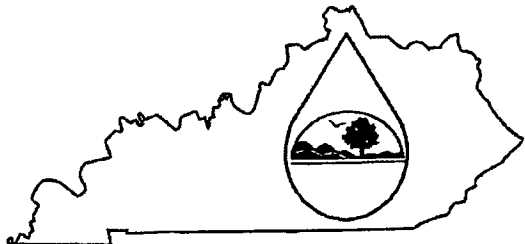
- A. The Contractor shall obtain a Land Disturbance Permit from the LFUCG Division of Engineering, after the LFUCG Division of Water Quality inspects the installation of the best management practices as required by the Stormwater Pollution Prevention Plan (SWPPP). The site grading plan shall show the original and finish grade contours. The grading plan shall be in conformance with the SWPPP.

B. Where to obtain:

Division of Engineering
Lexington-Fayette Urban County Government
101 E. Vine St.
4th Floor
Lexington, KY 40507
(859) 258-3410
Att: Land Disturbance Permit Section

- C. All excess earthen/rock materials hauled off the site to a location in Fayette County shall be hauled to a site permitted by the Kentucky Division of Water and the LFUCG. The haul site must be permitted in accordance with these specifications.

FORM NOI-SWCA



KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)

Notice of Intent (NOI) for coverage of Storm Water Discharges Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000

This is an application for:

- New construction activity.
- Modification of coverage for additional area in same watershed.
- Modification of coverage for additional area in different watershed.

If Modification is checked, state reason for Modification:

| | | | | | | | | | | |
|----------------|--------------------------|---|---|---|---|---|--|--|--|--|
| For Agency Use | Permit No. (Leave Blank) | K | Y | R | I | 0 | | | | |
| For Agency Use | AI ID (Leave Blank) | | | | | | | | | |

SECTION I – FACILITY OPERATOR INFORMATION

| | | | |
|--------------------|---------|---|--|
| Operator Name(s)*: | | Phone:* | |
| Mailing Address:* | | Status of Owner/Operator: <input type="checkbox"/> Private <input type="checkbox"/> State <input type="checkbox"/> Federal <input type="checkbox"/> Public (other than state or federal) | |
| City:* | State:* | Zip Code:* | |

SECTION II – FACILITY/SITE LOCATION INFORMATION

| | | |
|------------------------------|-------------------------------|------------|
| Name of Project:* | Physical Address:* | City:* |
| State:* | Zip Code:* | County:* |
| Latitude (decimal degrees):* | Longitude (decimal degrees):* | SIC Code:* |

SECTION III – SITE ACTIVITY INFORMATION

For single projects provide the following information

| | | | |
|------------------------------------|---|-------------|------------------|
| Total Number of acres in project:* | Total Number of acres to be disturbed:* | Start date: | Completion date: |
|------------------------------------|---|-------------|------------------|

For common plans of development projects provide the following information

| | | |
|--|---|---------------------------------|
| Total Number of acres in project:* | Number of individual lots in development: | Number of lots to be developed: |
| Total acreage intended to be disturbed:* | Number of acres intended to be disturbed at any one time: | |
| Start date: | Completion date: | List Contractors: |

SECTION IV – DISCHARGE TO A WATER BODY

| | |
|--|---|
| Name of Receiving Water:* | Anticipated number of discharge points: |
| Location of anticipated discharge points: Latitude (decimal degrees):* | Longitude (decimal degrees):* |
| Receiving Water Body Stream Use Designation | <input type="checkbox"/> Cold Water Aquatic Habitat <input type="checkbox"/> Domestic Water Supply <input type="checkbox"/> Outstanding State Resource Water <input type="checkbox"/> Secondary Contact Recreation <input type="checkbox"/> Primary Contact Recreation <input type="checkbox"/> Warm Water Aquatic Habitat |
| Antidegradation Categorization | <input type="checkbox"/> Outstanding National Resource Water <input type="checkbox"/> Exceptional Water <input type="checkbox"/> High Quality Water <input type="checkbox"/> Impaired Water |
| Name of Receiving Water:* | Anticipated number of discharge points: |
| Location of anticipated discharge points: Latitude (decimal degrees):* | Longitude (decimal degrees):* |
| Receiving Water Body Stream Use Designation | <input type="checkbox"/> Cold Water Aquatic Habitat <input type="checkbox"/> Domestic Water Supply <input type="checkbox"/> Outstanding State Resource Water <input type="checkbox"/> Secondary Contact Recreation <input type="checkbox"/> Primary Contact Recreation <input type="checkbox"/> Warm Water Aquatic Habitat |
| Antidegradation Categorization | <input type="checkbox"/> Outstanding National Resource Water <input type="checkbox"/> Exceptional Water <input type="checkbox"/> High Quality Water <input type="checkbox"/> Impaired Water |

FORM NOI-SWCA

| | | | |
|--|-----------------------------------|---|-------------------------------|
| SECTION V - DISCHARGE TO AN MS4 | | | |
| Name of MS4: | | Date of application /notification to the MS4 for construction site coverage: | |
| Number of discharge points: | Location of each discharge point: | Latitude (decimal degrees):* | Longitude (decimal degrees) * |
| SECTION VI - CONSTRUCTION ACTIVITIES IN OR ALONG A WATER BODY | | | |
| Will the project require construction activities in a water body or the riparian zone. <input type="checkbox"/> Yes <input type="checkbox"/> No | | | |
| If yes, describe scope of activity: | | | |
| Is a Clean Water Act 404 permit required. <input type="checkbox"/> Yes <input type="checkbox"/> No | | Is a Clean Water Act 401 Water Quality Certification required. <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| SECTION VII - NOI PREPARER INFORMATION | | | |
| First Name:* | Last Name:* | Phone:* | eMail Address * |
| Mailing Address:* | City:* | State:* | Zip Code:* |
| SECTION VIII - ATTACHMENTS | | | |
| Attach a full size color USGS 7 1/2-minute quadrangle map with the facility site clearly marked. USGS maps may be obtained from the University of Kentucky, Mines and Minerals Bldg. Room 106, Lexington, Kentucky 40506. Phone number (859) 257-3896. | | | |
| SECTION IX - CERTIFICATION | | | |
| I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. | | | |
| Signature:* | First Name:* | Last Name:* | |
| Phone:* | eMail Address: | Date:* | |

This completed application form and attachments should be sent to: SWP Branch, Division of Water, 200 Fair Oaks, Frankfort, Kentucky 40601. Questions should be directed to: SWP Branch, Operational Permits Section at (502) 564-3410

KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM FORM NOI-SWCA – INSTRUCTIONS

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM

Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the **Storm Water Contact, Operational Permits Section, Kentucky Division of Water at (502) 564-3410.**

WHERE TO FILE NOI FORM

NOIs must be sent to the following address or submitted in on-line at <https://dep.gateway.ky.gov/cForms/Default.aspx?FormID=3>:

Operational Permits Section
SWP Branch, Division of Water
200 Fair Oaks Lane
Frankfort, KY 40601

Electronic NOI-SWCAs are to be submitted a minimum of seven (7) working days prior to commencement of construction related activities. Paper NOI-SWCAs are to be submitted a minimum of thirty (30) working days prior to commencement of construction related activities.

COMPLETING THE FORM

Enter information in the appropriate areas only. (*) denotes a required field. Enter N/A (Not Applicable) for fields that are required but do not apply to your submission. If you have any questions regarding the completion of this form call the **Storm Water Contact, Operational Permits Section, at (502) 564-3410.**

SECTION I – FACILITY OPERATOR INFORMATION

Operator Name(s): Enter the name or names of all operators applying for coverage under KYR10 using this NOI.
Mailing Address, City, State, and Zip Code: Provide the mailing address of the primary operator
Phone No.: Provide the telephone numbers of the person who is responsible for the operation.
Status of Owner/Operator: Select the appropriate legal status of the operator of the facility from the dropdown list.

Federal
Public (other than federal or state)
State
Private

SECTION II – FACILITY/SITE LOCATION INFORMATION

Name of Project: Provide the name of the project.
Physical Address, City, State, Zip Code and County: Provide the physical address of the project.
Latitude/Longitude: Provide the general site latitude and longitude of the operation.
SIC Code: Enter the Standard Industrial Code for the project

SECTION III – SITE ACTIVITY INFORMATION

For single projects provide the following information:

Total number of acres in project: Indicate the total acreage of the project including both disturbed and undisturbed areas.
Total number of acres to be disturbed: Indicate the total number of acres of the project to be disturbed.
Anticipated start date: Indicate the approximate date of when construction activities will begin.
Anticipated completion date: Indicated the approximate date of when final stabilization will be achieved.

For common plans of development provide the following information:

Total number of acres in project: Indicate the total acreage of the project including both disturbed and undisturbed areas.
Number of individual lots in development, if applicable: Indicate the number of individual lots or unit in the common plan of development
Number of lots to be developed: Indicate the number of lots that you intend to develop.
Total acreage of lots intended to develop: Indicate the total acreage of the lots you intend to develop
Total acreage intended to disturb: Indicate the total acreage of the lots you intend to disturb
Number of acres intended to disturb at any one time: Indicate the maximum number of acres to be disturbed at any one time.
Anticipated start date: Indicate the approximate date of when construction activities will begin.
Anticipated completion date: Indicated the approximate date of when final stabilization will be achieved.
List of contractors: Provide the names of all known contractors that will be working on site.

**KENTUCKY POLLUTANT DISCHARGE ELIMINATION SYSTEM
FORM NOI-SWCA – INSTRUCTIONS**

SECTION IV – IF THE PERMITTED SITE DISCHARGES TO A WATER BODY THE FOLLOWING INFORMATION IS REQUIRED

Name of Receiving Water: Provide the names of the each water body receiving discharges from the site. Provide only official USGS names do not provide local names

Anticipated number of discharge points: Indicate the number of discharge points to each receiving water body.

Location of anticipated discharge points: Provide the latitude and longitude of each discharge point. Add points as necessary.

Receiving Water Body Stream Use Designation: Check all appropriate boxes

Antidegradation Categorization: Select from the drop down box one of the following:

Outstanding National Resource Water
Exceptional Water
High Quality Water
Impaired Water

SECTION V – IF THE PERMITTED SITE DISCHARGES TO A MS4 THE FOLLOWING INFORMATION IS REQUIRED

Name of MS4: Provide the name of the MS4 to which the activity will discharge

Number of discharge points to the MS4: Indicate the number of discharge points

Location of each discharge point: Provide the latitude and longitude of each discharge point. Add points as necessary

Date of application/notification to the MS4 for construction site permit coverage: Indicate the date the MS4 has or will be notified.

SECTION VI – CONSTRUCTION ACTIVITIES IN OR ALONG A WATER BODY

Will the project require construction activities in a water body or the riparian zone: Select Yes or No from the drop down box.

If Yes, describe scope of activity: Provide a brief description of the activity (ies) that will take place in the water body or the riparian zone.

Is a Clean Water Act 404 permit required: Select Yes or No from the drop down box.

Is a Clean Water Act 401 Water Quality Certification required: Select Yes or No from the drop down box.

SECTION VII – NOI PREPARER INFORMATION

Provide the name, mailing address, telephone number and eMail address of the person preparing the NOI.

SECTION VIII –Attachments

Attach a USGS topographic map indicating the location of the activity and the proposed discharge points.

SECTION IX – CERTIFICATION

Provide the name, mailing address, telephone number and eMail address of the person who is responsible for the activity

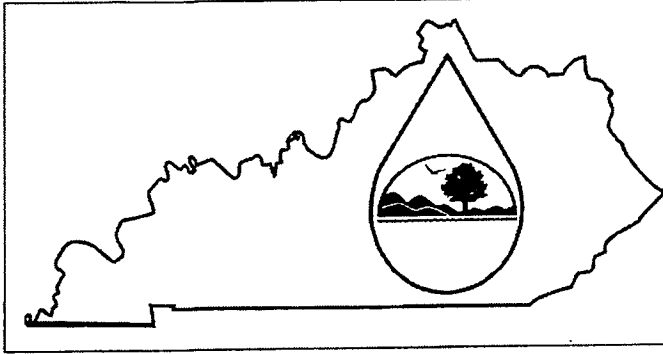
Signature: Provide full name of the responsibility party. This will constitute a signature.

The NOI must be signed as follows:

Corporation: by a principal executive officer of at least the level of vice president

Partnership or sole proprietorship: by a general partner or the proprietor respectively

KPDES FORM NOT-SW



Kentucky Pollutant Discharge
Elimination System (KPDES)

NOTICE OF TERMINATION (NOT)
of Coverage Under the KPDES
General Permit for Storm Water
Discharges Associated with
Industrial Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the KPDES program.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.
(Please see instructions on back before completing this form.)

| |
|--|
| I. PERMIT INFORMATION |
| KPDES Storm Water General Permit Number: |
| Check here if you are no longer the Operator of the Facility: <input type="checkbox"/> |
| Check here if the Storm Water Discharge is Being Terminated: <input type="checkbox"/> |
| II. FACILITY OPERATOR INFORMATION |
| Name: |
| Address: |
| City/State/Zip Code: |
| Telephone Number: |
| III. FACILITY/SITE LOCATION INFORMATION |
| Name: |
| Address: |
| City/State/Zip Code: |

Certification: I certify under penalty of law that all storm water discharges associated with industrial activity from the identified facility that are authorized by a KPDES general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial activity under this general permit, and that discharging pollutants in storm water associated with industrial activity of waters of the Commonwealth is unlawful under the Clean Water Act and Kentucky Regulations where the discharge is not authorized by a KPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Kentucky Revised Statutes.

| | |
|----------------------|-------|
| NAME (Print or Type) | TITLE |
| SIGNATURE | DATE |

Revised June 1999

INSTRUCTIONS
NOTICE OF TERMINATION (NOT) OF COVERAGE UNDER THE KPDES GENERAL PERMIT
FOR STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Who May File a Notice of Termination (NOT) Form

Permittees who are presently covered under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Storm Water Discharges Associated with Industrial Activity may submit a Notice of Termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at 40 CFR 122.26 (b)(14), or when they are no longer the operator of the facilities.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with industrial activity from the construction site that are authorized by a KPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Where to File NOT Form

Send this form to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
14 Reilly Road, Frankfort Office Park
Frankfort, KY 40601

Completing the Form

Type or print legibly in the appropriate areas and according to the instructions given for each section. If you have questions about this form, call the Storm Water Contact, Industrial Section, at (502) 564-3410.

Section I - Permit Information

Enter the existing KPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, call the Storm Water Contact, Industrial Section at (502) 564-3410.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II - Facility Operator Information

Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information

Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code. If the facility lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quarter, section, township, and range (to the nearest quarter section) of the approximate center of the site.

Section IV - Certification

Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor, or

For a municipality, State, Federal, or other public facility: by either a principal executive

Revised June 1999

LFUCG LAND DISTURBANCE PERMIT APPLICATION AND ESC PLAN CHECKLIST

OWNER / DEVELOPER Name: _____ Date: _____ Zone: _____
 Address: _____ City: _____ State: _____ Zip: _____
 Contractor Name and Address: _____ Reg #: _____
 Contact Name, Phone/ FAX/Email: _____

| ITEM DESCRIPTION | Y | N | N/A | PAGE # | NOTES |
|--|--------------------------|--------------------------|--------------------------|--------|--|
| I. Permits: | | | | | |
| KY Construction Permit (KYR10 or Indvid) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| USCOE 404 Permit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| KYDOW 401 Water Quality Cert. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| KY Stream Construction Permit | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| FEMA LOMR or CLOMR | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| II. BMPS: | | | | | |
| Site Preparation: | | | | | |
| Phasing plan for large projects | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Maximum disturbed area = 25 acres |
| Limits of disturbance clearly marked | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | 25 foot undisturbed buffer strip along streams |
| Construction Entrance/ Exit Pad | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | No. 2 stone w/ filter fabric, min. 50 ft long (100' where practical) |
| Temporary Diversion (Berm or Ditch) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Offsite (clean) water routed around disturbed area |
| Stream Crossings | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Not allowed without US Army Corps 404 permit |
| Concrete Washout Area | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | One washout pit for every 40 lots |
| Soil Stabilization: | | | | | |
| Seeding/sodding schedule/timing | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Applied within 14 days of reaching final grade or suspending work |
| Slope Protection: | | | | | |
| Silt Fence downslope of bare areas | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Silt Fence installed along contour | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Erosion Control Blankets on slopes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Conforms with Fig. 11-1 in LFUCG Stormwater Manual |
| Drainage System Control: | | | | | |
| Inlets Protected | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Pipe Outfall Erosion Prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Channel Lining | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Sodding or seed w/ blankets/mats immediately after construction |
| Check Dams | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Max drainage area = 10 acres |
| Sediment Basins and Traps: | | | | | |
| Sediment Traps (drainage area < 5 ac) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Minimum volume = 2yr-24hr runoff volume |
| Sediment Basins (drainage area = > 5 ac) | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Minimum volume = 2yr-24hr runoff volume |
| Good Housekeeping: | | | | | |
| Material storage addressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Spill Prevention and Control addressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Dust control addressed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Dewatering operations are filtered | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Narrative: | | | | | |
| Schedule/sequence for BMP installation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| BMP Inspection Requirement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | Every 7 days, or every 14 days and after 0.5" of rainfall |
| BMP Maintenance Requirement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |
| Roadway Cleaning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | | |

LFUCG USE ONLY: Review Date: _____ Status: In Compliance: Y N Additional Info Needed: Y N
 Reviewed By: _____ Department: _____

Comments / Items Missing or Incomplete:

Form Effective Date - January 13, 2011

Kentucky Best Management Practices Plan • Construction Site Inspection Report

| | | |
|---|---------------------------------------|---|
| Company: | Site: | County: |
| Site Operator: | | Date: |
| Receiving Water: | Total Site Area (acres): | # Disturbed Acres: |
| Inspector Name: | Inspector Qualifications: | |
| Inspection Type: Weekly or ½ Inch Rain | Days Since Last Rainfall _____ | # Inches of Last Rainfall: _____ |

Field Inspection Observations

| BMP Category | Compliance | | | Field Indicators for Compliance |
|---------------------------------|------------|----|-----|---|
| | Yes | No | N/A | |
| Project Operations | | | | Notice of Intent (KPDES permit) and other local/state permits on file BMP Plan on site and available for review Project timing/schedule and activities following BMP Plan Weekly inspection and rain-event reports on BMPs available for review Diversions, silt checks/traps/basins, and silt fences/barriers installed prior to clearing Grading and clearing conducted in phases to minimize exposed soil areas No vegetation removal or operations in stream or sinkhole buffer area (25-50 ft min) Rock pad in place on all construction site exits leading to paved roads No sediment, mud, or rock on paved public roads in project area Dust control if needed when working in residential areas during dry conditions |
| Drainage Management | | | | Upland runoff diverted around bare soil areas with vegetated/lined ditches/berms Drainage channels exiting the site are lined with grass/blanket/rock and stabilized Discharges from dewatering operations cleaned in silt fence enclosure or other filter No muddy runoff leaving site after rains up to 1½ inches |
| Erosion Protection | | | | Exposed soil seeded/mulched after 2 weeks if no work is planned for the next 7 days Soils on steep slopes seeded/mulched/blanketed as needed to prevent rutting |
| Sediment Barriers | | | | Silt fence, rock filter, or other sediment barrier below all bare soil areas on slopes Barrier installed across slope on the contour, trenched in, posts on downhill side Multiple sediment barriers at least 125 ft apart on unseeded slopes steeper than 4:1 J-hook interceptors along silt fence where heavy muddy flows run along fencing No visible undercutting or bypassing or blowout of sediment barrier Accumulated sediment is less than halfway to the top of sediment barrier |
| Slope Protection | | | | Slopes tracked, disked, or conditioned after final grade is established Slopes seeded, mulched, or blanketed within 21 days, no unmanaged rills or gullying Heavy downslope flows controlled by lined downdrain channels or slope drain pipes No muddy runoff from slopes into streams, rivers, lakes, or wetlands |
| Inlet Protection | | | | Inlet dam/device or filtration unit placed at all inlets receiving muddy flows No visible undercutting, bypassing, or blowout of inlet protection dam or device Accumulated sediment is less than halfway to the top of the inlet protection dam/device |
| Outlet Protection | | | | High flow discharges have rock or other flow dissipaters of adequate sizing at outlet Culvert outlets show no visible signs of erosion/scour, bank failure, or collapse |
| Ditch and Channel Stabilization | | | | No unmanaged channel bank erosion or bottom scouring visible within or below site Ditches with slopes more than 3% have check dams spaced as needed, if not grassed Ditch check dams tied in to banks, with center 4" lower than sides, and no bypassing Ditches with slopes of up to 5% are thickly seeded with grass (minimum requirement) Ditches 5% to 15% are lined with thick grass and erosion control blankets as needed Ditches 15% to 33% are lined with thick grass and matting or other approved product Ditches exceeding 33% are paved or lined with rock or other approved product |

CONTRACTOR AND SUBCONTRACTOR CERTIFICATIONS

SWPPP Files, Updates, and Amendments

This SWPP Plan and related documents (e.g., NOI, inspection reports, US ACE permits, etc.) will be kept on file at the construction site by _____ (name and title). The SWPPP will be updated by the Owner and/or Site Manager to reflect any and all significant changes in site conditions, selection of BMPs, the presence of any unlisted potential pollutants on site, or changes in the Site Manager, contractor, subcontractors, or other key information. Updates and amendments will be made in writing within 7 days and will be appended to the original BMP Plan and available for review.

Stormwater Pollution Prevention Plan Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____

Date: _____

Title: _____

I certify under penalty of law that I understand the terms and conditions of the general KPDES permit that authorizes the storm water discharges associated with the construction site activity identified as part of this certification.

Subcontractor Certification

The subcontractors below certify under penalty of law that they understand the terms and conditions of the general KPDES permit that authorizes the storm water discharges associated with the construction site activity identified as part of this certification.

Signed: _____

Date: _____

Title: _____

Signed: _____

Date: _____

Title: _____

Signed: _____

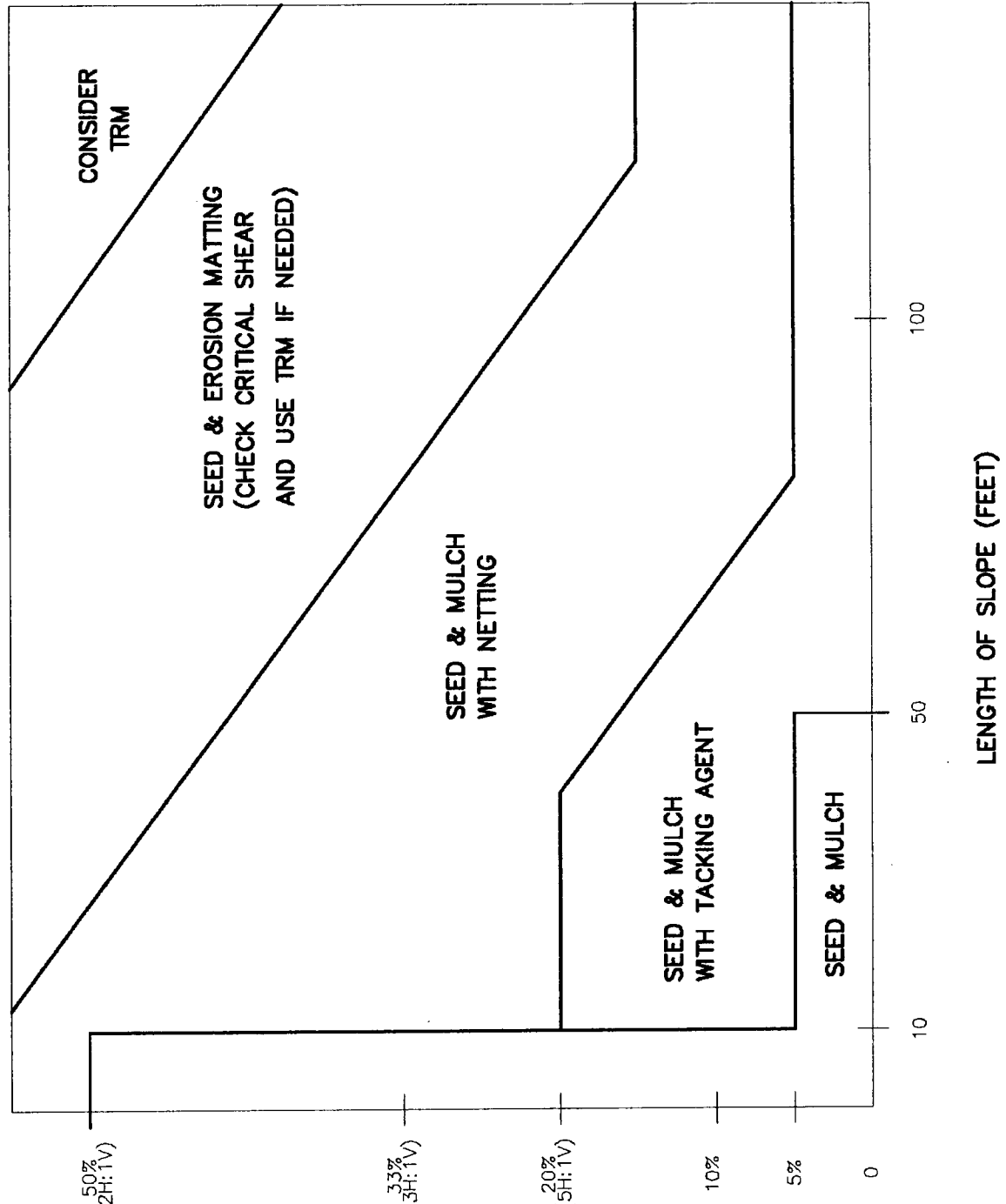
Date: _____

Title: _____



STORMWATER MANUAL

FIGURE 11-1
SLOPE PROTECTION GUIDANCE
(EFFECTIVE DATE 1/13/2011)



SLOPE PROTECTION GUIDANCE

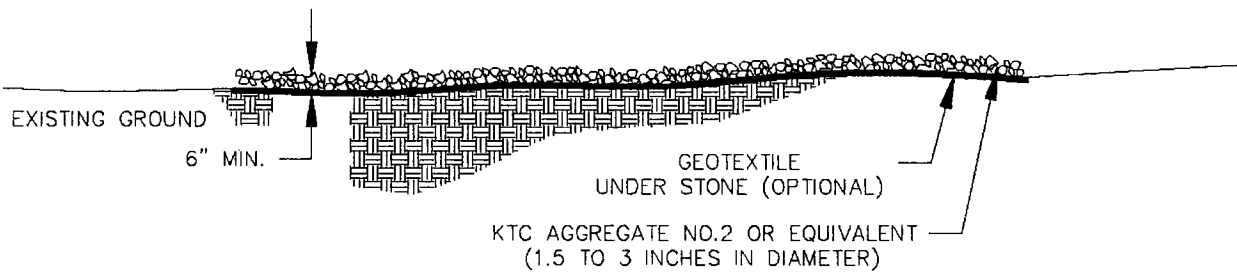
NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



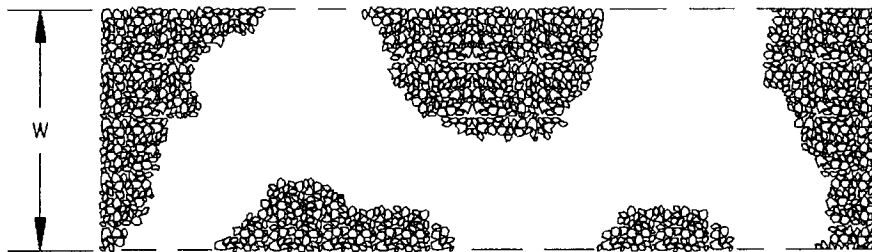
STORMWATER MANUAL

FIGURE 11-2
ROAD\PARPING STABILIZATION
(EFFECTIVE DATE 1/13/2011)

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS,
THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



CROSS SECTION



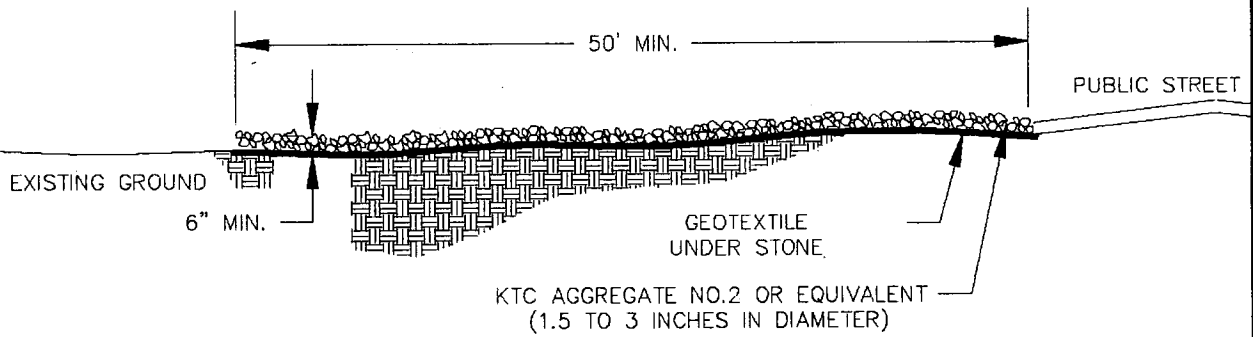
PLAN VIEW

W = 14' MIN. FOR ONE WAY TRAFFIC
20' MIN. FOR TWO WAY TRAFFIC

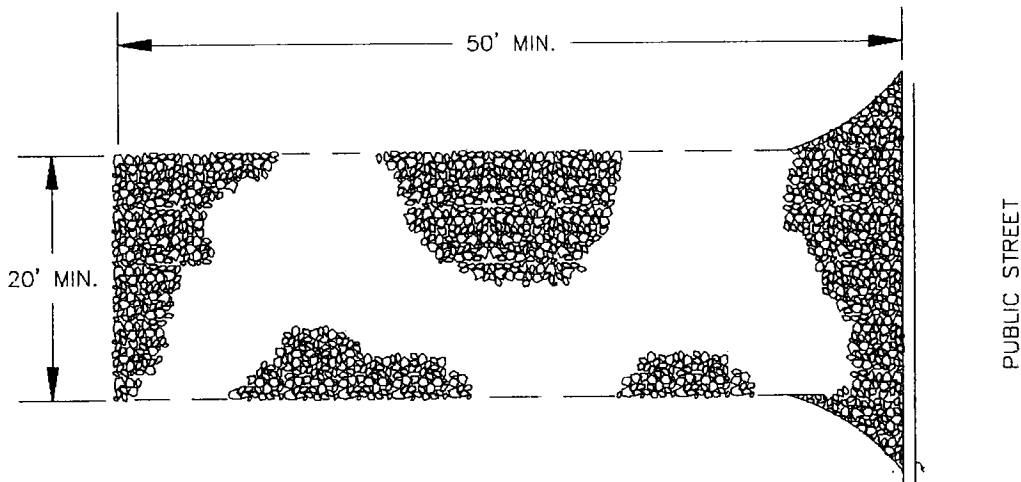


STORMWATER MANUAL

FIGURE 11-3
CONSTRUCTION ENTRANCE
(EFFECTIVE DATE 1/13/2011)



CROSS SECTION



PLAN VIEW

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS,
THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

FIGURE 11-4 CONSTRUCTION ENTRANCE NOTES AND SPECIFICATIONS (EFFECTIVE DATE 1/13/2011)

SPECIFICATIONS FOR GEOTEXTILE FABRIC

| | |
|-----------------------|--|
| GRAB TENSILE STRENGTH | 220 LBS. (MIN.) (ASTM D1682) |
| ELONGATION FAILURE | 60% (MIN.) (ASTM D1682) |
| MULLEN BURST STRENGTH | 430 LBS. (MIN.) (ASTM D3768) |
| PUNCTURE STRENGTH | 125 LBS. (MIN.) (ASTM D751) (MODIFIED) |
| EQUIVALENT OPENING | SIZE 40-80 (US STD SIEVE) (CW-02215) |

NOTES

1. A STABILIZED ENTRANCE PAD OF CRUSHED STONE SHALL BE LOCATED WHERE TRAFFIC WILL ENTER OR LEAVE THE CONSTRUCTION SITE ONTO A PUBLIC STREET.
2. SOIL STABILIZATION FABRIC SHALL BE USED AS A BASE FOR THE CONSTRUCTION ENTRANCE.
3. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC STREETS OR EXISTING PAVEMENT. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS WARRANT AND REPAIR OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
4. ANY SEDIMENT SPILLED, DROPPED, WASHED, OR TRACKED ONTO PUBLIC STREETS OR INTO STORM DRAINS MUST BE REMOVED IMMEDIATELY.
5. WHEN APPROPRIATE, WHEELS MUST BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTERING A PUBLIC STREET. WHEN WASHING IS REQUIRED, IT SHALL BE DONE IN AN AREA STABILIZED WITH CRUSHED STONE WHICH DRAINS INTO AN APPROVED SEDIMENT BASIN.

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS,
THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

FIGURE 11-5
**STAPLE PATTERN FOR STRAW
 OR EXCELSIOR MATS**
 (EFFECTIVE DATE 1/13/2011)

SLOPES UP TO 1.5H:1V

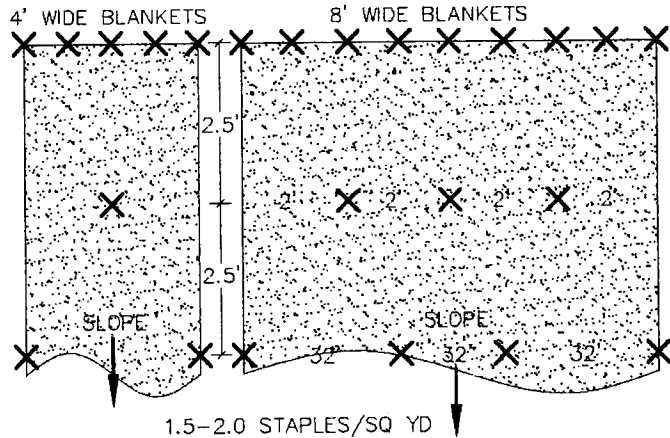
- INSTALL BLANKET VERTICALLY OR HORIZONTALLY
- USE 12" STAPLE SPACING ON STARTER ROW.

COHESIVE SOILS:

- NO OVERLAP REQUIRED ON SIDE SEAMS
- USE 6" STAPLE LENGTH

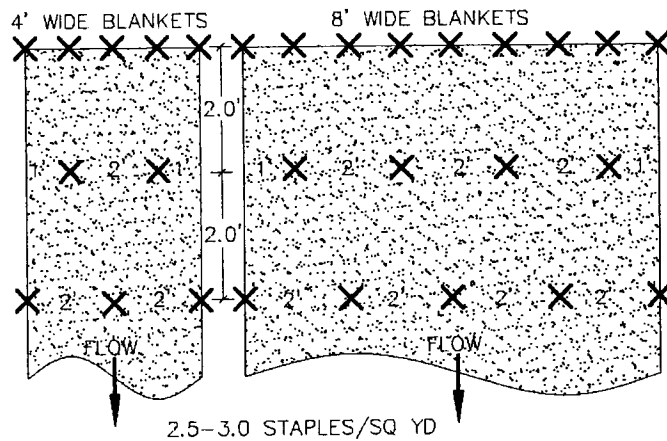
NON-COHESIVE SOILS:

- USE 6" SIDE SEAM OVERLAP
- USE 8" STAPLE LENGTH
- USE 6" ANCHOR TRENCH AT TOP OF SLOPE



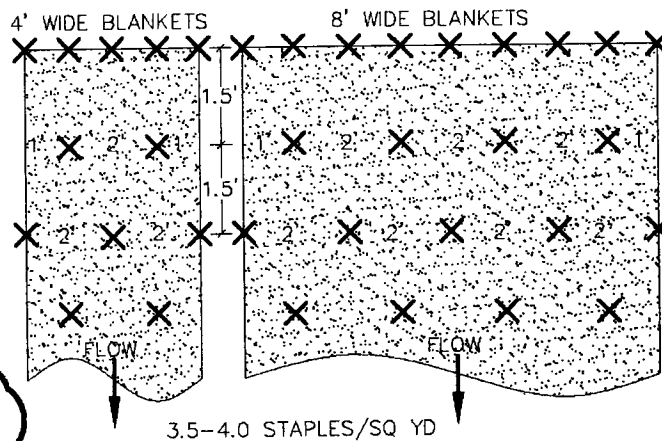
CHANNELS IN COHESIVE SOILS

- USE 6" SIDE SEAM OVERLAP
- USE 6" STAPLE LENGTH
- USE 6" TRANSVERSE ANCHOR TRENCH AT 100-FT. INTERVALS
- USE 12" STAPLE SPACING ON STARTER ROW.
- UPSTREAM BLANKET SHOULD OVERLAP DOWNSTREAM BLANKET A DISTANCE OF 12" IN A "SHINGLE" FASHION AND BURY THE FINISHED TOE AT LEAST 6".



CHANNELS IN NON-COHESIVE SOILS

- USE 6" SIDE SEAM OVERLAP
- USE 8" STAPLE LENGTH
- USE 6" TRANSVERSE ANCHOR TRENCH AT 50-FT. INTERVALS
- USE 12" STAPLE SPACING ON STARTER ROW.
- UPSTREAM BLANKET SHOULD OVERLAP DOWNSTREAM BLANKET A DISTANCE OF 12" IN A "SHINGLE" FASHION AND BURY THE FINISHED TOE AT LEAST 6".

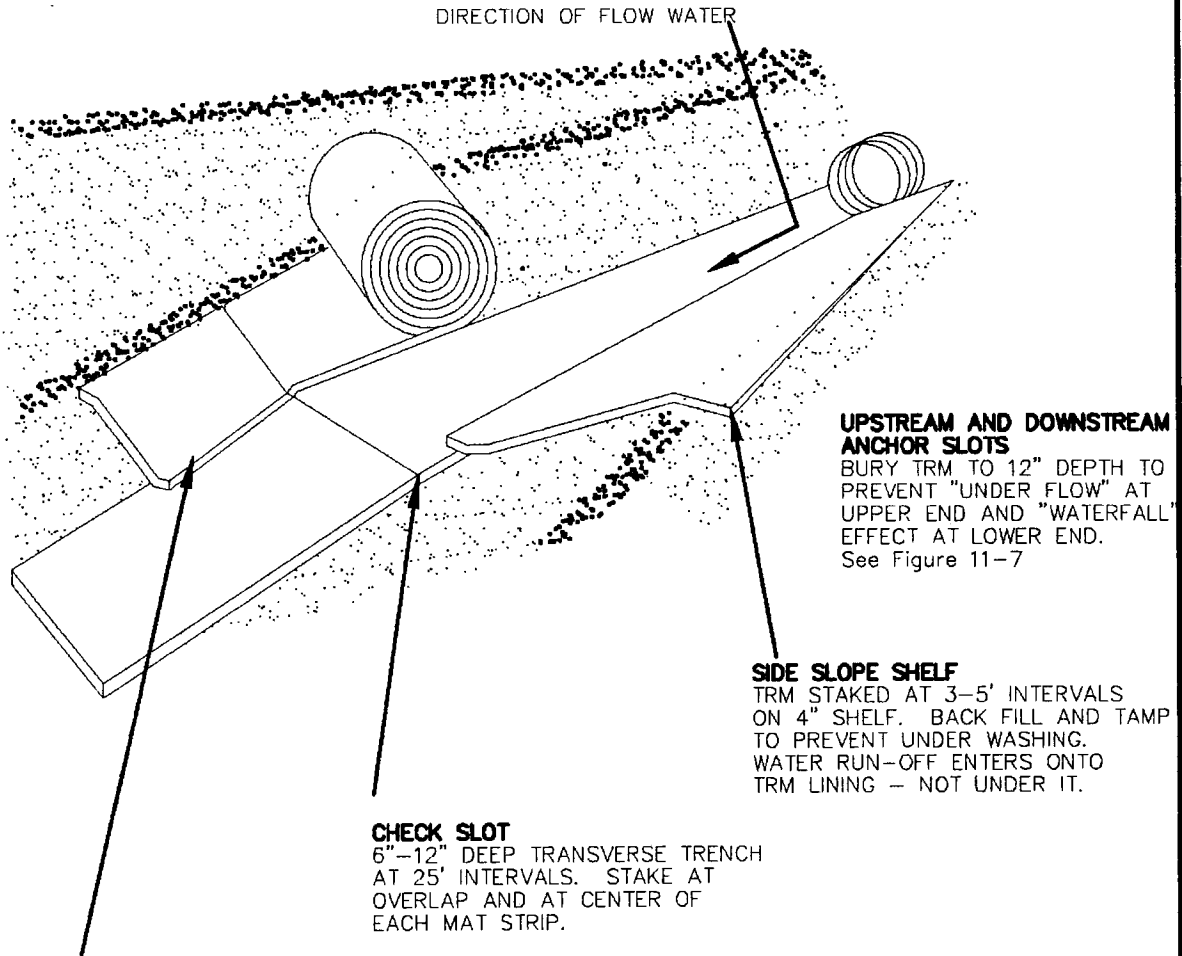


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



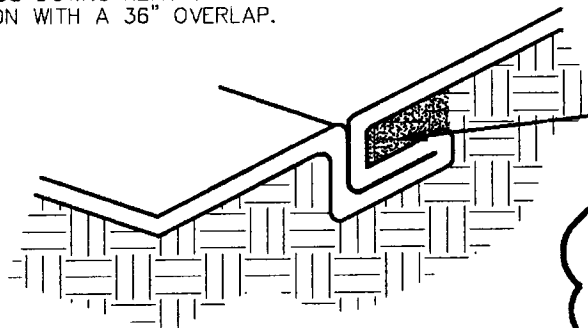
STORMWATER MANUAL

FIGURE 11-6
PLACEMENT OF TRM IN CHANNEL
(EFFECTIVE DATE 1/13/2011)



OVERLAP IN A SHINGLE FASHION
3" OVERLAP STAKED AT 3-5' INTERVALS

WHEN ROLL TERMINATES, IT IS STAKED OVER THE ROLL WHICH EXTENDS DOWNSTREAM IN A SHINGLE FASHION WITH A 36" OVERLAP.



CHECK SLOT DETAIL
STAKE AND BACK FILL IN CHECK SLOT BEFORE CONTINUING TO PLACE UPSLOPE

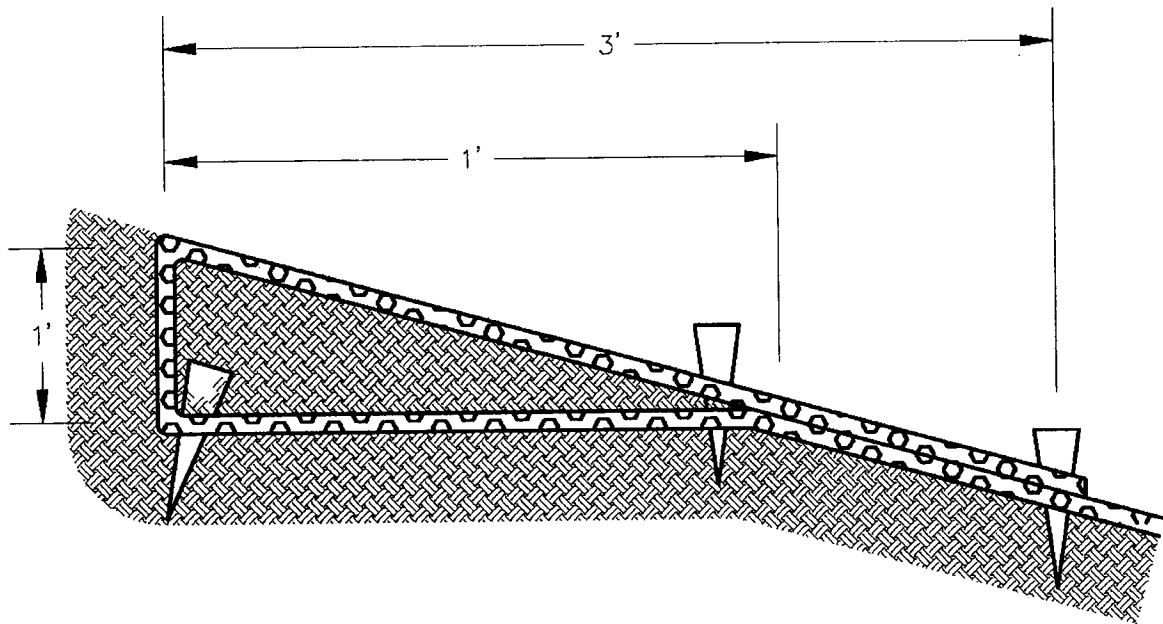
NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



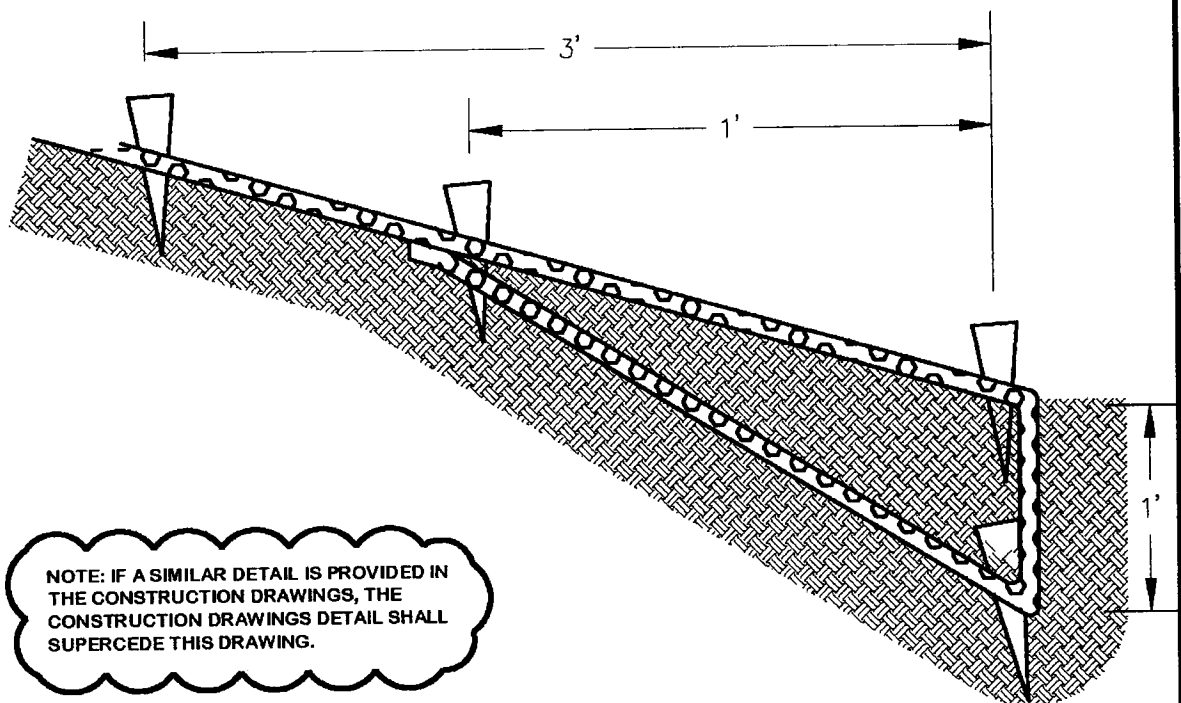
STORMWATER MANUAL

FIGURE 11-7
ANCHOR SLOT DETAILS FOR TRM
(EFFECTIVE DATE 1/13/2011)

UPSTREAM ANCHOR SLOT DETAIL



DOWNSTREAM ANCHOR SLOT DETAIL

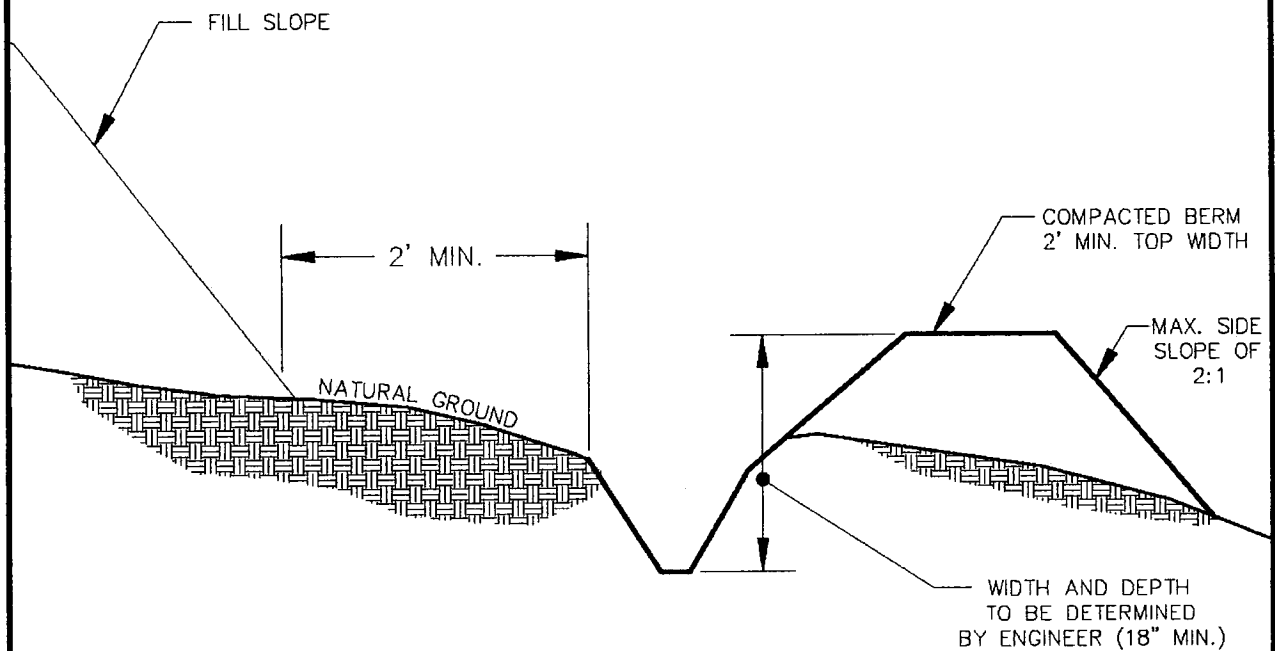


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN
THE CONSTRUCTION DRAWINGS, THE
CONSTRUCTION DRAWINGS DETAIL SHALL
SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

FIGURE 11-12
TEMPORARY DIVERSION DITCH
(EFFECTIVE DATE 1/13/2011)



NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.

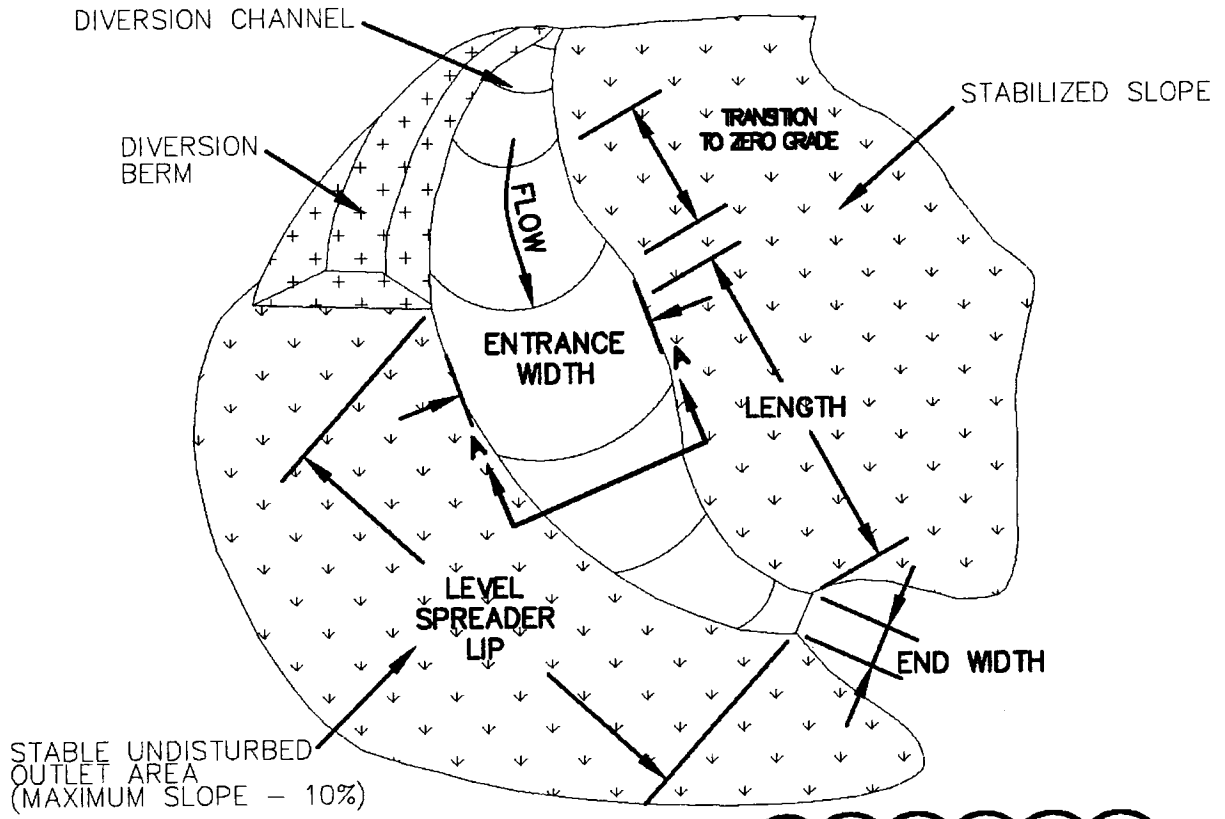


STORMWATER MANUAL

FIGURE 11-13

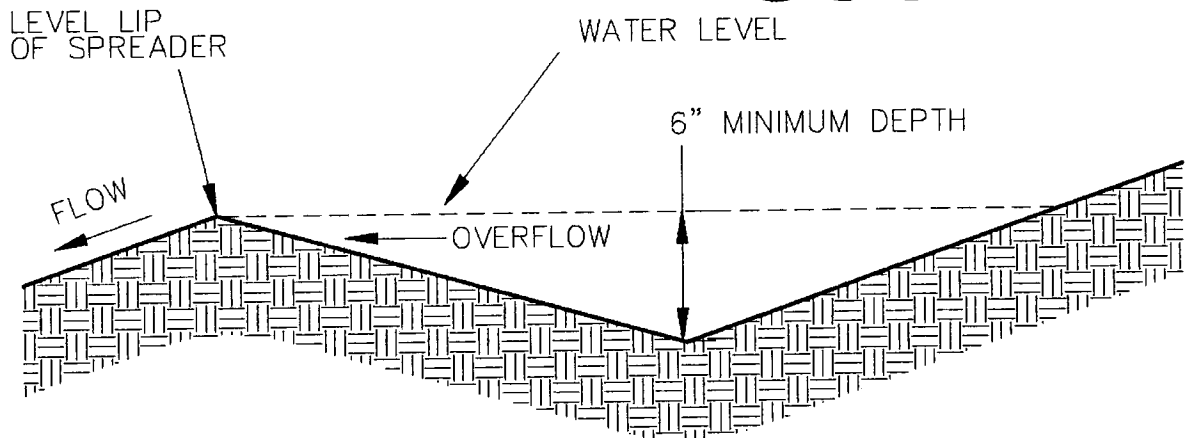
LEVEL SPREADER

(EFFECTIVE DATE 1/13/2011)



PERSPECTIVE

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.

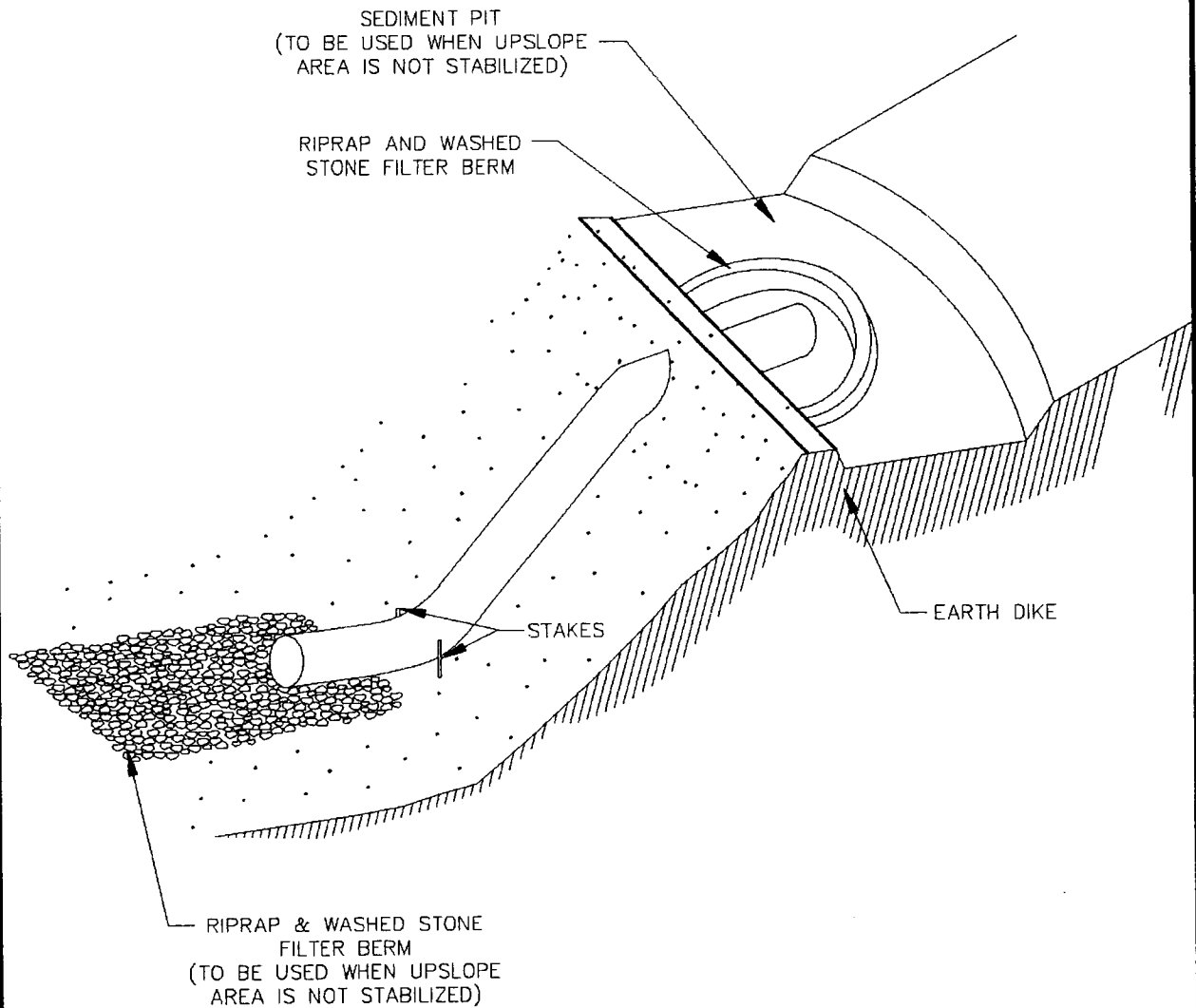


SECTION A-A



STORMWATER MANUAL

FIGURE 11-14
FLEXIBLE PIPE SLOPE DRAIN
(EFFECTIVE DATE 1/13/2011)

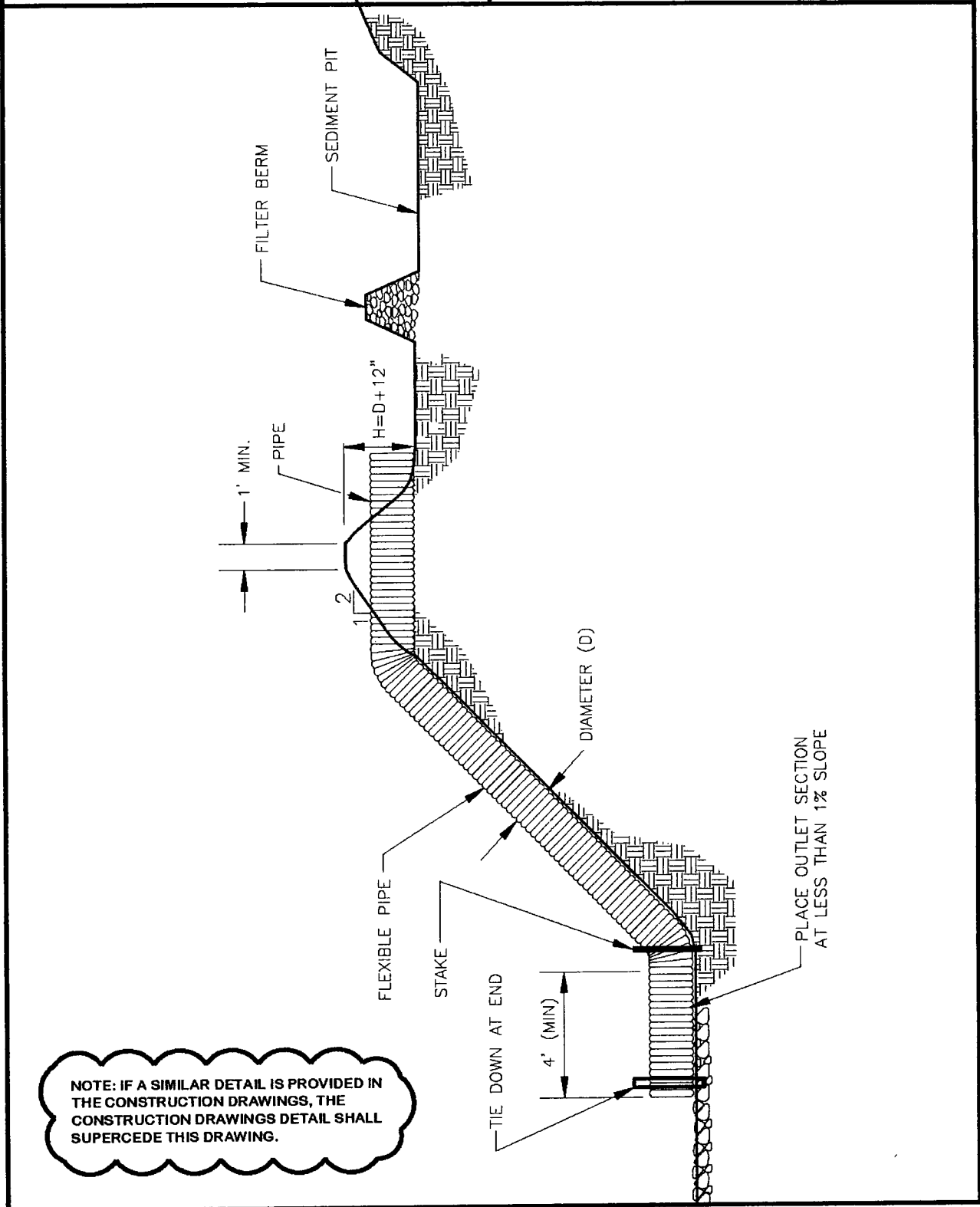


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN
THE CONSTRUCTION DRAWINGS, THE
CONSTRUCTION DRAWINGS DETAIL SHALL
SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

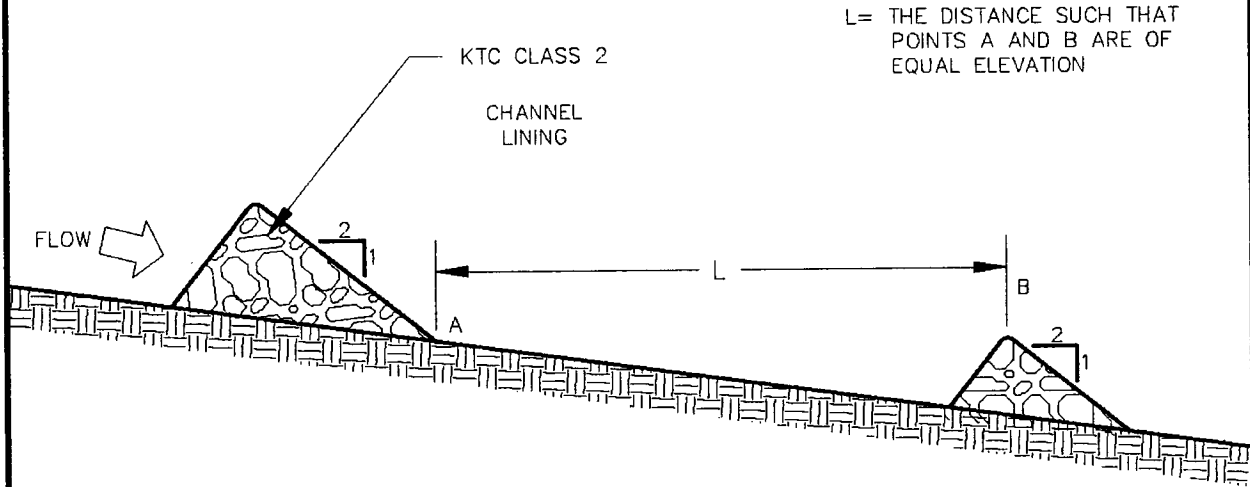
FIGURE 11-15
SLOPE DRAIN - PROFILE
(EFFECTIVE DATE 1/13/2011)





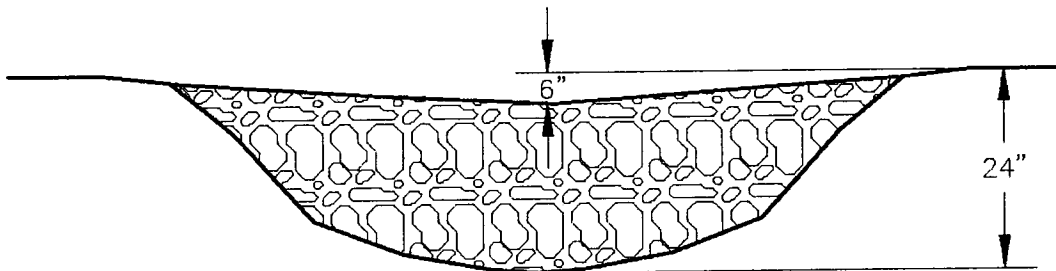
STORMWATER MANUAL

FIGURE 11-16
ROCK CHECK DAM
(EFFECTIVE DATE 1/13/2011)



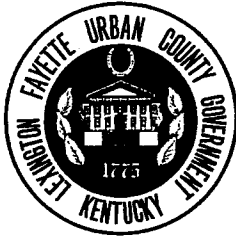
L= THE DISTANCE SUCH THAT
POINTS A AND B ARE OF
EQUAL ELEVATION

**LONGITUDINAL SECTION SHOWING
SPACING BETWEEN CHECK DAMS**



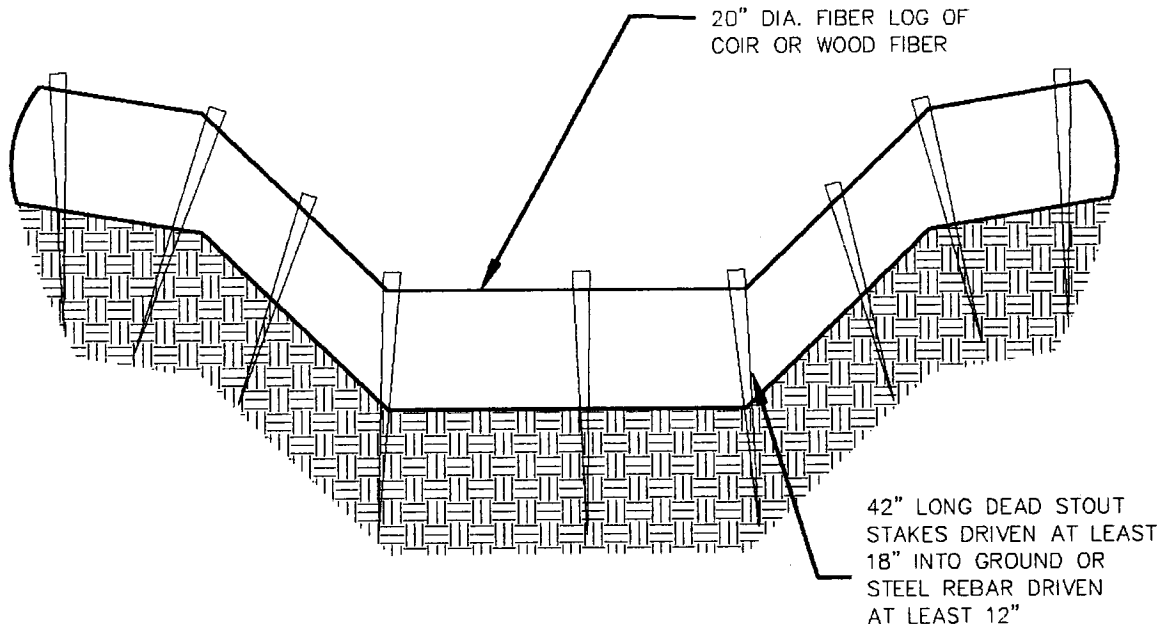
SECTION ACROSS CHANNEL

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN
THE CONSTRUCTION DRAWINGS, THE
CONSTRUCTION DRAWINGS DETAIL SHALL
SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

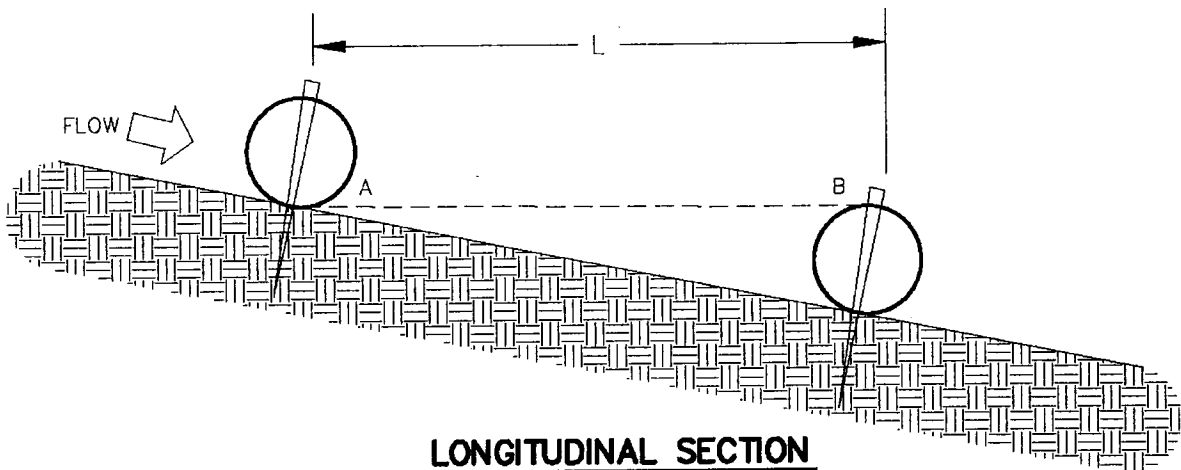
FIGURE 11-17
FIBER LOG CHECK DAM
(EFFECTIVE DATE 1/01/09)



SECTION ACROSS CHANNEL

STAKES SHALL BE SPACED NO FURTHER THAN 24" AND SHALL BE DRIVEN AT EACH SIGNIFICANT SLOPE BREAK AND WITHIN 6" OF EACH END.

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



LONGITUDINAL SECTION

L = DISTANCE SUCH THAT POINTS A AND B ARE OF EQUAL ELEVATION

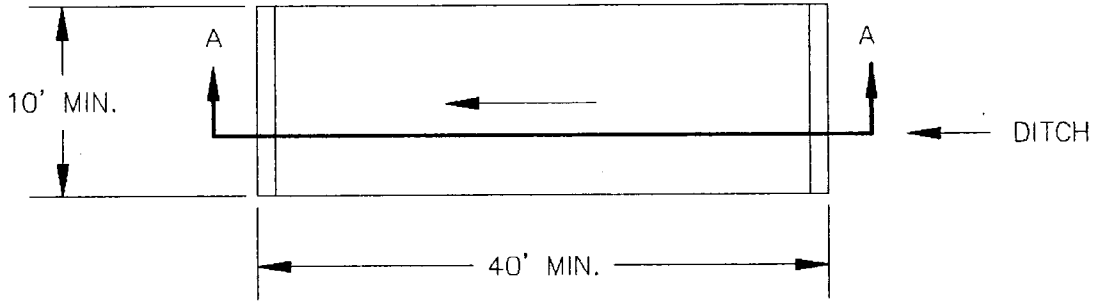


STORMWATER MANUAL

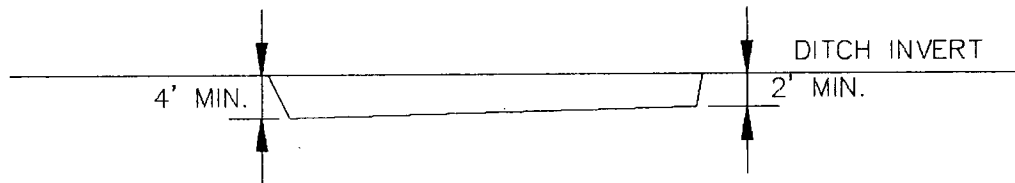
FIGURE 11-18

SEDIMENT TRAP

(EFFECTIVE DATE 1/13/2011)



PLAN VIEW



SECTION A-A

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.

NOTES:

- 1) THE SIZE, SHAPE AND LOCATION OF TRAP MAY BE ADJUSTED FROM THAT SHOWN IN THE CONSTRUCTION PLANS, AS DIRECTED BY THE ENGINEER.
- 2) THE SEDIMENT TRAP MAY BE CONSTRUCTED AS DIRECTED BY THE ENGINEER AS LONG AS THE AREA AND DEPTH IS AT LEAST AS THAT INDICATED ON THE PLANS.
- 3) SEDIMENT TRAP SHALL BE CONSTRUCTED BY EXCAVATING THE BASIN IN NATURAL OR EXCAVATED CHANNELS. SEDIMENT DEPOSITS IN TRAP SHALL BE REMOVED EACH TIME THE TRAP IS APPROXIMATELY 50 PERCENT FILLED. WHEN THEIR USEFULNESS HAS ENDED, THE TRAPS SHALL BE REMOVED, SURPLUS MATERIAL DISPOSED OF AND THE ENTIRE DISTURBED AREA SHALL BE SEEDED AND PROTECTED, OR SODDED, AS DIRECTED. SEDIMENT TRAPS MAY REMAIN IN PLACE UPON COMPLETION OF THE PROJECT ONLY WHEN PERMITTED BY THE ENGINEER OR THE PLANS.



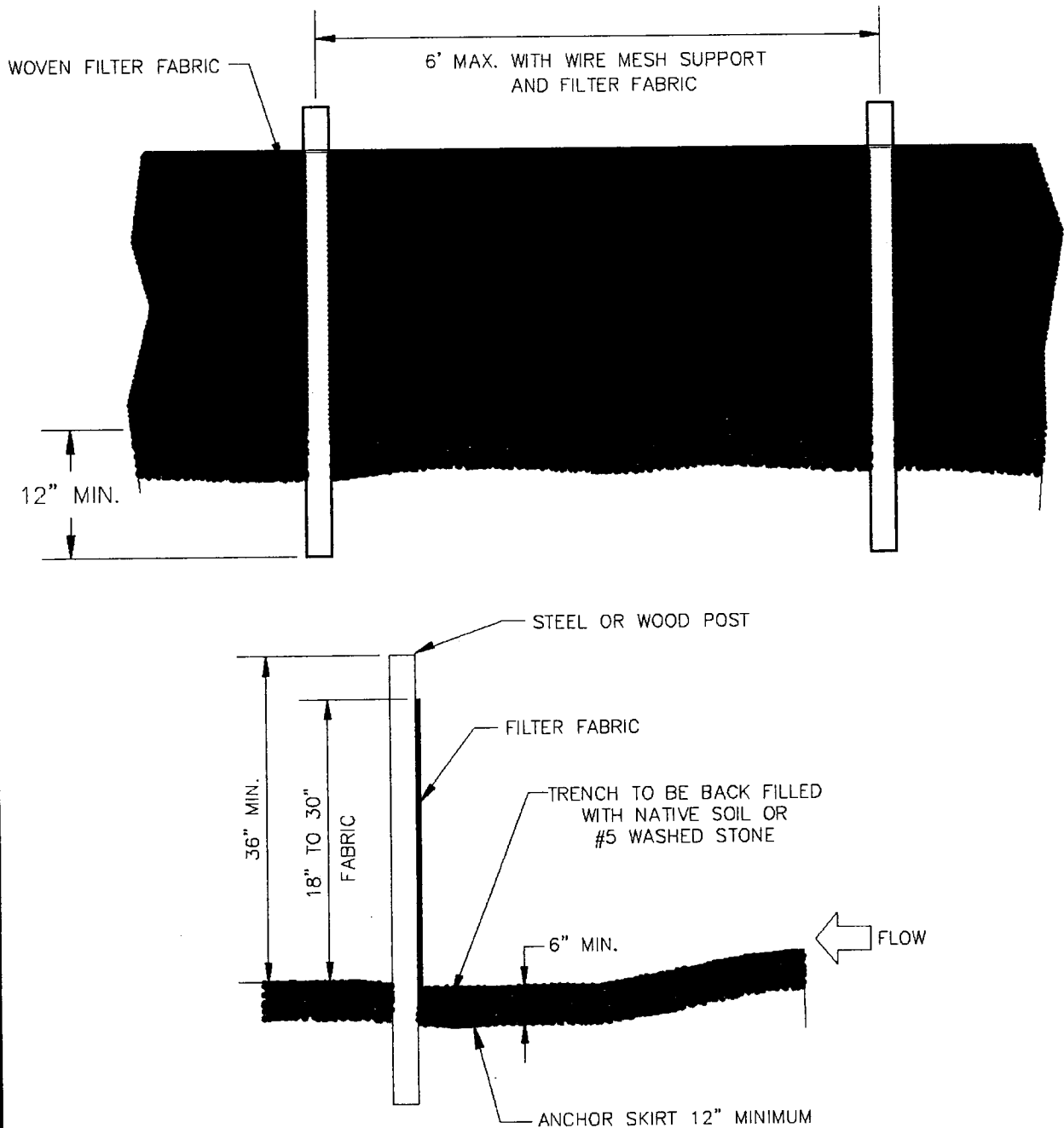
STORMWATER MANUAL

FIGURE 11-21

TEMPORARY SILT FENCE

(EFFECTIVE DATE 1/13/2011)

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.





STORMWATER MANUAL

FIGURE 11-22

TEMPORARY SILT FENCE GENERAL NOTES

(EFFECTIVE DATE 1/13/2011)

GENERAL NOTES

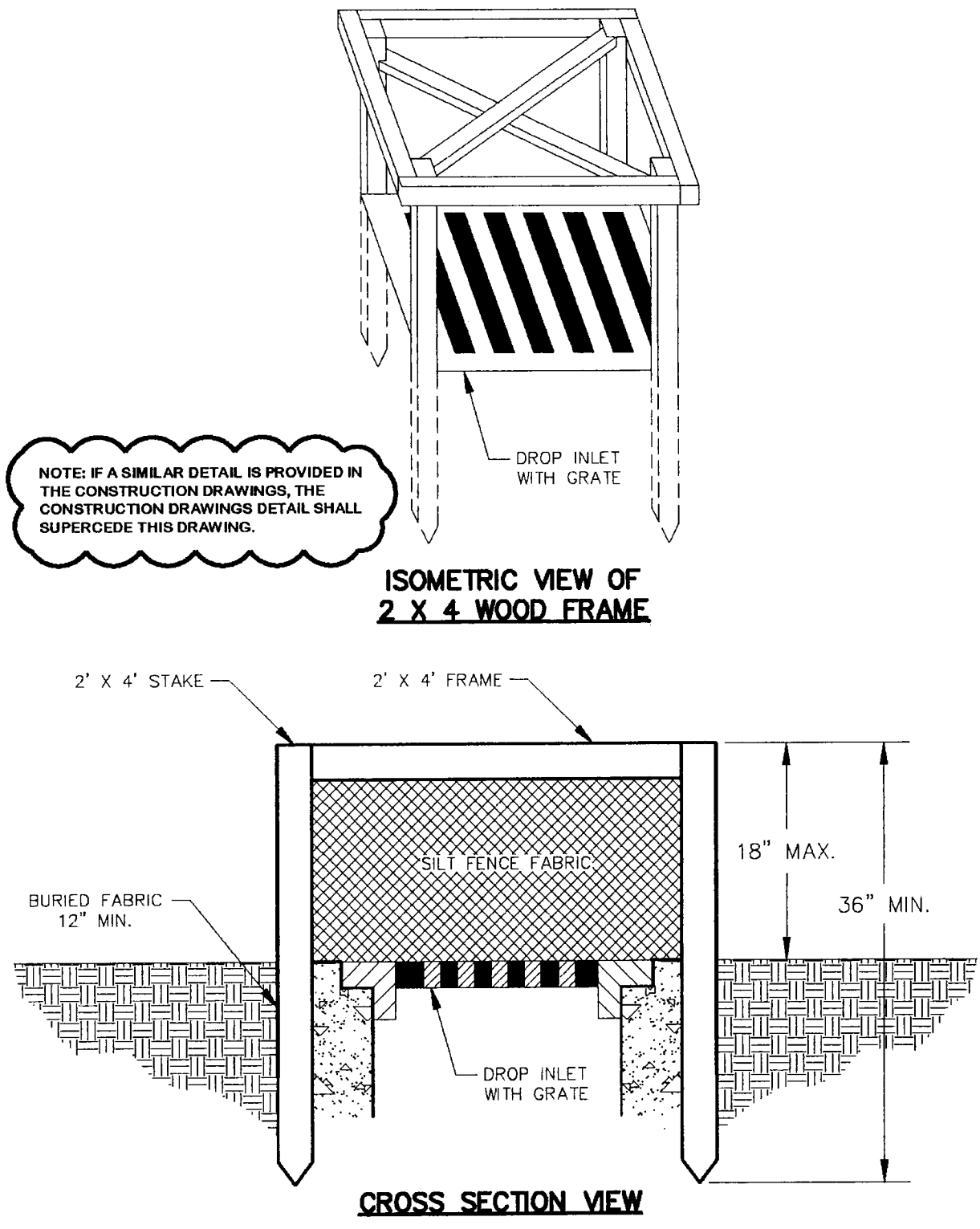
1. FILTER FABRIC SHALL BE PURCHASED IN A CONTINUOUS ROLL AND CUT TO THE LENGTH OF THE BARRIER. WHEN JOINTS CANNOT BE AVOIDED, FILTER FABRIC SHALL BE SPLICED TOGETHER ONLY AT A POST WITH 3 FOOT MIN. OVERLAP, AND SECURELY SEALED.
2. POSTS SHALL BE SPACED AT 6 FOOT INTERVALS IN AREAS OF RAPID RUNOFF.
3. POSTS SHALL BE AT LEAST 5 FEET IN LENGTH.
4. STEEL POSTS SHALL HAVE PROJECTIONS FOR FASTENING WIRE AND FABRIC.
5. WOOD POSTS SHALL BE 2 INCHES BY 2 INCHES OR EQUIVALENT. STEEL POSTS SHALL BE 1.33 LBS PER LINEAR FOOT.
6. A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1 INCH IN LENGTH, WIRE TIES OR HOG RINGS. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
7. WASHED STONE SHALL BE USED TO BURY SKIRT WHEN SILT FENCE IS USED ADJACENT TO A CHANNEL, CREEK, OR POND.
8. TURN SILT FENCE UP SLOPE AT ENDS.

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

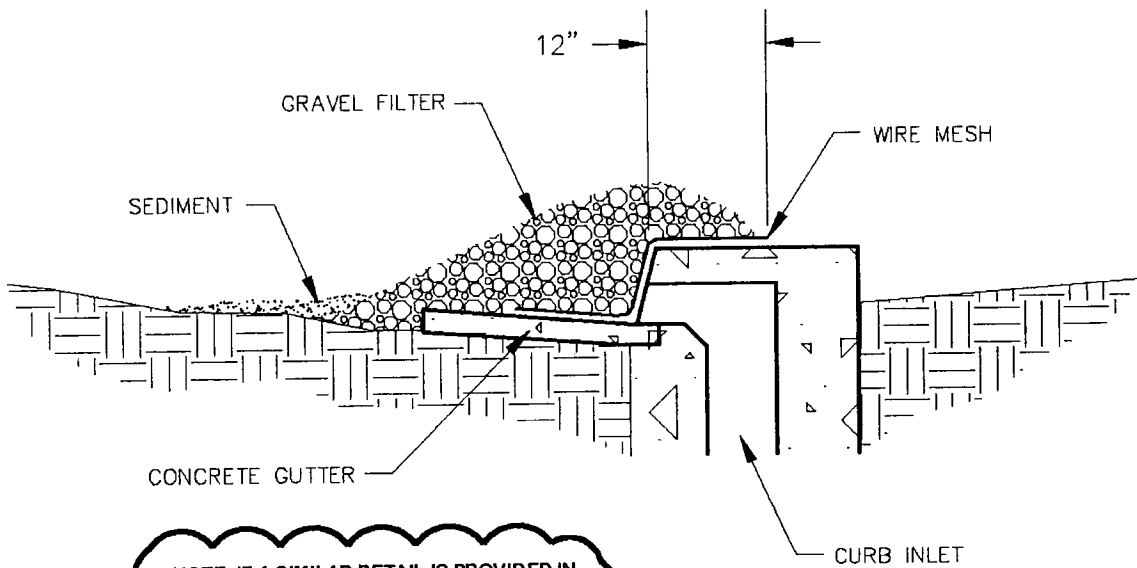
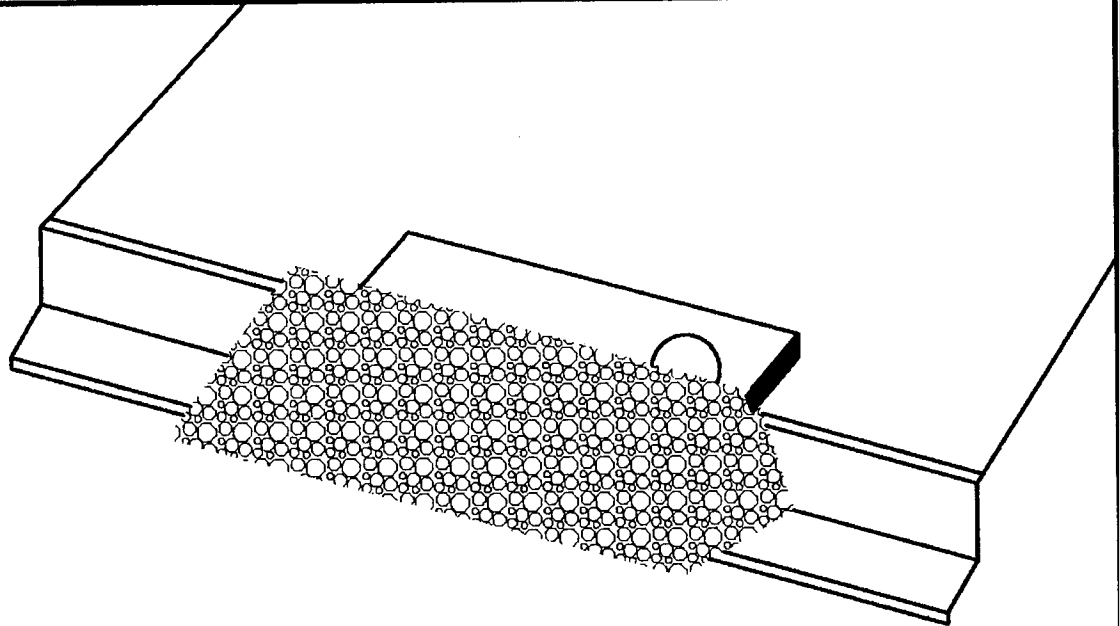
FIGURE 11-23
DROP INLET PROTECTION
USING SILT FENCE
(EFFECTIVE DATE 1/13/2011)





STORMWATER MANUAL

FIGURE 11-24
GRAVEL CURB INLET SEDIMENT FILTER
(EFFECTIVE DATE 1/13/2011)

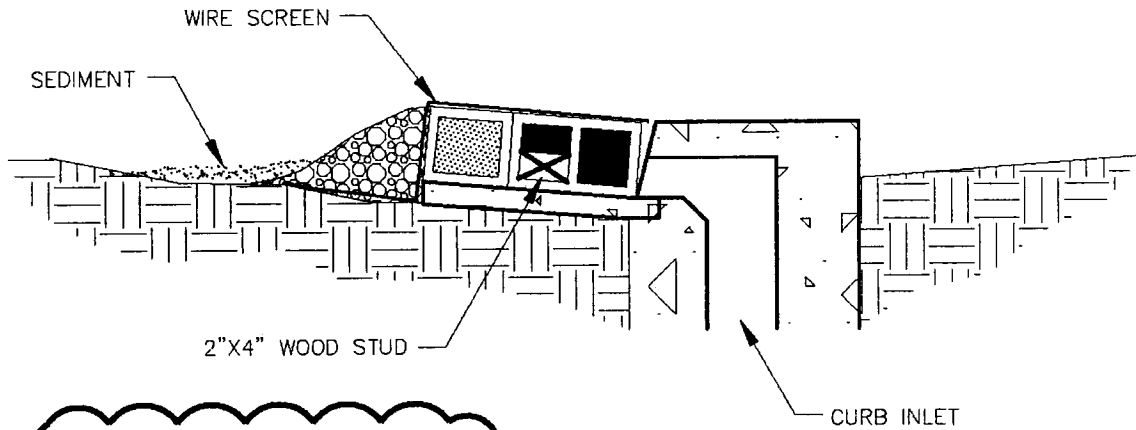
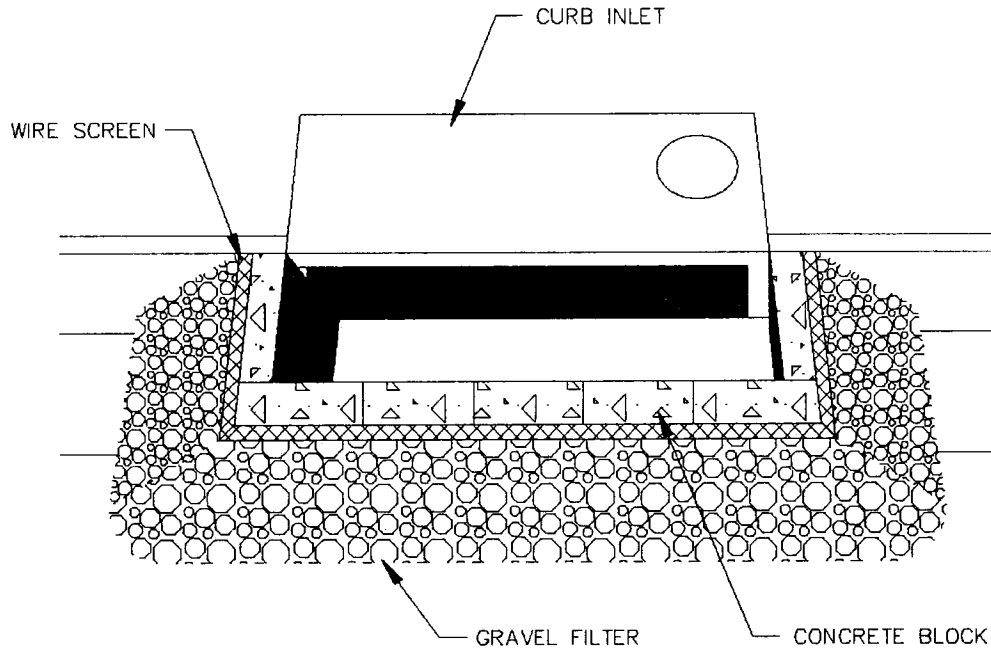


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

FIGURE 11-25
BLOCK AND GRAVEL CURB INLET
SEDIMENT FILTER
(EFFECTIVE DATE 1/13/2011)

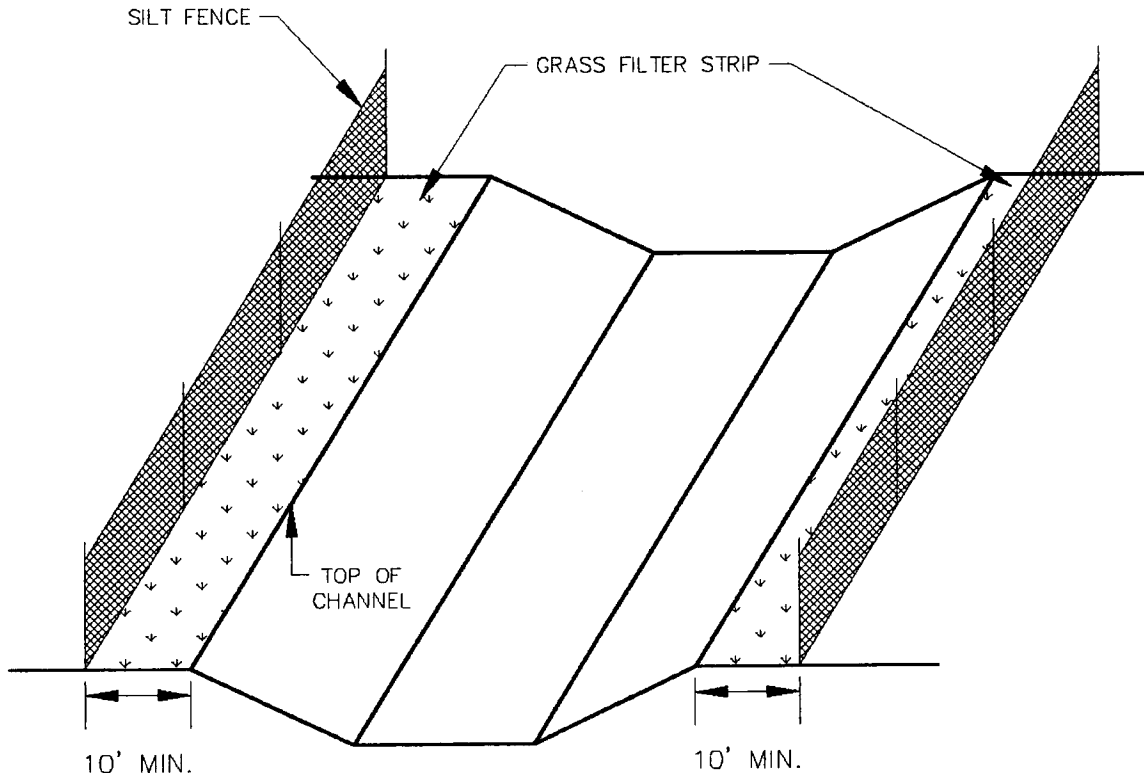


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



STORMWATER MANUAL

FIGURE 11-26
FILTER STRIP FOR
CONSTRUCTED CHANNEL
(EFFECTIVE DATE 1/13/2011)

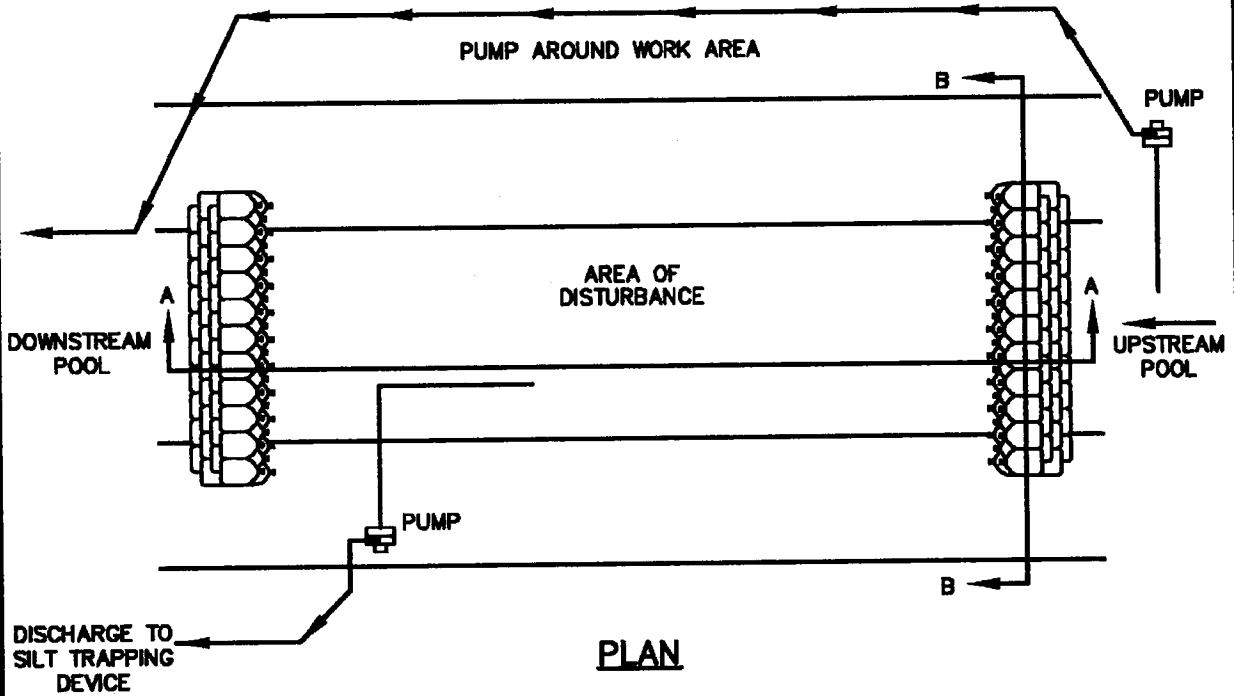


NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.

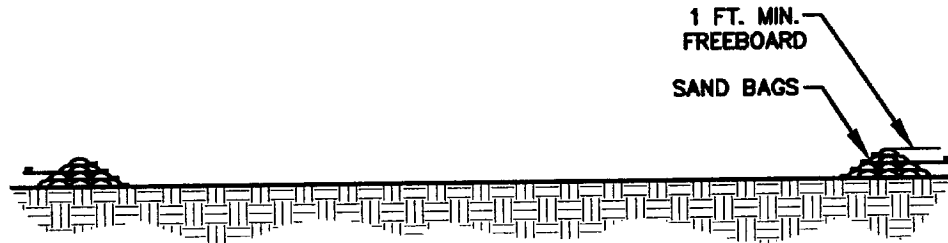


STORMWATER MANUAL

FIGURE 11-27
PUMP-AROUND FLOW DIVERSION
(EFFECTIVE DATE 1/13/2011)

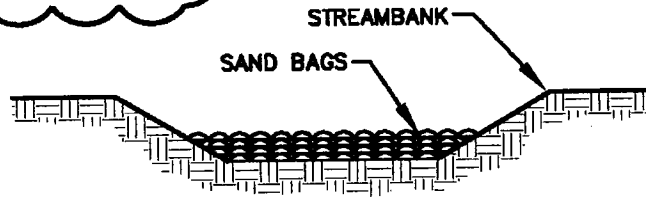


PLAN



SECTION A-A

NOTE: IF A SIMILAR DETAIL IS PROVIDED IN THE CONSTRUCTION DRAWINGS, THE CONSTRUCTION DRAWINGS DETAIL SHALL SUPERCEDE THIS DRAWING.



SECTION B-B

END OF SECTION

SECTION 02373 – STREAM CROSSINGS, STREAMBANK RESTORATION, AND STREAM BUFFER RESTORATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, and equipment required for installing all structural and vegetative features associated with stream crossings, streambank restoration, and stream buffer restoration areas. Work in this section may include installation of Constructed Riffles, Temporary Stream Crossings, Streambank Restoration, and/or Stream Buffer Restoration.
- B. The Contractor shall take all measures necessary to minimize the use of equipment within the banks of a stream.

1.02 PERMIT REQUIREMENTS

- A. The Contractor is responsible to meet and follow all of the requirements and provisions in all project permits. A copy of applicable permits acquired by the Owner is included in Section 00890 – Permits.

PART 2 – PRODUCTS

2.01 STREAM BUFFER PERMANENT SEEDING

- A. Stream buffer seeding shall be used for permanent seeding where land disturbance has occurred within 25 feet of the stream bank, with the following exceptions:
 - 1. If a property owner landscaping agreement differs from this specification, the property owner landscaping agreement shall be followed on that property, or
 - 2. The Construction Drawings identify a different location and/or seed mix.
- B. The Stream Buffer Permanent Seed Mix shall consist of the following mix spread at a rate of 20 lbs/acre:

| Common Name | Scientific Name | % | Lbs/ac |
|----------------------|--------------------------------|-------------|-----------|
| Redtop | <i>Agrostis alba</i> | 10% | 2 |
| Elm-leaved Goldenrod | <i>Solidago ulmifolia</i> | 5% | 1 |
| Big Bluestem | <i>Andropodon gerardii</i> | 20% | 4 |
| Virginia Wild Rye | <i>Elymus virginicus</i> | 20% | 4 |
| Prairie Switchgrass | <i>Panicum virgatum</i> | 15% | 3 |
| Cutleaf Coneflower | <i>Rudbeckia laciniata</i> | 5% | 1 |
| Ox Eye Sunflower | <i>Heliopsis helianthoides</i> | 5% | 1 |
| River Oats | <i>Chasmanthium latifolium</i> | 15% | 3 |
| Black-eyed Susan | <i>Rudbeckia hirta</i> | 5% | 1 |
| TOTAL | | 100% | 20 |

2.02 WOVEN COIR FABRIC

- A. The Contractor shall submit a shop drawing for the proposed material for review and approval by the Owner's Engineer prior to placement.
- B. Woven Coir Fabric shall be woven from machine twisted coir twines made of bristle coir. Woven Coir Fabric shall be Rolanka BioD-Mat 90 or approved equal meeting the following minimum requirements:

| PROPERTY | TEST METHOD | TYPICAL |
|--|-------------|---------|
| Mass/Unit Area (oz/yd ²) | ASTM D 3776 | 29 |
| Tensile Strength (Machine Direction) (lbs./ft) | ASTM D 4595 | 1776 |
| Tensile Strength (Transverse Directions) (lbs./ft) | ASTM D 4595 | 936 |
| Elongation (Machine Direction) (%) | ASTM D 4595 | 52 |
| Elongation (Transverse Direction) (%) | ASTM D 4595 | 24 |
| Thickness (in.) | ASTM D 1777 | 0.35 |
| Recommended Shear Stress (lbs./ft. ²) | N/A | 5 |
| Recommended Flow (ft/s) | N/A | 16 |

- C. Wooden stakes to fasten coir fabric to the soil shall be hardwood stakes that are solid and free of rot, with the following approximate dimensions: 1" x 2" x 18" (tapered to a point). The Contractor may fabricate or purchase stakes.
- D. Sod staples for anchoring void spaces of the coir fabric shall be bio-degradable wooden stakes.

2.03 CONTAINER PLANTS

- A. Tree and shrub plant species and quantities shall be in accordance with those listed or shown on the Construction Drawings. All trees and shrubs shall be in containers grown with air-root pruned technique, spin-out containers or equivalent.
- B. Woody plants shall exhibit a fully developed fibrous root system that allows the root ball to remain intact after removal from the container. Roots shall not be pot-bound or spiraling in the container.
- C. Double shredded hardwood mulch shall consist of the bark from hardwood trees which has been milled and screened to a maximum 4 inch particle size. Mulch shall provide a uniform texture free from sawdust, weed seeds, foreign materials and any artificially introduced chemical compounds detrimental to plant life. Mulch shall be well aged (a minimum age of 6 months).
- D. Nursery stock material shall be identified with attached, durable, waterproof labels and weatherproof ink. Labels shall state the scientific name of the specified plants. Common names are not acceptable. The scientific names must match those in the project plans. Plants that are unlabeled or improperly labeled shall not be accepted. Plant material shall be protected during delivery to prevent desiccation and damage to branches, trunk, root system, or earth ball.
- E. Plant material shall be checked for unauthorized substitution and to establish nursery grown status. Plant material showing desiccation, abrasion, sun-scald injury, disfigurement, or unauthorized substitution shall be rejected. Container-grown plant material shall show new

fibrous roots and the root mass shall contain its shape when removed from the container. Plant material with broken containers shall be rejected. All rejected plant material shall be removed from the project site by the Contractor by the close of each working day.

- F. Fertilizer for container plants shall be MYCOtabs 20-10-5 slow release mycorrhizal fertilizer tablets or equivalent.

2.04 LIVE STAKES

- A. Live stake plant species shall be silky dogwood unless otherwise denoted in the Construction Drawings. Cuttings shall be alive, but dormant, with side branches removed and bark intact.
- B. Cuttings shall be ½ to 2-inch diameter stock and 3 feet in length.
- C. The basal ends of the cuttings shall be cut on an angle to facilitate insertion into the soil.
- D. The materials may be collected or purchased.
- E. No species shall be substituted without prior written approval from the Owner.
- F. Cuttings shall be bagged and/or bundled by species and shall be identified with durable and waterproof labeling and/or weatherproof ink. Labels shall state the scientific name of the plant species grouping. Common names are not acceptable. The scientific names must match those in the specification. Plants that are unlabeled or improperly labeled shall not be accepted.
- G. Plant material that is damaged or desiccated, or does not meet the material specifications shall not be accepted. All rejected plant material shall be removed from the project site by the Contractor by the close of the working day.

2.05 BRANCH PACKING

- A. Material may consist of branches of silky dogwood species. Branches should be a minimum of 5 feet long and should be installed the same day that they are prepared, if harvested locally. Materials can be either harvested from existing living trees or purchased from a vendor. If immediate planting cannot be performed, the basal end of the plant shall be kept in water and the plant shall be refrigerated.

2.06 STONE

- A. All stone shall consist of clean limestone of the specified size; hard, durable, and angular in shape, and resistant to weathering. Stone shall not contain deleterious amounts of shale, as determined by the Engineer. Porous or friable stone shall not be accepted.
- B. Stone shall be of the size and quantity as shown on the Construction Drawings.

2.07 TOPSOIL

- A. Topsoil shall consist of the upper portion of the soil profile and shall be loose, friable soil that is free of stones larger than one inch (1"), sub-soil, refuse and other debris including stumps, roots, brush, weeds, and non-organic materials. The acceptable soil texture classification for topsoil, in accordance with the U.S. Department of Agriculture is: clay (40% maximum), silt (70% maximum), and sand (60% maximum). Manure and/or partially composted materials are not acceptable. Topsoil (both salvaged and furnished) shall meet the following minimum

standards through analytical testing, unless otherwise directed by LFUCG or the Owner's Engineer:

| | |
|----------------|-------------------------|
| Organic Matter | > 3% |
| pH (range) | 5.8 – 7.0 |
| Soluble Salts | < 500 parts per million |

The Owner's Engineer shall visually approve representative samples of topsoil. All operations involved in the placing, spreading, and rolling of the topsoil shall be subject to the approval of the Owner. Selected topsoil shall be obtained from approved stockpiles of materials from excavation, from stripping, from borrow areas, or from other approved sources.

PART 3 – EXECUTION

3.01 GENERAL

- A. All work within and along a stream shall be consistent with all project permits and the requirements of the state and local regulatory agencies.
- B. The Contractor shall take care to prevent the deposition of sediment into the stream.
- C. Stream diversion operations shall be scheduled such that work is completed as quickly as possible. Contractor shall not construct in a stream when rainfall is expected during the time excavation will be occurring in the stream.
- D. Gravity sewer lines, force mains and water lines that cross streams shall be constructed by methods that maintain normal stream flow and allow for a dry excavation. Water pumped from the excavation shall be contained and allowed to settle prior to reentering the stream. Excavation equipment and vehicles shall operate outside of the flowing portion of the stream. Spoil material from the line excavation shall not be allowed to enter the flowing portion of the stream. The provisions of this condition shall apply to all types of utility line stream crossings.
- E. Removal of riparian vegetation in the stream buffer and on the stream banks shall be limited to that necessary for equipment access. Effective erosion and sedimentation control measures shall be employed at all times during the project to prevent degradation of waters of the Commonwealth. Within 25 feet of a stream, site regrading and reseedling shall be accomplished within 7 days after disturbance.

3.02 STREAM BUFFER PERMANENT SEEDING

- A. Stream Buffer Permanent Seeding shall be conducted in accordance with the specifications of Section 02372, Article 3.04 - Permanent Seed using the seed mix listed in this Section 02373, Article 2.01 - Stream Buffer Permanent Seeding.

3.03 WOVEN COIR FABRIC

- A. When placing woven coir fabric, the surface of the soil should be smooth and free of rocks, roots and other obstructions.
- B. Seed the prepared soil areas in accordance with Section 02372, Article 3.04 – Permanent Seed prior to the installation of the coir fabric.
- C. Fabric shall be trenched, placed and staked in according to the Construction Drawings.

- D. Biodegradable wooden stakes shall be inserted sporadically within void spaces and areas with puckers in the fabric.

3.04 CONTAINER PLANTS

- A. Planting operations shall be performed only during periods when successful results are likely. To minimize stress or transplant shock, no plants shall be installed when ambient temperatures are forecasted to rise above 90°F at any point during a forty-eight (48) hour period following installation. In addition, no plants shall be installed when ambient temperatures are forecasted to drop below freezing. In general, trees and shrubs do best when planted in early spring or fall.
- B. If trees and shrubs are not planted through erosion control blanket, then mulch in the form of hardwood mulch or mulch mats shall be used.
- C. The Contractor shall mulch and fertilize.
- D. All trees and shrubs should be fertilized with MYCOtabs 20-10-5 slow release mycorrhizal fertilizer tablets or equivalent. Each containerized plant should receive one 21 gram tablet. All fertilizer tablets are to be installed 4 inches below and 4 inches to the side of the plant roots.
- E. All plants shall be watered thoroughly once unloaded and immediately after planting. Water until saturated once per week for the first four to six weeks and once every other week through the fall season. Water shall not contain elements toxic to plant life.
- F. Prior to shipping to the site, the Contractor shall request approval of trees, shrubs, and fertilizer ordered. A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery of trees and shrubs.
- G. If plants are not planted on the day of delivery, the plants shall be stored onsite in a shaded location and will be kept moist and cool.
- H. Each root ball from containerized woody stock shall be carefully removed from the container without damaging the root system or plant.
- I. When digging a planting hole for containerized woody stock, the diameter of the planting hole shall be at least 30% greater than the diameter of the root ball.
- J. Trees and shrubs shall be placed in the center of the hole with top of root ball 1 inch above finished grades.
- K. Following planting, each hole shall be backfilled with soil removed from the hole when the hole was formed.
- L. Where the removed soil is unacceptable, a soil amendment shall be required.
- M. Each planted tree and shrub shall have a minimum depth of 6 inches of organic material.
- N. Organic soil amendment may consist of composted wood chips, composted leaf mulch, or other suitable and available natural organic material.
- O. If amending the planting areas with topsoil, acceptable topsoil shall meet the material requirements of this Section 02373, Article 3.08 - Topsoil.
- P. Containerized trees and shrubs planted through erosion control blanket shall be planted through clean incisions in the blanket. Incisions shall be parallel to the direction of flow in the stream.

- Q. Portions of the erosion control blanket shall not be removed.
- R. The blanket incision shall be securely closed with wire staples or stakes.
- S. Seeded areas shall be inspected at least weekly after planting and after each rainfall of one-half inch or more. Areas requiring additional seed and mulch shall be repaired within 48 hours.
- T. If vegetative cover is not established within 21 days, the area shall be reseeded.

3.05 LIVE STAKES

- A. Live stakes shall be installed at any time during their dormant period when the ground is not frozen. Live stakes shall not be installed after dormancy is broken or after sprouting. Stakes that begin sprouting before planting will be rejected.
- B. Prior to shipping to the site, the Contractor shall request approval from the Owner's Engineer of live stakes ordered. A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery of live stakes.
- C. Plants shall be stored in a continuously cool, covered, and moist state.
- D. Live stakes shall be soaked for 24 hours prior to installation in clear water, with the basal end of the plant in the water and shall be removed from the water no more than 1 hour before planting.
- E. Live stakes shall not be soaked for a length greater than ten (10) days.
- F. The angled end of the live stakes shall be inserted into the soil manually or with the use of a dead blow hammer with the uncut end protruding for approximately 3/5 of the cutting length.
- G. In rock toe, live stakes shall be inserted to one-half their length into soil below stone fill with a minimum of two buds exposed above the stone fill. An iron bar or a stinger attached to a backhoe bucket can be used to make a pilot hole in firm or rocky soil.
- H. If a pilot hole is used, the diameter of the pilot hole shall be less than the diameter of the smallest live stake to ensure firm contact with the soil.
- I. Each live stake shall be positioned perpendicular to the slope at a 45° angle facing downstream followed by foot compaction around each cutting.
- J. Live stakes shall be installed in a random configuration.
- K. Live stakes that become split or "mushroomed" during installation shall be replaced at the Contractor's expense.

3.06 BRANCH PACKING

- A. Prior to shipping to the site, the Contractor shall request approval from the Owner's Engineer of live stakes ordered. A delivery schedule shall be provided at least 10 calendar days prior to the first day of delivery of live stakes.
- B. Plants shall be stored in a continuously cool, covered, and moist state.

- C. Branches shall be soaked for 24 hours prior to installation in clear water, with the basal end of the plant in the water and shall be removed from the water no more than 1 hour before planting.
- D. Branches shall not be soaked for a length greater than ten (10) days.
- E. The live branches should be placed in a crisscross configuration with the growing tips generally oriented toward the slope face.
- F. The density of the branches shall be 10-15 branches per linear foot.
- G. After the live branches are configured, cover with a thin layer of soil approximately 1" thick.

3.07 STONE

- A. All stone shall consist of clean limestone of the specified size; hard, durable, and angular in shape, and resistant to weathering. Stone shall not contain deleterious amounts of shale, as determined by the Engineer. Porous or friable stone shall not be accepted.
- B. Stone shall be of the size and quantity as shown on the Construction Drawings and shall be placed in the manner shown in Construction Drawings.

3.08 TOPSOIL

- A. All proposed planted areas, not including stream banks, are to be covered with a minimum of 6 inches of topsoil prior to seeding or planting. Do not place topsoil within a stream channel or on a stream bank where full bank flow could erode and remove the material.
- B. Topsoil shall be evenly placed and spread over the graded area to a depth of 6 inches.
- C. Minimize compaction during all operations by utilizing equipment having low unit pressure ground contact and by limiting repeat passes over the same areas.

3.09 PUMP AROUND FLOW DIVERSION FOR STREAM CROSSINGS

- A. For stream crossings, the Contractor shall install, maintain, and operate all cofferdams, pumps, and protective works needed to divert stream flow and other surface water through and around the project work zone.
- B. The Contractor is responsible to determine the number and sizes of pumps necessary for dewatering needs.
- C. The Contractor shall inform the Owner's Engineer of a plan for diverting the stream flow. The de-watering plan must be approved by the Owner prior to the start of work and it shall include information on the type, sizes of pumps, dam construction techniques, discharge outfall protection, and other relevant information.
- D. Operations shall be scheduled such that diversion installation, in-stream excavation, in-stream construction, stream restoration, and diversion removal are completed as quickly as possible.
- E. The Contractor shall not construct in a stream when rainfall is expected during the time excavation will be occurring in the stream.
- F. To capture or divert water flows, cofferdams can be used across the stream channel and secondary drainageways above (up-slope from) the work side as follows:

1. Cofferdams shall be constructed of materials that will have a minimal impact on the stream system. Cofferdams constructed of soil or material from the site shall not be used unless specifically directed by the Owner's Engineer.
 2. Acceptable materials shall include stone, water structures, plastic barriers, or sand bags filled with clean and washed sand.
 3. Contractor shall add sand bags filled with clean and washed sand as required to seal leaks in rock cofferdams.
 4. The Contractor is responsible to install all cofferdams/diversion structures in a safe and correct manner. Cofferdams must be installed so as to withstand the pressures exerted by the stream flow or ponded water against the cofferdam.
 5. Commercial projects used as cofferdams (i.e. water structures, plastic barriers) shall be installed in accordance with the manufacturer's specifications.
 6. The Contractor is permitted to make only minor disturbances to the streambed or banks as may be required to properly install the cofferdam.
- G. Stream flow shall be pumped around the cofferdams and discharged back into the same drainageway that the water was taken from.
- H. The Contractor shall be responsible to provide all pumps, hoses, pipelines, fuel tanks, and other items required to pump the stream flow around the work site, and for providing supervision of the pumping operation during all hours the pumps are running.
1. The Contractor shall be responsible for calculating the required pump capacity to handle the average stream flow in the area of the work.
 2. The Contractor shall provide pumps that are in good operating order and free of leaks. Pumps that are leaking fuel, lubricants, or other material, shall be immediately repaired or replaced as necessary. All pump equipment shall be properly equipped with mufflers and other noise suppression equipment to minimize noise impacts on the surrounding residences.
 3. Discharge hoses shall be reasonably free of leaks at either the fittings or the discharge hose casing. No leaks from discharge lines shall be allowed to cause erosion.
 4. The Contractor shall provide adequate suction hose length to allow the pumps to be placed back from the immediate edge of the stream. Electric sump type pumps are exempt from this requirement.
 5. Only clean water will be allowed to enter the storm system or stream. The pumping operation shall not allow for sediment from the stream bottom to be pulled into the pump.
- I. Contractor shall dewater the work area and pump the work zone dewatering water into a sediment trapping device.
- J. Outlet protection shall be installed as required at the discharge point to prevent erosion of soils and the streambed or bank.
- K. Contractor shall complete construction activities across the stream.
- L. Contractor shall restore the streambed and banks.
- M. Contractor shall remove all materials placed for the cofferdam and outfall protection and shut down pumping operation. (Salvage sandbags for future use if multiple stream crossings are

required on the project.) Contractor shall remove all sandbags from the stream, including damaged and empty bags.

3.10 TEMPORARY STREAM CROSSING

- A. Clearing and excavation of the streambed and banks shall be kept to a minimum.
- B. The structure shall be removed as soon as it is no longer necessary for project construction.
- C. Upon removal of the structure, the stream shall immediately be reshaped to its original cross section and properly stabilized.
- D. 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.
- E. The structure shall be inspected after every rainfall and at least once a week and all damages repaired immediately.

END OF SECTION

SECTION 02374 – ESC PERMITTING, INSPECTION, AND PERMITTING PROCEDURES

[Note to engineer: Verify that the most up to date version is included prior to advertising the project.]

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Permitting, Inspection, and Enforcement Procedures for Erosion and Sediment Control on Capital Projects Division of Water Quality Remedial Measures Plan (RMP)

RMP Contract Administrators: Mark Fischer, Doug Baldwin
Resident Project Representative (RPR): DWQ Consultant
ESC Plan Reviewer: DWQ Stormwater Section – Amad AL-Humadi
ACCELA Data Entry: DWQ Compliance and Monitoring – Richard Lamey
Permittee: Contractor

Permitting Procedures

1. Contractor shall develop a Stormwater Pollution Prevention Plan (SWPPP)/ESC Plan. A SWPPP/ESC Plan template is on the LFUCG website at <http://lexingtonky.gov/index.aspx?page=863>.

On some projects, the construction contract documents may contain a SWPPP/ESC Plan prepared by LFUCG's staff engineer or consultant for purposes of establishing bid quantities. If the Contractor chooses to use this SWPPP to obtain the required permits, the Contractor takes sole responsibility for the content of the SWPPP and the implementation of the SWPPP during construction.
2. Contractor must submit an application for a Land Disturbance Permit to the LFUCG Division of Engineering before beginning construction. A permit application is on the LFUCG website at <http://lexingtonky.gov/index.aspx?page=863>.
3. Contractor must submit a Notice of Intent (NOI) to the KY Division of Water (KDOW) and obtain the KDOW Construction Permit before beginning construction. The NOI can be submitted electronically at:
<https://dep.gateway.ky.gov/eForms/default.aspx?FormID=7>.
4. Contractor cannot start work until they have obtained the LFUCG Land Disturbance Permit and the KDOW Construction Permit. In addition, Contractor will be required to post an ESC Performance Bond before starting construction. (Note: ESC will be bid as lump sum. The value of the bond will be equal to the lump sum amount.)
5. Amad AL-Humadi reviews the SWPPP/ESC Plan, confirms that the Contractor has obtained the KDOW Construction Permit, and authorizes the Contractor to install the BMPs.
6. Amad AL-Humadi inspects the installation of the BMPs and authorizes DOE to issue the Land Disturbance Permit.



Contractor Responsibilities

Contractor shall:

1. Attend a pre-construction conference with LFUCG.
2. Post the LFUCG Land Disturbance Permit and KDOW Construction Permit on the project sign at the site.
3. Follow the SWPPP/ESC Plan; revise and redline it as conditions change on the site.
4. Install and maintain BMPs to prevent sediment from washing into streets, storm sewers, and streams.
5. Conduct an ESC inspection at least once every 7 calendar days and within 24 hours after each rainfall of 0.5" or greater.
6. Complete an inspection form after each inspection.
7. Stabilize the site within 14 days after reaching final grade.
8. For work within 25' of a stream, wetland, sinkhole, or inlet, stabilize the area within 24 hours after completing work.
9. Maintain a 25' vegetative buffer strip along streams, wetlands, sinkholes, and inlets. The buffer zone is 50' adjacent to streams impaired by sediment. The list of impaired streams can be found at <http://www.lexingtonky.gov/index.aspx?page=2677>.
10. File a Notice of Termination with the KY Division of Water, LFUCG Division of Engineering, and LFUCG Division of Water Quality when construction has been completed.
11. Respond promptly to Verbal Warnings from the LFUCG inspector regarding correcting ESC problems.



Inspection Procedures of the RPR

RPR Monthly Field Inspection (two times a month if crossing a stream or in a floodplain)

1. Ensure the LFUCG Land Disturbance Permit and KDOW Construction Permit are posted at site
2. Ensure ESC Plan and SWPPP are available for review
3. Ensure Contractors' weekly inspection forms are available for review
4. Walk the perimeter of the entire site
5. Note downgradient controls
 - Inspect silt fences, culvert/ditch outlets
 - Significant sediment discharges?
6. Walk around internal disturbed areas
 - Idle for more than 14 days . . . stabilized?
7. Inspect all inlets and ditches
 - Inlets protected, ditches stabilized?
8. Check out material/fuel storage areas
 - Spills? Leaks? Leaching pollutants?
9. Inspect concrete washout(s)
10. Inspect the construction entrance/exit
11. Inspect the vegetated buffer strip adjacent to streams (no disturbance allowed)
12. Complete the LFUCG inspection checklist
13. Submit a copy of the checklist to the Contract Administrator, who will give it to Richard Lamey, who will enter it into ACCELA

Important things for the RPR to look for:

- Posted permits, plans, and inspection reports
- Graded areas stabilized with seed, mulch, blankets, mats, etc.
- Stabilized ditches
- Maintenance on silt fences and curb/drop inlets
- No mud on the street
- Trash and litter managed
- No disturbance in 25' buffer zone adjacent to streams, wetlands, sinkholes, and inlets. The buffer zone is 50' adjacent to streams impaired by sediment. The list of impaired streams can be found at <http://www.lexingtonky.gov/index.aspx?page=2677>.



Enforcement Procedures

1. The Contractor will be paid for erosion and sediment control based upon a schedule of values established within the Measurement and Payment section of the specifications (e.g. 25% paid once initial ESCs have been installed and LDP obtained, 50% paid in equal monthly payments for maintenance over the construction period, 25% paid for removal of ESCs and final stabilization). The intent of this provision is to pay the Contractor for monthly ESC maintenance only if the BMPs are functioning properly.
2. When the RPR identifies ESC deficiencies, the RPR shall issue a verbal warning to the Contractor to address the deficiencies. If the deficiencies are not addressed after two verbal warnings, the RPR shall notify the Contract Administrator of the deficiencies.
3. The Contract Administrator shall use all available means in the contract to obtain compliance, including:
 - a. stopping work
 - b. withholding payment
 - c. notifying the Contractor that LFUCG intends to initiate the process for declaring that the Contractor is in default of the contract and specifying a deadline for addressing the ESC deficiencies
 - d. initiating the process for calling the ESC Performance Bond
 - e. issuing NOVs

Compliance Assistance Guidance for RPRs on RMP Projects (10.15.13)

| Observed Condition | Verbal Warning to Correct within 3-5 days | Verbal Warning to Correct within 24 hours (See Note 1) | Notify RMP Contract Administrator Immediately |
|--------------------------------------|---|---|--|
| Construction Entrance to Public Road | Rock pad poorly installed/maintained | Rock pad not installed | |
| | Small amount of sediment on road | Rock pad completely covered with soil | |
| Unstabilized Areas | Flat inactive disturbed areas not stabilized in 14 days | Ditches not stabilized immediately after construction | |
| | | Disturbed, inactive slopes not stabilized within 14 days | Disturbed, inactive slopes above waterways, wetlands, floodplains, critical areas not stabilized within 24 hours |
| Inlet Protection | Sediment needs to be removed around inlet protection | Curb inlet protection not in place or improperly installed | Discharge of concrete wash water, chemicals, other pollutants into inlets, streams, wetlands, etc. |
| Silt Fencing | Does not match ESC Plan but critical areas and roads are protected | Silt fence not installed per plan | |
| | Does not comply with Stormwater Manual but is functional | Blowouts have occurred with discharge of sediment to critical areas | |
| | Needs maintenance/repair, but is not near an inlet or surface water | Not trenched in, is not functional | |
| Soil Stockpiles | No perimeter controls, downstream BMPs in place | Needs repaired in critical areas | |
| | | No perimeter controls, downstream BMPs not in place | |
| Permit Violations | | Permit expired | Site not permitted |
| | | Permit not posted or available on site | |
| | | Contact name/phone not posted | |
| | | No self-inspection reports; reports not on site | |
| | | Self-inspection reports not current | |
| | | ESC Plan / SWPPP not on site | |
| | Minor unapproved construction activities in 25 ft buffer zone around sinkholes, streams, wetlands, etc. | Major unapproved construction activities in 25 ft buffer zone around sinkholes, streams, wetlands, etc. | |
| | | Construction has started, BMPs not installed | |

1. Refer issue to RMP Contract Administrator after 2nd Verbal Warning
2. Critical areas are streams, wetlands, sinkholes, and inlets

SECTION 02400 - BORING AND JACKING

(NOT USED)

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required to furnish and install all bored and jacked carrier pipes in encasement pipes under railroad and highway crossings as shown on the Drawings and/or specified herein.

1.02 SUBMITTALS

- A. Descriptive literature, catalog cuts, or dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the Engineer for review before ordering. The submitted documents shall provide information indicating that the materials are in conformance with the Contract Documents.
- B. At the time of submission, the Contractor shall, in writing, call the Engineer's attention to any deviations that the submittals may have from the requirements of the Contract Drawings and Specifications.

PART 2 - PRODUCTS

2.01 CARRIER PIPE

- A. Carrier pipe shall be as specified in Section 02532 - Sewage Collection Lines or Section 02531 - Sewage Force Mains.

2.02 CASING PIPE

- A. Casing pipe shall be steel, plain end, have a minimum yield point strength of 35,000 psi and conform to ASTM A 252 Grade 2 or ASTM A 139 Grade B without hydrostatic tests. The steel pipe shall have welded joints and be in at least 18 foot lengths. The exterior of the casing pipe shall be coal tar epoxy coated.
- B. The diameter of the casing pipe shall be as follows:

| Carrier Pipe Nominal Diameter (Inches) | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 4 | 6 | 8 | 10 | 12 | 14 | 15 | 16 | 18 | 20 | 21 | 24 | 27 | 30 | 33 | 36 |
| Casing Pipe Nominal Diameter (Inches) | | | | | | | | | | | | | | | |
| 10 | 12 | 16 | 18 | 20 | 24 | 24 | 30 | 30 | 30 | 36 | 36 | 38 | 42 | 46 | 48 |

For carrier pipe sizes greater than 36-inches nominal diameter, the casing pipe diameter size shall be determined by the Engineer or as shown on the Contract Drawings.

C. The wall thickness of the casing pipe shall be as follows:

| Carrier Pipe Nominal Diameter (Inches) | | | | | | | |
|--|---------|-------|-------|-------|-------|-------|-------|
| Under 20 | 20 & 22 | 24 | 30 | 36 | 38 | 42 | 48 |
| Casing Pipe Nominal Thickness (Inches) | | | | | | | |
| 0.250 | 0.281 | 0.312 | 0.406 | 0.469 | 0.500 | 0.562 | 0.625 |

However, should casing pipe thickness be specified or required on Highway or Railroad permit approval sheets, said permit thickness requirement shall govern. Permit approval sheets will be made available to the Contractor.

2.03 CASING SPACERS

- A. **Stainless Steel Casing Spacers:** Stainless steel casing spacers shall be bolt-on style with a shell made in two (2) sections of heavy T-304 stainless steel. Connecting flanges shall be ribbed for extra strength. The shell shall be lined with a PVC liner .090" thick with 85-90 durometer. All nuts and bolts are to be 18-8 stainless steel. Runners shall be made of ultra high molecular weight polymer with inherent high abrasion resistance and a low coefficient of friction. Runners shall be supported by risers made of heavy T-304 stainless steel. The supports shall be mig welded to the shell and all welds shall be fully passivated. Stainless steel casing spacers shall be made by Cascade Waterworks Mfg. Co., or equal.
- B. **Solid Polyethylene Casing Spacers (to be used with PVC pipe only):** Solid polyethylene casing spacers shall be bolt-on style with a shell made in two (2) sections. Carrier pipe shall be wrapped with rubber strap inside casing space to prevent slippage. All nuts and bolts are to be 18-8 stainless steel. Solid polyethylene casing spacers shall be made by Calpico Inc., Advance Products & Systems, Inc., or equal.

2.04 CASING END SEALS

- A. **Wrap-around end seals -** Wrap-around end seals shall be made of a waterproof flexible coal tar membrane reinforced with fiberglass, or synthetic rubber. The two exposed edges of the wrap-around seal shall be adhesively bonded forming a watertight seal. The ends of the wrap shall be sealed on the casing and carrier pipe by stainless steel bands. Wrap-around end seals shall be made by Calpico Inc., Advance Products & Systems, Inc., or equal.

PART 3 - EXECUTION

3.01 CROSSINGS - GENERAL

- A. **Steel casing pipe for crossings shall be bored and/or jacked (or open cut installed where indicated on the Drawings) into place to the elevations shown on the drawings. All joints between lengths shall be solidly butt-welded with a smooth non-obstructing joint inside. The casing pipe shall be installed without bends. The carrier pipe shall be installed after the casing pipe is in place, and shall extend a minimum of two (2) feet beyond each end of the casing to facilitate making joint connections. The carrier shall be braced and centered with casing spacers within the casing pipe to preclude possible flotation. Casing spacers shall be installed a maximum of eight (8) feet apart along the length of the carrier pipe within the casing pipe, within two (2) feet of each side of a pipe joint, and the rest evenly spaced. The**

height of the supports and runners combined shall be sufficient to keep the carrier pipe at least 0.75" from the casing pipe wall at all times. Manufacturer's recommendations may govern these requirements.

- B. At each end of the casing pipe, the carrier pipe shall be sealed with casing end seals. The end seals shall extend a minimum of 12 inches in each direction from the end of the casing pipe.
- C. Wood skids are not an acceptable method of supporting the carrier pipe.

3.02 CROSSING - RAILROAD

- A. All sewer line crossings of railroads shall be prominently marked at railroad right-of-way lines, on both sides of the track crossing, by durable, fiberglass line markers located over the center of the sewer line. When possible, signs shall be located so that when standing at one sign, the other marker is visible. Signs shall show the following:
 - 1. Name and address of Owner.
 - 2. Contents of pipe.
 - 3. Pressure in pipe.
 - 4. Pipe depth below grade at point of sign.
 - 5. Emergency telephone number in event of pipe rupture.
- B. Contractor must adhere to all safety requirements of the Railway line involved in the crossing.
 - 1. All operations shall be conducted so as to not interfere with, interrupt, or endanger the operation of trains nor damage, destroy, or endanger the integrity of railroad facilities. Operations will be subject to inspection at any and all time.
 - 2. All cranes, lifts, or other equipment that will be operated in the vicinity of the railroad's electrification and power transmission facilities shall be electrically grounded in an approved manner.
 - 3. Whenever equipment or personnel are working closer than fifteen (15) feet from the centerline of an adjacent track, that track shall be considered as being obstructed. Operations closer than fifteen (15) feet from the centerline of the track shall be conducted only with the permission of, and as directed by, a duly qualified railroad employee present at the site of the work.
 - 4. Crossing the tracks at grade by equipment and personnel is prohibited except by prior arrangement with, and as directed by, the railroad line. A separate permit must be obtained, by the Contractor, for any "at grade" crossing of the tracks.
- C. All railroad costs incurred by the Railway line due to work associated with the crossing (inspection, flagging, track work, etc.) shall be paid by the Owner. However, it is the Contractor's responsibility to coordinate the work with the Railway.
- D. Contractor shall notify the Railway line's area engineer a minimum of 14 working days prior to desired start of construction.

3.03 BORING AND JACKING

- A. The Contractor shall excavate his own pits, as he may deem necessary, and will set his grade which shall be checked by the Engineer. Permits, as required, will be furnished or obtained by the Owner, but shall be in the Contractor's hands before any excavating is commenced.

- B. The boring method shall consist of pushing the pipe into the earth with a boring auger rotating within the pipe to remove the spoil.
 - 1. The boring operation shall be progressed until the leading edge of the pipe has reached the receiving pit.
 - 2. The front of the pipe shall be provided with mechanical arrangements or devices that will positively prevent the auger from leading the pipe so that there will be no unsupported excavation ahead of the pipe.
 - 3. The auger and cutting head arrangement shall be removable from within the pipe in the event an obstruction is encountered. If the obstruction cannot be removed without excavation in advance of the pipe, the pipe shall be abandoned in place and immediately filled with grout or flowable fill concrete.
 - 4. The over-cut by the cutting head shall not exceed the outside diameter of the pipe by more than 2 inch. If voids should develop or if the bored hole diameter is greater than the outside diameter of the pipe by more than approximately 1 inch, grouting or other approved methods must be used to fill such voids.
 - 5. The face of the cutting head shall be arranged to provide a reasonable obstruction to the free flow of soft or poor material.
 - 6. Any method which does not have this boring arrangement will not be permitted. Contractor's boring arrangement plans and methods must be submitted to, and approved by, the Engineer.
- C. In the event an obstruction is encountered in boring which cannot be removed and it becomes necessary to withdraw the casing and commence elsewhere, the hole from which the casing is withdrawn shall be completely backfilled with flowable fill concrete.
- D. Insurance to be furnished by the Contractor to cover this type of work shall be adequate to meet the requirements of the Railroad and/or State or County Highway Departments.

3.04 CONTRACTOR'S RESPONSIBILITIES

- A. Obtain a copy of the highway or railroad encroachment permit from LFUCG before beginning construction.
- B. Attend a preconstruction meeting, if requested by the Owner, at the construction site with the Owner, Highway Inspector Engineer, and Contractor being present.

END OF SECTION

SECTION 02531 – SEWAGE FORCE MAINS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide all labor, materials, equipment and services required for furnishing and installing all force main pipe and appurtenances as specified and shown on Drawings.

PART 2 - PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PLASTIC PRESSURE PIPE

- A. AWWA C905 (Outside Diameter compatible with Cast Iron O.D.)
 - 1. 14-inch through 36-inch PVC plastic pipe shall conform to ANSI/AWWA C905. Pipe shall be pressure Class 165, DR 25 for 14-inch through 16-inch; pressure Class 200, DR 21 for 18-inch through 36-inch. PVC pipe shall have a maximum laying length of 20 feet, with bell end and elastomeric gasket, and with plain end for cast-iron or ductile-iron fittings. Elastomeric gasket shall conform with the requirements of ASTM F-477. The seal of the National Sanitation Foundation Testing Laboratory must appear on each pipe.
 - 2. Joints for polyvinyl chloride (PVC) mains shall be integral bell and spigot type joints with rubber o-ring gasket. The cleaning and assembling of the pipe joints shall be in accordance with manufacturer's recommendations.
 - 3. Pipe color shall be green.
 - 4. Fittings shall be DI in the same pressure class as pipe with Protecto 401 lining as specified in this Section.
- B. AWWA C900 (Outside Diameter compatible with Cast Iron O.D.)
 - 1. 8-inch through 12-inch PVC plastic pipe shall conform to ANSI/AWWA C900. Pipe shall be pressure Class 165, DR 25. PVC pipe shall have a maximum laying length of 20 feet, with bell end and elastomeric gasket, and with plain end for cast-iron or ductile-iron fittings. Elastomeric gasket shall conform with the requirements of ASTM F-477. The seal of the National Sanitation Foundation Testing Laboratory must appear on each pipe.
 - 2. Joints for polyvinyl chloride (PVC) mains shall be integral bell and spigot type joints with rubber o-ring gasket. The cleaning and assembling of the pipe joints shall be in accordance with manufacturer's recommendations.
 - 3. Pipe color shall be green.
 - 4. Fittings shall be DI in the same pressure class as pipe with Protecto 401 lining as specified in this Section.

2.02 RESTRAINT DEVICES FOR POLYVINYL CHLORIDE PLASTIC (PVC) PIPE

- A. Each restraint system shall be manufactured of ductile iron conforming to ASTM A536. A backup ring shall be utilized behind the PVC Bell. A restraint ring incorporating a plurality of individually actuating gripping surfaces shall be used to grip the pipe then bolted to the backup ring. The restraint shall be the Series 2000PV (mechanical joint restraint to fittings) or 2800 (pipe harness) as manufactured by EBAA Iron, Inc. or approved equal.

- B. Restraint devices for mechanical joint fittings and appurtenances shall conform to either AWWA C111, or AWWA C153. The working pressure for the restraint shall equal that of the pipe on which it is used.
- C. Mechanical joint restraints, 4" through 24", shall meet or exceed the requirements of ASTM F1674.
- D. Mechanical joint restraint shall be Series 2800 produced by EBAA Iron, Inc. or approved equal.
- E. Mechanical joint retainer glands and pipe bell harnesses shall receive a fluoropolymer corrosion protective coating (EBAA Iron Mega-Bond or equal).

2.03 DUCTILE IRON (DI) PIPE AND FITTINGS

- A. **Ductile iron pipe and fittings shall be furnished with Protecto 401 lining as specified herein.** Ductile iron pipe shall be furnished with rubber gasket push-on joints except as may otherwise be noted on the drawings or in difficult working areas and with approval of the Engineer. All pipe inside of casing pipe shall have restraining gaskets as specified in this Section.
- B. Pressure class shall be minimum 150 psi for mechanical and push-on joint pipe.
- C. Thickness design of ductile iron shall conform in all aspects to the requirements of ANSI/AWWA C150/A 21.50 latest revision.
- D. Manufacture and testing of ductile iron pipe shall conform in all aspects to the requirements of ANSI/AWWA C151/A 21.51 latest revision.
- E. Pipe Coatings

1. Interior Lining

a. Condition of Ductile Iron Prior to Surface Preparation

All ductile pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the ductile iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six (6) inches of the exterior of the spigot ends.

b. Lining Material

The standard of quality is Protecto 401 Ceramic Epoxy. The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.

- (1) A permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.
- (2) The following test must be conducted on coupons from factory lined ductile iron pipe:
 - (a) ASTM B-117 Salt Spray (scribed panel) – Results to equal 0.0 undercutting after two years.

- (b) ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F. Results to equal no more than 0.5 mm undercutting after 30 days.
- (c) Immersion Testing rated using ASTM D-714-87.
 - i. 20% Sulfuric Acid – no effect after two years
 - ii. 25% Sodium Hydroxide – No effect after two years
 - iii. 160°F Distilled Water – No effect after two years
 - iv. 120° Tap Water (scribed panel) – 0.0 undercutting after two years with no effect.

(3) An abrasion resistance of no more than 4 mils (.10 mm) loss after one million cycles European Standard EN 598: 1994 section 7.8 Abrasion resistance.

c. Application

(1) Applicator

The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

(2) Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease, or any substance which can be removed by solvent is present, shall be solvent cleaned using the guidelines outlined in DIPRA-1 Solvent Cleaning. After the surface has been made free of grease, oil, or other substances, all areas to receive the protective compounds shall be abrasively blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

(3) Lining

After the surface preparation and within eight (8) hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401. No lining shall take place when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

(4) Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, the gasket area and spigot end up to six (6) inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum Protecto Joint Compound. The joint compound shall be applied by brush to ensure coverage. Care should be taken that the joint compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

(5) Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed

literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. **No material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.**

(6) Touch-Up and Repair

Protecto Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.

d. Inspection and Certification

(1) Inspection

- (a) All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2 Film Thickness Rating.
- (b) The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500-volt test. Any defects found shall be repaired prior to shipment.
- (c) Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

(2) Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

e. Handling

Protecto 401 lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc., shall be placed inside the pipe and fittings for lifting, positioning, or laying.

2. Exterior Coating

Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A 21.51 for pipe and ANSI/AWWA C110/A 21.10 for fittings.

- F. Fittings and gaskets for mechanical and push-on joint ductile and cast iron pipe shall conform to the latest revisions of ANSI/AWWA C110/A 21.10 for mechanical and push-on joint fittings, ANSI/AWWA C111/A 21.11 for gaskets and ANSI/AWWA C153/A 21.53 for mechanical and push-on joint compact fittings. Mechanical and push-on joint fittings shall have pressure class rating of 150 psi minimum.
- G. All ductile and cast iron fittings shall be ductile iron grade 80-60-03 in accordance with ASTM A339-55.
- H. Restrained joint pipe and fittings shall be a boltless system equal to "Field-Lok" restraining gaskets or "TRFLEX Joint" as manufactured by U.S. Pipe and Foundry Company.
- I. Pipe shall be as manufactured by U.S. Pipe and Foundry Company, Clow, American Pipe Company, or equal.
- J. Pipe or fitting shall have the ANSI/AWWA standard, pressure (or thickness) class, diameter,

DI or ductile noted, manufacturer, and country and year where cast on the outside of the body.

2.04 PRESTRESSED CONCRETE CYLINDER PIPE (PCCP)

- A. Unless otherwise specified, the design materials and workmanship for pipe shall conform to the requirements of AWWA C301. Core and coating thickness for pipe shall be as specified in AWWA C301.
- B. Prestressed concrete cylinder pipe and fittings shall be manufactured by Hanson Pressure Pipe, Grand Prairie, TX or equal.
- C. Design Conditions
 - 1. Pipe shall be designed in accordance with the AWWA C304 Standard, using the following design conditions; these conditions shall also be used in designing fittings that include a Portland cement mortar interior and exterior coating of the steel cylinder:
 - a. External Loading
 - (1) The earth load shall be taken as the greater of the following:
 - (a) Depth from existing ground level to top of pipe as shown on plans, or
 - (b) Five feet minimum in all cases.
 - (2) Earth loads shall be computed using the following parameters:
 - (a) Unit Soil Weight = 120 pounds per cubic foot
 - (b) [TYPE[RED1] R___ Bedding
 - (c) [Bedding[RED2] angle = ___°
 - (3) Live loads shall be calculated as:
 - (a) Pipe in streets and other paved areas: AASHTO HS-20 for two trucks passing
 - (b) Pipe within railroad right-of-way: AREA Cooper E-80
 - (c) Both HS-20 and E-80 live loads shall be computed in accordance with the American Concrete Pipe Association "Concrete Pipe Design Manual" or "Concrete Pipe Handbook".
 - b. Internal Pressure
 - (1) [Design[RED3] working pressure (Pw) shall be ___ psi
 - (2) [Surge[RED4] Pressure (Pt) shall be ___ psi.
 - (3) [Field[RED5] Test Pressure (Pft) shall be ___ psi.
- D. Fittings
 - 1. Steel thickness of all fittings shall be designed in accordance with Chapter 8 of the AWWA M9 Manual. Fittings shall be designed for the same conditions as the adjacent pipe.

2. Fabrication of the fittings shall be as per AWWA M9 Manual and C301.
 3. Interior and exterior concrete/mortar coating shall be as per AWWA C301.
- E. The date of manufacture or a serial number traceable to the date of manufacture and the design strength classification shall be clearly marked by stencil with waterproof paint at the end of the pipe barrel. Unsatisfactory or damaged pipe will be permanently rejected, repaired in the field if permitted by the Engineer and the pipe manufacturer, or returned to the pipe plant for repairs. Pits, blisters, rough spots, minor concrete or mortar breakage, and other imperfections may be repaired unless prohibited by the Engineer. Repairs shall be carefully inspected before final approval. Cement mortar used for repairs shall have a minimum compressive strength of 3,000 psi at the end of 7 days and 4,500 psi at the end of 28 days, when tested in cylinders stored in the standard manner. Major breakage or spalling from interior of pipe may be reason for the rejection of pipe. Pipe may be repaired under unloaded conditions (removal of prestressing wire). Cement mortar used for repair shall have a minimum compressive strength of 3,000 psi at 7 days and 4,500 psi at 28 days when tested as standard cylinders. New prestressing wire may be applied when the compressive strength as determined by cylinder testing equals or exceeds the strength required for prestressing as stated in AWWA C301.
- F. Cement shall be Type II and shall be in accordance with ASTM C150.
- G. The pipe core shall be produced by the centrifugal method or the vertical casting method.
- H. Wire shall be a minimum of No.6 gauge and shall meet the requirements of ASTM A648, Class III. Wire of a class strength greater than Class III will not be permitted.
- I. Steel cylinders shall be No. 16 gauge minimum thickness and shall be hot rolled.
- J. Mortar coating shall consist of one part cement to a maximum of three parts fine aggregate by weight. Rebound not to exceed one fourth of the total mix weight may be used provided the rebound is treated as fine aggregate.
- K. Bell and spigot joint rings shall be steel, self-centering type, and otherwise specified in AWWA C301. Surfaces of the joint rings that will be exposed after fabrication is complete shall receive a zinc metalized coating of 4 mils thickness (0.004"). In areas of the alignment where the pipe will be subject to unbalanced hydrostatic thrust forces (bends, tees, bulkheads, wyes, and valves), the pipe joints shall be restrained (harnessed) by field welding joints or by mechanically restrained joints.

Lengths of restrained joint pipe shall be determined using the computational method as contained in Chapter 9 of the AWWA M9 Manual for Concrete Pressure Pipe. The steel cylinder thickness in pipe sections between the location of the maximum thrust force and the end of the harnessed section can be prorated on the basis of zero longitudinal thrust at the end of the harnessed section.

Two acceptable types of mechanically harnessed or restrained joints are the harness clamp and Snap Ring® types of flexible restrained joints. The clamp type consists of two semicircular steel clamps which fit over steel lugs that are factory welded or rolled into the steel bell and spigot sections. The semicircular clamps are drawn together by bolts at the springline on both sides of the pipe to form a flexible restrained joint.

The Snap Ring® type of flexible restrained joint consists of a split steel ring which is recessed in the special steel bell section of the pipe until the joint is made. Once the joint is made, the split steel ring is drawn down into position to form a lock between the bell and spigot by tightening a single steel bolt.

Both joint types shall be capable of transmitting the longitudinal thrust forces due to working

pressure and test pressure and must be encased in grout after the joint has been completed and before the line is pressurized using special grout bands supplied by the pipe manufacturer.

Field welding of the joints for thrust restraint during initial installation can be done from inside the pipe or outside the pipe as permitted by the pipe manufacturer and applicable safety regulations.

- L. The rubber gaskets shall be in accordance with AWWA C301 and shall be designed and manufactured so that the completed joint will withstand an internal water pressure in excess of the highest pressure to which the pipe will be subjected without showing any leakage by the gasket or displacement of it.
- M. Bell and spigot wall fittings shall be the manufacturer's standard design. Wall fittings shall be supplied with adequate bracing to keep them round and true during transportation and installation.
- N. Alignment for long-radius, curved sections as specified on the drawings may be produced by joint deflections of joints not to exceed that recommended by the manufacturer. Required deflections which are in excess of those recommendations shall be produced by beveling the spigot end of the pipe.
- O. All Prestressed Concrete Cylinder Pipe shall include full thickness internal protection to prevent microbiologically induced corrosion with concrete admixture ConShield Technologies, Inc. or approved equal.
- P. Pipe Manufacturer's Field Service Representative:
 - 1. Pipe manufacturer shall provide a qualified Field Service Representative, who shall be available to be on the project site, with proper notice, from the Contractor's, Engineer's, or Owner's representative.
 - 2. The Field Service Representative, who shall be an employee of the pipe manufacturer, must have experience as a representative of the pipe manufacturer in the area of providing such services. The individual may be a Registered Professional Engineer possessing a minimum of 2 years of experience in the area of manufacture of pipe, sales and service representation.
 - 3. It is the intent of the Owner to be assured that the installation of this pipeline is performed in accordance with the specified standards and manufacturer's recommendations. Good installation procedures will assure integrity of the pipeline with the minimum amount of pipe joints required for completion of the main. Therefore, the Contractor shall include in his Bid as a minimum that the pipe manufacturer's Field Service Representative will be on-site for the following periods:
 - a. Initial construction training and monitoring.
 - b. Provide problem-solving assistance during construction.

2.05 COUPLING AND ADAPTORS

- A. Flexible couplings shall be of the sleeve type with a middle ring, two wedge shaped resilient gaskets at each end, two follower rings, and a set of steel trackhead bolts. The middle ring shall be flared at each end to receive the wedge portion of the gaskets. The follower rings shall confine the outer ends of the gaskets, and tightening of the bolts shall cause the follower rings to compress the gaskets against the pipe surface, forming a leak-proof seal. Flexible couplings shall be steel with minimum wall thickness of the middle ring or sleeve installed on pipe being 5/16-inch for pipe smaller than 10 inches, 3/8-inch for pipe 10 inches or larger. The minimum length of the middle ring shall be 5 inches for pipe sizes up to 10 inches and 7 inches for pipe 10 inches to 30 inches. The pipe stop shall be removed. Gaskets shall be suitable for 250 psi pressure rating or at rated working pressure of the

connecting pipe. Couplings shall be harnessed and be designed for 250 psi.

- B. Flanged adapters shall have one end suitable for bolting to a pipe flange and the other end of flexible coupling similar to that described hereinbefore. All pressure piping with couplings or adapters shall be harnessed with full threaded rods spanning across the couplings or adapters. The adapters shall be furnished with bolts of an approved corrosion resistant steel alloy, extending to the adjacent pipe flanges. Flanges on flanged adapter (unless otherwise indicated or required) shall be faced and drilled ANSI B16.1 Class 125.
- C. Flexible couplings and flanged adapters shall be as manufactured by Dresser, Rockwell, or equal, unless otherwise specified and/or noted on the Drawings.

2.06 CONCRETE PIPE ANCHORS, THRUST BLOCKS, CRADLE OR ENCASEMENT

- A. Where indicated on the Drawings, required by the specifications or as directed by the Engineer, concrete pipe anchors, thrust blocks, cradles or encasements shall be installed. Concrete shall be Class A. Thrust blocking shall be in accordance with LFUCG Standard Drawings.

2.06 ELECTRONIC MARKERS

- A. Electronic markers shall be installed along the force main at intervals of 500 feet maximum, at all bends, and as noted on drawings or directed by Engineer. Maximum depth shall be 36". Markers shall be used regardless of the pipe material. Markers shall be green Tempo Omni Markers or equal.

PART 3 – EXECUTION

3.01 EXCAVATION FOR PIPELINE TRENCHES

- A. See Section 02225 for trenching specification.
- B. Minimum cover of 36" shall be provided for all force mains.**

3.02 PIPE BEDDING

- A. Bedding shall be in accordance with LFUCG Standard Drawings.

3.03 LAYING PIPE

- A. The laying of pipe in finished trenches shall be commenced at the lowest point so the spigot ends point in the direction of flow.
- B. All pipes shall be laid with ends abutting and true to line and grade as given by the Engineer. Supporting of pipes shall be as set out hereinbefore under "Pipe Bedding" and in no case shall the supporting of pipes on blocks be permitted.
- C. Before each piece of pipe is lowered into the trench, it shall be thoroughly inspected to insure it's clean. Each piece of pipe shall be lowered separately unless special permission is given otherwise by the Engineer. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, they shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

- D. Pipe shall not be laid on solid rock. Pipe bedding shall be installed prior to laying pipe. Irregularities in subgrade in an earth trench shall be corrected by use of #9 crushed limestone.
- E. When ordered by the Engineer, unsuitable materials in subgrades shall be removed below ordinary trench depth in order to prepare a proper bed for the pipe.
- F. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood or fabricated plug fitted into the pipe bell, so as to exclude earth or other material, and precautions taken to prevent flotation of pipe by runoff into trench.
- G. No backfilling (except for securing pipe in place) over pipe will be allowed until the Engineer has had an opportunity to make an inspection of the joints, alignment and grade, in the section laid.

3.04 BACKFILLING PIPELINE TRENCHES

- A. Backfilling shall be in accordance with LFUCG Standard Drawings.

3.05 SETTLEMENT OF TRENCHES

- A. Whenever lines are in, or cross, driveways and streets, the Contractor shall be responsible for any trench settlement which occurs within these rights-of-way within one year from the time of final acceptance of the work. If paving shall require replacement because of trench settlement within this time, it shall be replaced by the Contractor at no extra cost to the Owner. Repair of settlement damage shall meet the approval of the Owner and/or the State Department of Transportation.

3.0.6 CONCRETE THRUST BLOCKS OR ENCASEMENT

- A. Concrete thrust blocks or encasement shall be placed at all bends or where shown on the Drawings and in accordance with LFUCG Standard Drawings.

3.07 INSTALLATION OF PCCP AND FITTINGS

- A. Prestressed concrete cylinder pipe and fittings shall be installed in accordance with requirements of AWWA M9, except as otherwise provided herein. A firm, even bearing throughout the length of the pipe shall be provided by tamping select fill in the haunch area and at the side of the pipe to achieve the required bedding support angle. **BLOCKING WILL NOT BE PERMITTED.**
- B. Gasket, gasket groove, and bell sealing surfaces shall be cleaned and lubricated with a lubricant furnished by the pipe manufacturer. The lubricant shall be approved for use in potable water and shall be harmless to the rubber gasket. Use only lubricant supplied by the pipe manufacturer. Pipe shall be laid with bell ends looking ahead in the direction of laying. As soon as the spigot ring is centered in the bell of the previously laid pipe, it shall be forced home with approved equipment. After the gasket is compressed, verify the position of the gasket in the spigot ring groove with a feeler gage provided by the pipe manufacturer.
- C. The grout diaper for PCCP shall consist of a Tyvar synthetic fabric layer (gray in color) and a layer of closed cell foam. These layers are sewn together along with a pair of 5/8" wide steel bands at each edge which are used to secure the diaper to the pipe exterior. Use only grout diapers supplied by the pipe manufacturer. A stretching tool is used to tighten the steel bands. Once the bands are pulled tight, a steel clip is crimped around the bands to hold them in position. It is important that the diaper be carefully placed against the exterior

surface of the pipe to insure that it is flush with no gaps or gathers. The closed cell foam surface is to be placed against the pipe exterior.

The wet grout will flow down to the bottom of the diaper and begin to bulge it out. It is often helpful to place some bedding material (or sandbags) directly under the diaper at the bottom to support the weight of the wet grout. Take care to not push excessive amounts of bedding material under the diaper such that the diaper is pushed up into the joint recess impeding the flow of wet grout.

Mix the grout using one part ASTM C150 Type 1 or Type 2 portland cement to not more than three parts clean sand with sufficient water to achieve a pourable consistency. The grout should look and pour like a thick cream. Carefully pour the mixed grout into the gap at the top of the diaper. As the pouring proceeds, the workers must inspect the diaper around the joint periphery to insure that the grout is flowing all around. Once the diaper is full and wet grout is puddling at the gap at the top, apply a stiffer mix the consistency of wet brick mortar over the joint insuring that all steel components of the joint are covered.

3.08 TESTING

- A. All ductile iron and PVC force mains shall be given a hydrostatic test to 150 psi or 250% of working design pressure, whichever is greater, and tested at the lowest level of the pipeline. In no case shall the pipe be tested at a pressure exceeding the pressure class rating of the pipe.
- B. All prestressed concrete cylinder pipe shall be given a hydrostatic test to 120% of working design pressure, and tested at the lowest level of the pipeline. In no case shall the pipe be tested at a pressure exceeding the pressure class rating of the pipe.
- C. Loss of pressure during the test shall not exceed 0 psi in a 4 hour period and 2 psi in a 24 hour period. Any test results that do not meet either of these requirements shall constitute a failure of the pressure test.
- D. Leakage in force mains, when tested under the hydrostatic test described above, shall not exceed 10 gallons per 24 hours per inch of diameter per mile of pipe.
- E. Contractor shall furnish a recording gauge and water meter for measuring water used during leakage test and recording pressure charts during duration of test. Recording pressure charts shall be turned over to the Engineer at conclusion of tests. The pressure recording device shall be suitable for outside service, with a range from 0-200 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Engineer.
- F. Duration of test shall be not less than 24 hours.
- G. Where leaks are visible at exposed joints, evident on the surface where joints are covered and/or identified by isolating a section of pipe, the joints shall be repaired.
- H. All pipe, fittings, valves, and other materials found to be defective under test shall be removed and replaced at no additional expense to the owner.
- I. Lines which fail to meet tests shall be repaired and retested as necessary until test requirements are complied with.
- J. The Contractor will provide water for testing the pressure piping.

END OF SECTION

SECTION 02532 – SEWAGE COLLECTION LINES

PART 1 – GENERAL

1.01 SUMMARY

- A. The Contractor shall furnish all labor, material, and equipment necessary to install gravity sewer piping together with all appurtenances as shown and detailed on the Drawings and specified herein.

PART 2 – PRODUCTS

2.01 DUCTILE IRON (DI) PIPE

- A. Ductile iron pipe shall be furnished cement lined in accordance with ANSI/AWWA C104/A21.4 with bituminous seal coat unless otherwise noted on the drawings or in Bid Form. Ductile iron pipe shall be furnished with rubber gasket push-on joints except as may otherwise be noted on the drawings or in difficult working areas and with approval of the Engineer. All pipe inside of casing pipe shall have restraining gaskets as specified in this Section. **All DI pipe and fittings within 2,000 LF downstream or to nearest manhole beyond 2,000 LF of a force main discharge shall be lined with Protecto 401 coating, or approved equal as specified hereinafter.**
- B. Pressure class shall be 150 psi minimum for mechanical and push-on joint pipe.
- C. Thickness design of ductile iron shall conform in all aspects to the requirements of ANSI/AWWA C150/A 21.50 latest revision.
- D. Manufacture and testing of ductile iron pipe shall conform in all aspects to the requirements of ANSI/AWWA C151/A 21.51 latest revision.

E. Pipe Coatings

1. Interior Lining

a. Condition of Ductile Iron Prior to Surface Preparation

All ductile pipe and fittings shall be delivered to the application facility without asphalt, cement lining, or any other lining on the interior surface. Because removal of old linings may not be possible, the intent of this specification is that the entire interior of the ductile iron pipe and fittings shall not have been lined with any substance prior to the application of the specified lining material and no coating shall have been applied to the first six (6) inches of the exterior of the spigot ends.

b. Lining Material

The standard of quality is Protecto 401 Ceramic Epoxy. The material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment. Any request for substitution must be accompanied by a successful history of lining pipe and fittings for sewer service, a test report verifying the following properties, and a certification of the test results.

(1) A permeability rating of 0.00 when tested according to Method A of ASTM E-96-66, Procedure A with a test duration of 30 days.

(2) The following test must be run on coupons from factory lined ductile iron pipe:

- (a) ASTM B-117 Salt Spray (scribed panel) – Results to equal 0.0 undercutting after two years.
- (b) ASTM G-95 Cathodic Disbondment 1.5 volts @ 77°F. Results to equal no more than 0.5 mm undercutting after 30 days.
- (c) Immersion Testing rated using ASTM D-714-87.
 - i. 20% Sulfuric Acid – No effect after two years.
 - ii. 25% Sodium Hydroxide – No effect after two years.
 - iii. 160°F Distilled Water – No effect after two years.
 - iv. 120°F Tap Water (scribed panel) – 0.0 undercutting after two years with no effect.

(3) An abrasion resistance of no more than 4 mils (.10mm) loss after one million cycles – European Standard EN 598: 1994 section 7.8 Abrasion resistance.

c. Application

(1) Applicator

The lining shall be applied by a competent firm with a successful history of applying linings to the interior of ductile iron pipe and fittings.

(2) Surface Preparation

Prior to abrasive blasting, the entire area to receive the protective compound shall be inspected for oil, grease, etc. Any areas where oil, grease, or any substance which can be removed by solvent is present, shall be solvent cleaned using the guidelines outlined in DIPRA-1 Solvent Cleaning. After the surface has been made free of grease, oil, or other substances, all areas to receive the protective compounds shall be abrasively blasted using compressed air nozzles with sand or grit abrasive media. The entire surface to be lined shall be struck with the blast media so that all rust, loose oxides, etc., are removed from the surface. Only slight stains and tightly adhering annealing oxide may be left on the surface. Any area where rust reappears before lining must be reblasted.

(3) Lining

After the surface preparation and within eight (8) hours of surface preparation, the interior of the pipe shall receive 40 mils nominal dry film thickness of Protecto 401. No lining shall take place when the substrate or ambient temperature is below 40 degrees Fahrenheit. The surface also must be dry and dust free. If flange pipe or fittings are included in the project, the lining shall not be used on the face of the flange.

(4) Coating of Bell Sockets and Spigot Ends

Due to the tolerances involved, the gasket area and spigot end up to six (6) inches back from the end of the spigot end must be coated with 6 mils nominal, 10 mils maximum Protecto Joint Compound. The Joint Compound shall be applied by brush to ensure coverage. Care should be taken that the Joint Compound is smooth without excess buildup in the gasket seat or on the spigot ends. Coating of the gasket seat and spigot ends shall be done after the application of the lining.

(5) Number of Coats

The number of coats of lining material applied shall be as recommended by the lining manufacturer. However, in no case shall this material be applied above the dry thickness per coat recommended by the lining manufacturer in printed literature. The maximum or minimum time between coats shall be that time recommended by the lining material manufacturer. **No material shall be used for lining which is not indefinitely recoatable with itself without roughening of the surface.**

(6) Touch-Up and Repair

Protecto Joint Compound shall be used for touch-up or repair in accordance with manufacturer's recommendations.

d. Inspection and Certification

(1) Inspection

- (a) All ductile iron pipe and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined in SSPC-PA-2 Film Thickness Rating.
- (b) The interior lining of all pipe barrels and fittings shall be tested for pinholes with a non-destructive 2,500-volt test. Any defects found shall be repaired prior to shipment.
- (c) Each pipe joint and fitting shall be marked with the date of application of the lining system along with its numerical sequence of application on that date and records maintained by the applicator of his work.

(2) Certification

The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified.

e. Handling

Protecto 401 lined pipe and fittings must be handled only from the outside of the pipe and fittings. No forks, chains, straps, hooks, etc., shall be placed inside the pipe and fittings for lifting, positioning, or laying.

2. Exterior Coating

Bituminous outside coating shall be in accordance with ANSI/AWWA C151/A 21.51 for pipe and ANSI/AWWA C110/A 21.10 for fittings.

- F. Fittings and gaskets for mechanical and push-on joint ductile and cast iron pipe shall conform to the latest revisions of ANSI/AWWA C110/A 21.10 for mechanical and push-on joint fittings, ANSI/AWWA C111/A 21.11 for gaskets, and ANSI/AWWA C153/A 21.53 for mechanical and push-on joint compact fittings.
- G. All ductile and cast iron fittings shall be ductile iron grade 80-60-03 in accordance with ASTM A339-55.
- H. Restrained joint pipe and fittings shall be a boltless system equal to "Field-Lok" restraining gaskets or "TRFLEX Joint" as manufactured by U.S. Pipe & Foundry Company.

- I. Pipe shall be as manufactured by U.S. Pipe & Foundry Company, Clow, American Pipe Company, or equal.
- J. Pipe or fitting shall have the ANSI/AWWA standard, pressure (or thickness) class, diameter, DI or ductile noted, manufacturer, and country and year where cast on the outside of the body.

2.02 POLYVINYL CHLORIDE (PVC) PIPE (SOLID WALL)

- A. PVC pipe and fittings less than 15 inches in diameter shall conform to the requirements of ASTM Standard Specifications for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings, Designation D 3034. Pipe and fittings shall have a minimum cell classification of 12454B or 12454C as defined in ASTM D-1784. For depths 10 feet and less, pipe shall have a pipe diameter to wall thickness ratio (SDR) of 35. For depths greater than 10 feet up to 20 feet maximum, pipe shall be SDR 26.
- B. PVC pipe and fitting with diameters 18-inch through 27-inch shall conform to the requirements of ASTM D-17845 and ASTM F-679. Pipe and fittings shall have a minimum cell classification of 14545C. The minimum wall thickness shall conform to T-1 as specified in ASTM F-679. For depths 10 feet and less, pipe shall have pipe stiffness 46 (SDR 35). For depths greater than 10 feet up to 20 feet maximum, pipe shall have pipe stiffness of 115 (SDR 26).
- C. Joints shall be push-on bell and spigot type using elastomeric ring gaskets conforming to ASTM D 3212 and F 477. The gaskets shall be securely fixed into place in the bells so that they cannot be dislodged during joint assembly. The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.
- D. Pipe shall be furnished in lengths of not more than 13 feet. The centerline of each pipe section shall not deviate from a straight line drawn between the centers of the openings at the ends by more than 1/16 inch per foot of length.
- E. PVC pipe shall not have a filler content greater than ten percent (10%) by weight relative to PVC resin in the compound.
- F. PVC pipe shall be clearly marked at intervals of 5 feet or less with the manufacturer's name or trademark, nominal pipe size, PVC cell classification, the legend "Type PSM SDR 35 PVC Sewer Pipe" and the designation "ASTM D 3034", or "ASTM F-679". Fittings shall be clearly marked with the manufacturer's name or trademark, nominal size, the material designation "PVC", "PSM" and the designation "ASTM D 3034", or "ASTM F-679".
- G. PVC pipe shall have minimum pipe stiffness of 46 psi (SDR 35) or 115 psi (SDR 26) for each diameter when measured at 5 percent vertical ring deflection and tested in accordance with ASTM D 2412.
- H. PVC pipe installation shall conform to ASTM D-2321 latest revision.
- I. Pipe shall be as manufactured by JM Eagle, H & W Pipe Company, or equal.

2.03 FIBERGLASS REINFORCED POLYMER MORTAR PIPE (FRPM)

A References

- 1. ASTM D3262 – Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.
- 2. ASTM D4161 – Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced

Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

3. ASTM D2412 – Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
4. ASTM D3681 – Standard Test Method for Chemical Resistance of “Fiberglass” Pipe in a Deflected Condition.
5. ASTM D638 – Test Method for Tensile Properties of Plastics.

B. Materials

1. Pipe Class: Pipe shall be stiffness class 46 (SN) for depths 30 feet or less; SN 72 for depths greater than 30 feet.
2. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
3. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
4. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
5. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the product.
6. Elastomeric Gaskets: Gaskets shall meet ASTM F477 and be supplied by qualified gasket manufactures and be suitable for the service intended.

C. Manufacture and Construction

1. Pipes: Manufacture pipe to result in a dense, nonporous, corrosion-resistant, consistent composite structure. The interior surface of the pipes exposed to sewer flow shall be manufactured using a resin & glass reinforced liner or resin with a 50% elongation (minimum) when tested in accordance with D638. The interior surface shall provide crack resistance and abrasion resistance. The exterior surface of the pipes shall be comprised of a glass reinforced resin or sand and resin layer which provides UV protection to the exterior. Pipes shall be Type 1, Liner 1, Grade 1 or Type 1, Liner 2, Grade 3 per ASTM D362.
2. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilized elastomeric sealing gaskets as the sole means to maintain joint watertightness. The joints must meet the performance requirements of ASTM D4161. Joints at tie-ins, when needed, may utilize gasket-sealed closure couplings.
3. Fittings: Flanges, Elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. Fittings shall be FRPM. Tees with 6 inch stub for laterals may have stubs constructed of FRPM or PVC SDR 35. Ductile iron (DI) fittings may be substituted for FRPM fittings. **The DI fittings shall be lined with Protecto 401 coating, or approved equal, and in accordance with DI pipe specification in this Section 02532.**
4. Acceptable Manufacturer: HOBAS Pipe USA or Flowtite.

D. Dimensions

1. **Diameters:** The actual outside diameter (18 inches to 48 inches) of the pipes shall be in accordance with ASTM D3262 and be in cast iron pipe sizes. For other diameters, OD's shall be per manufacturer's literature.
2. **Lengths:** Pipe shall be supplied in nominal lengths of 20 to 40 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
3. **Wall Thickness:** The minimum wall thickness shall be the stated design thickness.
4. **End Squareness:** Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/8".

E. Testing

1. **Pipes:** Pipes shall be manufactured and tested in accordance with ASTM D3262.
2. **Joints:** Coupling joints shall meet the requirements of ASTM D4161.
3. **Stiffness:** Minimum pipe stiffness when tested in accordance with ASTM D2412 shall normally be 36 psi.
4. **Strain Corrosion:** The extrapolated 50-year strain corrosion value meet the requirements of Table 4 in ASTM D3262 when tested in accordance with ASTM 3681.

F. Installation

1. **Burial:** The bedding and burial of pipe and fittings shall be in accordance with the project plans and specifications and the manufacturer's requirements.
2. **Pipe Handling:** Use textile slings, other suitable materials or a forklift. Use of chains or cables is not allowed.
3. **Jointing:**
 - a. Clean ends of pipe and coupling components
 - b. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
 - c. Use suitable equipment and end protection to push or pull the pipes together.
 - d. Do not exceed forces recommended by the manufacturer for coupling pipe.
 - e. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer.
4. **Field Tests:**
 - a. Testing shall be in accordance with specification hereinafter in this Section 02532.

2.04 REINFORCED CONCRETE PIPE

- A. All reinforced concrete pipe shall conform to the requirements of ASTM C76, latest edition. Class shall be as shown on the Drawings.

- B. Joints shall be bell and spigot type using rubber Hamilton Kent TSS Series pre-lubricated profile gasket (or approved equal) and shall conform to ASTM C443.
- C. The pipe shall be furnished in standard lengths of 8 feet to 16 feet.
- D. The pipe shall be permanently marked showing the nominal inside diameter, manufacture date, ASTM C76 class, and manufacturer's name. These markings for 30-inch diameter and larger shall be inscribed on the pipe exterior and stenciled on the interior with paint or permanent ink.
- E. There shall be no lift holes.
- F. Pipe shall be as manufactured by Independent Concrete Pipe Company, Sherman Dixie, or approved equal.
- G. Cement used in the manufacture of circular reinforced concrete pipe shall meet the requirements of ASTM C 150 Standard Specification for Portland cement, for Type II cement.
- H. A three-edge-bearing test shall be conducted by the manufacture according to ASTM C 497 Standard Test Method for Concrete Pipe, Manhole Sections, or Tile as proof of design by determining the ultimate load capacity of the pipe. One segment from each pipe class must pass the three-edge-bearing test such that the load required to produce the ultimate load rating of the pipe. The test results shall be maintained in a log and provided to the Owner. Manufacturer shall also maintain concrete cylinder testing data and quality control records to verify that the pipe meets the required ASTM standards.
- I. Joint test shall be conducted at the manufacturing plant by the manufacturer according to the ASTM C 1103 Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines to determine if the joint design is allowing leaks that need to be corrected in the manufacturing of the pipe or gasket. The joint test shall be conducted on 25% (minimum) of the pipe segments and the test results shall be maintained in a log and provided to the Owner.
- J. An alkalinity test shall be conducted on the concrete mixture used for each type and class of reinforced concrete sewer pipe used in the project. The alkalinity test shall be conducted according to ASTM C497-05 Item 14 – Alkalinity of Concrete Mixture and the alkalinity of all concrete mixtures shall be equal to or greater than 0.2 grams of CaCO₃ equivalently reactive per gram of concrete. The manufacturer shall complete the alkalinity tests. The cost of the tests shall be incidental to the pipe cost. The Contractor shall include all such cost in the price bid for the Work. The Contractor shall submit a signed, dated, and certified copy of the test data to the Owner (in a format acceptable to the Owner) for review prior to delivering any pipe to the project site. No additional compensation will be made to the Contractor for requiring the testing.
- K. **All reinforced Concrete Sanitary Sewer Pipe shall include full thickness internal protection to prevent microbiologically induced corrosion with concrete admixture ConShield Technologies, Inc. or approved equal.**

PART 3 – EXECUTION

3.01 PIPE LAYING

- A. Excavation, trenching, backfilling, and bedding requirements are set forth in Section 02225.
- B. All pipe shall be laid with ends abutting and true to the lines and grades indicated on the Drawings. The pipe shall be laid straight between changes in alignment and at uniform grade between changes in grade. Pipe shall be fitted and matched so that when laid in the trench, it will provide a smooth and uniform invert.

- C. Before each piece of pipe is lowered into the trench, it shall be thoroughly swabbed out to insure its being clean. Any piece of pipe or fitting which is known to be defective shall not be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe and beveled to match the factory bevel for insertion into gasketed joints. Bevel can be made with hand or power tools.
- D. The interior of the pipe, as work progresses, shall be cleaned of dirt, jointing materials, and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of such pipe shall be closed with a plywood plug fitted into the pipe bell so as to exclude earth or other material and precautions taken to prevent flotation of pipe by runoff into trench.
- E. All pipe shall be laid starting at the lowest point and installed so that the spigot ends point in the direction of flow.

3.02 JOINTING

- A. All joint surfaces shall be cleaned immediately before jointing the pipe. The bell or groove shall be lubricated in accordance with the manufacturer's recommendation. Each pipe unit shall then be carefully pushed into place without damage to pipe or gasket. All pipe shall be provided with home marks to insure proper gasket seating. Details of gasket installation and joint assembly shall follow the direction of the manufacturer's of the joint material and of the pipe. The resulting joints shall be watertight and flexible. **No solvent cement joints shall be allowed.**

3.03 UTILITY CROSSING CONCRETE ENCASUREMENT

- A. At locations shown on the Drawings, required by the Specifications, or as directed by the Engineer, concrete encasement shall be used when the clearance between the proposed sanitary sewer pipe and any existing utility pipe is 18 inches or less. Utility pipe includes underground water, gas, telephone and electrical conduit, storm sewers, and any other pipe as determined by the Engineer.
- B. There are two cases of utility crossing encasement. Case I is applicable when the proposed sanitary sewer line is below the existing utility line. Case II is applicable when the proposed sanitary sewer line is laid above the utility line. In either case, the concrete shall extend to at least the spring line of each pipe involved.
- C. Concrete shall be Class A and shall be mixed sufficiently wet to permit it to flow between the pipes to form a continuous bridge. In tamping the concrete, care shall be taken not to disturb the grade or line of either pipe or damage the joints.

3.04 TESTING OF GRAVITY SEWER LINES

- A. After the gravity piping system has been brought to completion, and 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 the removal from the line of any and all dirt, debris, and trash. If necessary during the process of rodding the system, water shall be turned into the system in such quantities to carry off the dirt, debris, and trash.
- B. During the final inspection the Engineer will require all flexible sanitary sewer pipe (PVC and FRP) to be mandrel deflection tested after installation.

1. The mandrel (go/no-go) device shall be cylindrical in shape and constructed with nine (9) evenly spaced arms of prongs. The mandrel dimension shall be 95 percent of the flexible pipe's published ASTM average inside diameter. Allowances for pipe wall thickness tolerances of ovality (from shipment, heat, shipping loads, poor production, etc.) shall not be deducted from the ASTM average inside diameter, but shall be counted as part of the 5 percent allowance. The contact length of the mandrel's arms shall equal or exceed the nominal diameter of the sewer to be inspected. Critical mandrel dimensions shall carry a tolerance ± 0.001 inch.
 2. The mandrel inspection shall be conducted no earlier than 30 days after reaching final trench backfill grade provided, in the opinion of the Engineer, sufficient water densification or rainfall has occurred to thoroughly settle the soil throughout the entire trench depth. Short-term (tested 30 days after installation) deflection shall not exceed 5 percent of the pipe's average inside diameter. The mandrel shall be hand pulled by the contractor through all sewer lines. Any sections of the sewer not passing the mandrel test shall be uncovered and the Contractor shall replace and recompact the embedment backfill material to the satisfaction of the Engineer. These repaired sections shall be retested with the go/no-go mandrel until passing.
 3. The Engineer shall be responsible for approving the mandrel. Proving rings may be used to assist in this. Drawings of the mandrel with complete dimensioning shall be furnished by the Contractor to the Engineer for each diameter and type of flexible pipe.
- C. Low-pressure air tests shall be performed on all gravity sanitary sewers to verify water tightness of pipe joints and connections. The Contractor shall perform testing on each manhole-to-manhole section of sewer line after placement of backfill.
1. Testing of Polyvinyl Chloride (PVC), Fiberglass Reinforced Polymer Mortar (FRPM), and Ductile Iron (DI) pipe sewer lines shall be performed in accordance with the current editions of ASTM F1417, "Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air," and UNI-B-6, "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe," respectively. Testing of reinforced concrete pipe sewer lines shall be performed in accordance with the current edition of ASTM C 924, "Standard Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method" and ASTM C 1103-03 Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
 2. All testing equipment shall be inspected by the Engineer to ensure that equipment is functioning properly.
 3. The rate of air loss in the section under test shall be determined by the time-pressure drop method. The time required in minutes for the pressure in the section under test to decrease from 3.5 to 2.5 psig shall be not less than that indicated in the referenced standards.
 4. Immediately following the low-pressure air test, the Contractor shall notify the Engineer of the test results. A Low-Pressure Air Test Report shall be completed by the Contractor during testing. The report shall be completed according to the procedures outlined in LFUCG's Construction Inspection Manual, current edition. A copy of the completed Low-Pressure Air Test Report shall be provided to the Engineer and LFUCG-Division of Water Quality for each test.
 5. Pipes failing the pressure test will not be accepted and shall be repaired or replaced until a successful test is achieved.
 6. When conducting a low-pressure air test, the Contractor shall securely install and brace all plugs prior to pressurizing the pipe. Personnel shall not be permitted to enter manholes when the sewer pipe is pressurized.

- D. Infiltration tests (for concrete pipe only) shall be made after underdrains, if present, have been plugged and other groundwater drainage has been stopped such that the groundwater is permitted to return to its normal level insofar as practicable.
1. Upon completion of a section of the pipeline, the line shall be dewatered and a satisfactory test conducted to measure infiltration for at least 24 hours. The amount of infiltration, including manholes, tees and connections, shall not exceed 100 gallons per nominal inch diameter per mile of sewer per 24 hours.
- E. Exfiltration tests (for concrete pipe only) which subject the pipeline to an internal pressure, shall be made by plugging the pipe at the lower end and then filling the line and manholes with clean water to a height of 2 feet above the top of the sewer at its upper end. Where conditions between manholes may result in test pressures which would cause leakage at the plugs or stoppers in branches, provisions shall be made by suitable ties, braces and wedges to secure the plugs against leakage resulting from the test pressure.
1. The rate of leakage from the sewers shall be determined by measuring the amount of water required to maintain the level 2 feet above the top of the pipe.
 2. Leakage from the sewers under test shall not exceed the requirements for leakage into sewers as hereinbefore specified.
- F. TV Survey
1. TV survey and cleaning shall be performed on all gravity sewers.
 2. Hydraulic cleaning and vacuum must be done prior to TV survey.
 3. TV survey must be of dry pipe.
 4. TV survey shall be Pipe Assessment Certification Program (PACP) level of quality and TV equipment must include a slope-inclinometer.
 5. Acceptance of TV survey, completed sewers, and the repairs needed are to be determined at sole discretion of LFUCG.
 6. TV survey shall include:
 - a. Video file and shall be re-named to LFUCG's assets.
 - b. PACP database must be in Microsoft Access format, version 4.4.2 which includes photos embedded in database.
 - c. Report shall be provided in electronic version in PDF format.
- G. The Contractor shall furnish suitable test plugs, water pumps, and appurtenances, and all labor required to properly conduct the tests. Suitable bulkheads shall be installed, as required, to permit the test of the sewer. The Contractor shall construct weirs or other means of measurements as may be necessary.
- H. Should the sections under test fail to meet the requirements, the Contractor shall do all work of locating and repairing the leaks and retesting as the Engineer may require without additional compensation.

END OF SECTION

SECTION 02546 – CURED-IN-PLACE PIPE

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section provides specifications for the reconstruction of pipelines and conduits by the installation of a resin-impregnated flexible tube which is tightly formed to the original conduit.

1.02 RELATED WORK

- A. Section 02532—Sewage and Collection Lines.
- B. Section 02608—Manholes.

1.03 SUBMITTALS

- A. Submit shop drawings and manufacturer's literature for all Contractor supplied materials promptly to the Owner's Project Manager for approval in accordance with Specification Section 01300 Submittals.

1.04 REFERENCES

- A. This Section references the following American Society for Testing and Materials standards. In the case of conflicting requirements between this specification and these referenced documents, this specification will govern.
 - 1. ASTM F1216—Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube.
 - 2. ASTM F1743—Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP).
 - 3. ASTM D5813—Cured-in-Place Thermosetting Resin Sewer Pipe.
 - 4. ASTM D790—Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulation Materials.
 - 5. ASTM D2990—Standard Test Methods for Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics.

1.05 PRODUCT, MANUFACTURER, AND INSTALLER QUALIFICATION REQUIREMENTS

- A. Since sewer products are intended to have a 50-year design life, and in order to minimize Owner's risk, only proven products with substantial successful long-term track records will be approved. All trenchless rehabilitation products and installers must be preapproved prior to the formal opening of proposals.
- B. For a product to be considered commercially proven, a minimum of 5 successful wastewater collection system projects of a similar size and scope of work shall be performed in the U.S. and documented to the satisfaction of the Owner to assure commercial viability.
- C. For an installer to be considered as commercially proven, the installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have had at least

5 years active experience in the commercial installation. In addition, the installer must have successfully installed at least **50,000** feet of a cured-in-place product in wastewater collection systems. Acceptable documentation of these minimum installations must be submitted to the Owner. Installer's project managers must have a minimum of 2 years of CIPP installation experience and must be on-site during the installation of the CIPP products.

- D. Sewer rehabilitation products submitted for approval must provide third party test results supporting the structural performance (short-term and long-term) of the product and such data shall be satisfactory to the Owner. No product will be approved without independent third party testing verification.
- E. The rehabilitation manufacturing processes shall operate under a quality management system which is third-party certified to ISO 9000 or other recognized organization standards. Proof of certification shall be required for approval.
- F. Proposals must be labeled clearly on the outside of the proposal envelope, listing the product name and installer being proposed. Only proposals using preapproved products and installers will be opened and read. Proposals submitted on products and/or from installers that have not been preapproved will be returned unopened.
- G. The Owner authorizes the use of proven materials that serve to enhance the pipe performance specified herein. Proven materials have passed independent laboratory testing, not excluding long-term (10,000 hour) structural behavior testing, and have been successfully installed to repair failing host pipes in the U.S. for at least 4 years. IN addition to the aforementioned, the Owner may require that the Contractor demonstrate that the enhancements proposed exceed the specifications herein, prior to the installation of the enhanced material systems. This section in no way shall be interpreted as authorization to deviate from the minimum standard practices set forth herein.
- H. Documentation for products and installers seeking preapproved status must be submitted no less than 2 weeks prior to proposal due date to allow time for adequate consideration. The Owner will advise of acceptance or rejection a minimum of 3 days prior to the due date. All required submittals must be satisfactory to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The sewn tube shall consist of one or more layers of absorbent, nonwoven felt fabric and meet the requirements of ASTM F1216, Section 5.1, or ASTM F1743, Section 5.2.1, or ASTM D 5813, Sections 5 and 6. The tube shall be constructed to withstand installation pressures, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
- B. The wet out tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the calculated minimum design CIPP wall thickness.
- C. The tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during **inversion. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.**
- D. The outside layer of the tube shall be coated with an impermeable, flexible membrane that will contain the resin and allow the resin impregnation (wet out) procedure to be monitored.

- E. The tube shall be **homogeneous across the entire wall thickness containing no** intermediate or encapsulated elastomeric layers. No material shall be included in the tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
- F. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- G. Seams in the tube shall be stronger than the nonseamed felt material.
- H. The tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall include the manufacturer's name or identifying symbol. The tubes must be manufactured in the USA.
- I. The resin system shall be a corrosion resistant polyester or vinyl ester system including all required catalysts, initiators that when cured within the tube create a composite that satisfies the requirements of ASTM F1216, ASTM D5813, and ASTM F1743, the physical properties herein, and those which are to be utilized in the submitted and approved design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

2.02 STRUCTURAL REQUIREMENTS

- A. The CIPP shall be designed as per ASTM F1216, Appendix X.1. The CIPP design shall assume no bonding to the original pipe wall.
- B. The Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by his company. Such testing results are to be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing as defined within the relevant ASTM standard. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50 percent of the short-term test results shall not be applied unless substantiated by qualified third party test data to the Owner's satisfaction. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
- C. The Enhancement Factor "K" to be used in "Partially Deteriorated" design conditions shall be assigned a value of 7. **Application of enhancement factors in excess of 7 shall be substantiated through independent test data to the satisfaction of the Owner.**
- D. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any 2 layers with a probe or point of a knife blade so that the layers separate cleanly of the probe or knife blade moves freely between the layers. If the layers separate during field sample testing, new samples will be required to be obtained from the installed pipe. Any reoccurrence may cause rejection of the work.
- E. The cured pipe material (CIPP) shall conform to the structural properties, as listed below.

MINIMUM CIPP PHYSICAL PROPERTIES

| Property | Test Method | Cured Polyester Composite | |
|-----------------------|-------------|---------------------------|----------------|
| | | Min. per ASTM F1216 | Enhanced Resin |
| Modulus of Elasticity | ASTM D790 | 250,000 psi | 400,000 psi |
| Flexural Stress | ASTM D790 | 4,500 psi | 4,500 psi |

- F. The required structural CIPP wall thickness shall be based, as a minimum, on the physical properties in Section 5.5 or greater values if substantiated by independent lab testing and in accordance with the design equations in the Appendix XI, Design Considerations of ASTM F1216, and the following design parameters:

| | | |
|---|---|---------------------------|
| Design Safety Factor (typically used value) | = | <u>2.0</u> |
| Retention Factor for Long-Term Flexural Modulus to be used in Design (As determined by long-term tests described in Section 5.2 and approved by the Owner.) | = | <u>1% - 75%</u> |
| Ovality* (Calculated from (X1.1 of ASTM F1216)) | = | <u>%</u> |
| Enhancement Factor, K | = | <u>See Section 5.3</u> |
| Groundwater Depth (above invert of existing pipe)* | = | <u>ft</u> |
| Soil Depth (above crown of existing pipe)* | = | <u>ft</u> |
| Soil Modulus** | = | <u>psi</u> |
| Soil Density** | = | <u>pcf</u> |
| Live Load** | = | <u>H20 Highway</u> |
| Design Condition | = | <u>Fully Deteriorated</u> |

* Denotes information, which can be provided here or in inspection videotapes or project construction plans. Multiple line segments may require a table of values.

** Denotes information required only for fully deteriorated design conditions.

- G. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

2.03 TESTING REQUIREMENTS

- A. The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin systems similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical-testing requirements.
- B. When requested by the Owner, the Contractor shall submit test results from field installation of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in Section 2.02.E. have been achieved in previous field applications. Samples for this Project shall be made and tested as described in Section 3.04.A.

PART 3 - EXECUTION

3.01 INSTALLATION OF INCIDENTAL ITEMS

- A. It shall be the responsibility of the Owner to locate and designate all manhole access points open and accessible for the work, and provide rights-of-access to these locations. If a street must be closed to traffic because of the orientation of the sewer, the Owner shall institute the actions necessary to provide access during this for the mutually agreed time period.
- B. Cleaning of Sewer Lines: The Contractor, when required, shall remove all internal debris out of the sewer line that will interfere with the installation of CIPP. The Owner shall also provide a dump site for all debris removed from the sewers during the cleaning operation. Unless stated otherwise, it is assumed this site will be at or near the sewage treatment facility to which the debris would have arrived in absence of the cleaning operation. Any hazardous waste material encountered during this project will be considered as a changed condition.

- C. Bypassing Sewage: The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair. Plugging the line at an existing upstream manhole and pumping the flow into a downstream manhole or adjacent system shall make the bypass. The pump(s) and bypass line(s) shall be of adequate capacity to accommodate the sewage flow.
- D. Inspection of Pipelines: Inspection of pipelines shall be performed by experienced PACP personnel trained in locating breaks, obstacles and service connections using close circuit television (CCTV) inspection techniques. The pipeline interior shall be carefully inspected to determine the location of any conditions that may prevent proper installation of CIPP. These shall be noted and corrected. A videotape and suitable written log for each line section shall be produced for later reference by the Owner.
- E. Line Obstructions: It shall be the responsibility of the Contractor to clear the line of obstructions such as solids and roots that will prevent the insertion of CIPP. If preinstallation inspection reveals an obstruction such as a protruding service connection, dropped joint, or a collapse that will prevent the installation process, and it cannot be removed by conventional sewer cleaning equipment, then the Contractor shall make a point repair excavation to uncover and remove or repair the obstruction. Such excavation shall be approved in writing by the Owner's representative prior to the commencement of the work and shall be considered as a separate pay item.
- F. Public Notification: The Contractor shall make every effort to maintain sewer service usage throughout the duration of the Project. In the event that a connection will be out of service, the longest period of no service shall be 8 hours. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:
 - 1. Written notice to be delivered to each home or business the day prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the Project or any potential problems.
 - 2. Personal contact with any home or business, which cannot be reconnected within the time stated in the written notice.
- G. The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing the CIPP.

3.02 INSTALLATION

- A. **Prior to the installation of the CIPP, install hydrophilic gaskets to the interior circumference of the existing sewer at the inlet and out let of each manhole. The hydrophilic rubber gaskets can be either 3/4-inch by 1/4-inch bands or shaped as a sleeve. Install either 2 bands or one sleeve at each location.**
- B. CIPP installation shall be in accordance with ASTM F1216, Section 7, or ASTM F1743, Section 6, with the following modifications:
 - 1. The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the potential loss of resin during installation through cracks and irregularities in the original pipe wall, as applicable.

2. **Resin impregnation shall be by vacuum impregnation or alternate method. If vacuum impregnation is used, a roller system shall be used to uniformly distribute the resin throughout the tube. If the installer uses an alternate method or resin impregnation, the method must produce the equivalent results. Any alternate resin impregnation method must be documented to the Owner's satisfaction that the saturation of the CIPP is sufficient.**
3. The wet out tube shall be positioned in the pipeline using either inversion or a pull-in method as defined within relevant ASTM standards previously stipulated. If pulled into place, a power winch or its equivalent should be utilized and care should be exercised not to damage the tube as a result of pull-in friction. The tube should be pulled-in or inverted through an existing manhole or approved access point and fully extend to the next designated manhole or termination point.
4. Temperature gauges shall be placed between the tube and the host pipe's invert position to monitor the temperatures during the cure cycle using temperature sensor cable.
5. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. A cool-down process shall be conducted that complies with the resin manufacturer's specification.

3.03 REINSTATEMENT OF BRANCH CONNECTIONS

- A. It is the intent of these specifications that branch connections to buildings be reopened without excavation, utilizing a remotely controlled cutting device, monitored by a CCTV. The Contractor shall certify a minimum of 2 complete, functional cutters plus key spare components are on the job site before each installation or are in the immediate area of the job site and can be quickly obtained. Unless otherwise directed by the Owner or his authorized representative, all laterals will be reinstated. No additional payment will be made for excavations for the purpose of reopening connections and the Contractor will be responsible for all costs and liability associated with such excavation and restoration work.

3.04 INSPECTION

- A. CIPP samples shall be prepared for each installation designated by the Owner/Engineer or approximately 20 percent of the Project's installations. Pipe physical properties will be tested in accordance with ASTM F1216 or ASTM F1743, Section 8, using either method proposed. The flexural properties must meet or exceed the values listed in **paragraph 2.02.E** of this specification, Table 1 of ASTM F1216, or the values submitted to the Owner/Engineer by the Contractor for this Project's CIPP wall design, whichever is greater.
- B. Wall thickness of samples shall be determined as described in paragraph 8.1.6 of ASTM F1743. The minimum wall thickness at any point shall not be less than 87-1/2 percent of the submitted minimum design wall thickness as calculated in **paragraph 2.02.F** of this document.
- C. Visual inspection of the CIPP shall be in accordance with ASTM F1743, Section 8.6.

3.05 CLEANUP

- A. Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.

3.06 BASIS OF PAYMENT

- A. Payment for the work included in this Section will be in accordance with the prices set forth in the **Form of Proposal** for the quantity of work performed. Progress payments will be made monthly based on the work performed during that period.

END OF SECTION

SECTION 02608 – MANHOLES

PART 1 - GENERAL

1.01 SUMMARY

- A. The Contractor shall furnish all labor, material, and equipment necessary to construct manholes for sanitary storm sewers, including steps, frames, and covers, together with all appurtenances as shown and detailed on the Drawings and specified herein. Manhole materials shall be precast concrete.

1.02 DEFINITIONS

- A. **Standard Manhole:** A standard manhole is defined as any manhole that is greater than 5 feet in depth, as measured from the invert of the manhole base at its center to the top (rim) of the manhole cover.
- B. **Shallow Manhole:** A shallow manhole is defined as any manhole that is 5 feet or less in depth, as measured in the preceding sentence.

PART 2 - PRODUCTS

2.01 CONCRETE MANHOLES - GENERAL

- A. Manholes shall conform in shape, size, dimensions, materials, and other respects as shown on the Drawings or specified herein.
- B. All concrete manholes shall have precast reinforced concrete developed bases. No other type of base will be allowed. Invert channels shall be factory constructed when the base is made. Sloping invert channels shall be constructed whenever the difference between the inlet and outlet elevation is 2 feet or less.
- C. The concrete manhole walls (barrels and cones) and base shall be precast concrete sections manufactured with **Xypex C-1000 RED cementitious crystalline admixture at dosage of 3.5% by weight of cement**. The top of the cone shall be built of reinforced concrete to allow adjustment rings to be added for adjustment of the frame to meet the finished surface. Minimum strength of the concrete for the precast sections shall be 4,000 psi at the time of shipment.
- D. **Manholes that receive sewage from a force main discharge, and within 2,000 LF downstream or to the nearest manhole beyond the 2,000 LF, shall have concrete admixture ConShield, or approved equal, as specified in Section 02532 for reinforced concrete pipe.**
- E. Manholes located in the 100-year floodplain shall have a concrete base that includes an anti-flotation collar. The collar shall have a radius 6-inches larger than the exterior wall of the base section.
- F. For concrete manholes, the inverts of the developed bases shall conform accurately to the size of the adjoining pipes. Side inverts shall be curved and main inverts (where direction changes) shall be laid out in smooth curves of the longest possible radius which is tangent, within the manhole, to the centerlines of adjoining pipelines.
- G. For concrete manholes, the cast iron frames and covers shall be the standard frame and cover as indicated on the LFUCG Standard Drawings.

H. Manholes shall be manufactured by Sherman Dixie, Oldcastle Precast or approved equal.

2.02 PRECAST CONCRETE SECTIONS

- A. Precast concrete sections and appurtenances shall conform to the ASTM Standard Specifications for Precast Reinforced Concrete Manhole Sections, Designation C478, latest revision, with the following exceptions and additional requirements.
- B. The base section shall be monolithic for 4-foot and 5-foot diameter manholes. Manholes with diameter of 6 feet or larger shall have a monolithic base or base slab.
- C. The wall sections shall be not less than 5 inches thick.
- D. Type II or type III cement shall be used except as otherwise permitted.

2.03 CONCRETE MANHOLE - FRAMES AND COVERS

- A. The Contractor shall furnish all cast iron manhole frames and covers as shown in LFUCG Standard Drawings.
- B. Castings shall be designed for H-20 traffic loading.
- C. The castings shall be of good quality, strong, tough, evengrained cast iron, smooth, free from scale, lumps, blisters, sandholes, and defects of every nature which would render them unfit for the service for which they are intended. Contact surfaces of covers and frame seats shall be machined to prevent rocking of covers.
- D. Frames shall be set in mastic and bolted down in non-traffic areas with four 3/4" SS Hilti anchor bolts and washers. Hilti anchor bolts shall be embedded a minimum of 4-inches into precast concrete cone section. In traffic areas, the frame shall be set in mastic and Class A concrete donut poured around frame to the top of concrete cone section. The concrete donut shall be 12-inches in width and in depth up to within 1 1/2-inches of surface for bituminous asphalt pavement.
- E. All casting shall be thoroughly cleaned and subject to a careful hammer inspection.
- F. Castings shall be at least Class 25 conforming to the ASTM Standard Specifications for Gray Iron Casting, Designation A48, latest revision.
- G. Unless otherwise specified, manhole covers shall be 22-3/4 inches in diameter, weighing not less than 305 pounds per frame and cover. Manhole covers shall set neatly in the rings, with contact edges machined for even bearings and tops flush with ring edge. They shall have sufficient corrugations to prevent slipperiness. The covers shall have two (2) pick holes about 1-1/4 inches wide and 1/2 inch deep with 3/8-inch undercut all around. Covers shall not be perforated. Frames and covers shall be J.R. Hoe and Sons Mc-350, or approved equal.
- H. Watertight lids shall have neoprene T-gasket and concealed pickhole.
- I. All covers shall be marked in large letters "LEXINGTON KENTUCKY SANITARY SEWER" as shown in LFUCG Standard Drawings.

2.04 MANHOLE STEPS (CONCRETE MANHOLES)

- A. Manholes steps shall be the polypropylene plastic type reinforced with a 1/2 inch diameter deformed steel rod. The step shall be 10-3/4 inches wide and extend 5-3/4 inches from the

manhole wall. Steps shall line up over the downstream invert of the manhole. The steps shall be embedded into the manhole wall a minimum of 3-3/8 inches. Steps shall be uniformly spaced at 12-inch to 16-inch intervals.

- B. Manhole steps shall be in accordance with LFUCG Standard Drawings.

2.05 PREMOLDED ELASTOMERIC-SEALED JOINTS

- A. All holes for pipe connections in concrete barrels and bases shall have a factory-installed flexible rubber gasket to prevent infiltration. The manhole boots shall conform to the latest revision of ASTM-C923. The boots shall be Contour Seal or Kor-N-Seal manufactured by National Pollution Control Systems, Inc., Nashua, NH; A-Lok Manhole Pipe Seal manufactured by A-Lok Corporation, Trenton, NJ; or an approved equal.

2.06 MANHOLE DIAPHRAGM (FOR WATERTIGHT LID APPLICATIONS)

- A. Diaphragm manhole inserts shall be manufactured from corrosion-proof material suitable for atmospheres containing hydrogen sulfide and diluted sulfuric acid. Diaphragm shall be installed in manholes susceptible to inflow as indicated on the Drawings.
- B. The body of the manhole insert shall be made of high density ethylene hexene-1 copolymer material meeting ASTM Specification D 1248, Class A, Category 5 (the insert shall have a minimum impact brittleness temperature of -180 degrees Fahrenheit). The thickness shall be uniform 1/8 inch or greater. The manhole insert shall be manufactured to dimensions as shown on the Drawings to allow easy installation within the manhole frame.
- C. Gaskets shall be made of closed cell neoprene. The gasket shall have a pressure sensitive adhesive on one side and shall be placed under the weight bearing surface of the insert by the manufacturer. The adhesive shall be compatible with the manhole insert material so as to form a long lasting bond in either wet or dry conditions.
- D. Lift strap shall be attached to the rising edge of the bowl insert. The lift strap shall be made of 1 inch wide woven polypropylene web and shall be seared on all cut ends to prevent unraveling. The lift strap shall be attached to the manhole insert by means of a stainless steel rivet. Location of the lift strap shall provide easy visual location.
- E. Standard ventilation shall be by means of a valve or vent hole. Vent holes shall be on the side wall of the manhole insert approximately 3/4 inch below the lip. The valve or vent hole will allow a maximum release of 5 gallons per 24 hours when the insert is full.
- F. The manhole insert shall be manufactured to fit the manhole frame rim upon which the manhole cover rests. The Contractor is responsible for obtaining specific measurements of each manhole cover to insure a proper fit. The manhole frame shall be cleaned of all dirt, scale and debris before placing the manhole insert on the rim.
- G. Diaphragm shall be Rainstopper manufactured by Rainstopper, Inc. in color white, or approved equal.

2.07 CLEANOUTS

- A. Cleanouts shall be cast iron and extend to the finish grade and capped with a clean-out plug in accordance with details and at locations shown on the Drawings. Pipe shall be the same size as the gravity sewer line in which the cleanout is located. A 4-inch thick concrete pad, with 6" x 6", 1.9 x 1.9 wire mesh, 24 inches square, with the valve box lid section, shall be provided around each cleanout.

- B. Cleanouts shall be in accordance with LFUCG Standard Drawings.

2.08 DROP CONNECTIONS

- A. Drop connections shall be installed on exterior of manhole as shown on the LFUCG Standard Drawings. The pipe material inside the drop manhole shall be of the same material as the sanitary sewer line.

PART 3 - EXECUTION

3.01 FABRICATION - PRECAST SECTIONS

- A. Manhole sections shall contain manhole steps accurately positioned and embedded in the concrete when the section is cast.
- B. Sections shall be cured in an enclosed curing area and shall attain a strength of 4,000 psi prior to shipment.
- C. No more than two (2) lifting hooks may be cast or drilled in each section.
- D. Flat slab tops shall have a minimum thickness of 6 inches and reinforcement in accordance with ASTM C478.
- E. The date of manufacture and the name or trademark of the manufacturer shall be clearly marked on the precast sections.
- F. Acceptance of the sections will be on the basis of material tests and inspection of the completed product and test cylinders if requested by the Engineer.
- G. Cones shall be precast sections of similar construction.

3.02 SETTING PRECAST MANHOLE SECTIONS

- A. Precast-reinforced concrete manhole sections shall be set so as to be vertical and with sections and steps in true alignment.
- B. Butyl mastic sealant shall be installed in all manhole joints in accordance with the manufacturer's recommendations and as shown in LFUCG Standard Drawings. Butyl mastic sealant shall meet Federal Spec SS-S-210A, AASHTO M-19875I, and ASTM C990. Butyl mastic sealant shall be NPC Bidco C-56 as manufactured by Trelleborg Engineered Systems, or approved equal. Sealant shall be a minimum bead of 1 inch in rope configuration.
- C. All holes in sections used for their handling shall be thoroughly plugged with rubber plugs made specifically for this purpose.

3.03 ADJUSTING MANHOLE FRAMES AND COVERS TO GRADE

- A. Except where shown on the Drawings, the top of the precast concrete eccentric cone of a standard manhole or the top of the flat slab of a shallow manhole shall terminate 6 inches below existing grade in an unpaved non-traffic area except in a residential yard and 13 inches below existing grade in a paved or unpaved traffic area and in a residential yard. The remainder of the manhole shall be adjusted to the required grade.
- B. When a manhole is located in an unpaved non-traffic area other than in a residential yard, the frame and cover shall be adjusted to an elevation 1 inch above the existing grade at the

center of the cover. If field changes have resulted in the installed manhole invert elevation to be lower than the invert elevation shown on the Drawings, the adjustment to an elevation of 1 inch above existing grade shall be accomplished by the use of precast concrete or cast iron adjusting rings. The area around the adjusted frame and cover shall be filled with the required material, sloping it away from the cover at a grade of 1 inch per foot.

- C. When a manhole is located in a bituminous, concrete, or crushed stone traffic area, or in a residential yard, the frame and cover shall be adjusted to the grade of the surrounding area by the use of precast concrete or cast iron adjusting rings. The adjusted cover shall conform to the elevation and slope of the surrounding area.
 - 1. The Contractor shall coordinate elevations of manhole covers in paved streets with the local public works department. If resurfacing of the street in which sewers are laid is expected within twelve (12) months, covers shall be set 1-1/2 inches above the existing pavement surface in anticipation of the resurfacing operations.

3.04 ADJUSTING SECTIONS

- A. Only clean adjusting sections shall be used. Each adjusting section shall be laid in a bead of butyl mastic sealant and shall be thoroughly bonded.

3.05 SETTING MANHOLE FRAMES AND COVERS

- A. Manhole frames shall be set with the tops conforming to the required elevations set forth hereinbefore. Frames shall be set concentric with the top of the concrete and in a full bead (1") of butyl mastic sealant so that the space between the top of the masonry and the bottom flange of the frame shall be completely watertight.
- B. Manhole covers shall be left in place in the frames on completion of other work at the manholes.

3.06 VACUUM TESTING (ASTM C1244)

- A. Scope
 - 1. This test method covers procedures for testing precast concrete manhole sections when using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. This test method is used for testing concrete manhole sections utilizing mortar, mastic, or gasketed joints.
- B. References, ASTM Standards:
 - 1. C 822 Terminology Relating to Concrete Pipe and Related Products.
 - 2. C 924 Practice for Testing Concrete Pipe Sewer Lines by Low-Pressure Air Test Method.
 - 3. C 969 Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.
- C. Summary of Practice

All lift holes and any pipes entering the manhole are to be plugged. A vacuum will be drawn and the vacuum drop over a specified time period is used to determine the acceptability of the manhole.

D. Significance and Use

This is not a routine test. The values recorded are applicable only to the manhole being tested and at the time of testing.

E. Preparation of the Manhole

1. All lift holes shall be plugged.
2. All pipes entering the manhole shall be temporarily plugged, taking care to securely brace the pipes and plugs to prevent them from being drawn into the manhole.

F. Procedure

1. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
2. A vacuum of 10 inches of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 inches of mercury.
3. The manhole shall pass if the **minimum time** for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury **exceeds 60 seconds (one minute)**.
4. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.
5. Use or failure of this vacuum test shall not preclude acceptance by appropriate water infiltration or exfiltration testing, (see Practice C 969), or other means.

G. Precision and Bias

No justifiable statement can be made either on the precision or bias of this procedure, since the test result merely states whether there is conformance to the criteria for the success specified.

END OF SECTION

SECTION 02609 - SEWER MANHOLE REHABILITATION

PART 1 - GENERAL

1.01 GENERAL INFORMATION

- A. All work done for the LFUCG by the Contractor must meet OSHA standards in regards to safety.
- B. The Contractor shall repair manholes at required locations. These manhole repairs shall consist of one or more of the following:
 - 1. Rehabilitation of manhole walls and bases by plugging, patching, and coating with mortars, coatings, and sealants to improve the structural condition, eliminate infiltration, and provide corrosion protection.
 - 2. Repair of manhole chimney and corbel (cone) to improve structural condition, eliminate infiltration, and reconstruct to the desired elevation.
 - 3. Reinstallation or replacement of manhole frames casting, covers and precast adjustment rings to adjust manhole to grade, eliminate infiltration under frame and eliminate inflow through cover.
 - 4. Installation of external or internal manhole frame-chimney seals to eliminate infiltration under frame.

1.02 MATERIALS

- A. The materials used shall be designed, manufactured and intended for sewer manhole rehabilitation and the specific application in which they are used. All materials shall be applied in accordance with the manufacturer's written instructions, by manufacturer certified application contractor.
- B. REPAIR MATERIALS (MINOR INFILTRATION)
 - 1. Cementitious repair materials may be used for mild or moderate H₂S environments, as approved by the Engineer. A rapid-setting cementitious or chemical grout specifically formulated for leak control shall be used to stop minor water infiltration. It shall be mixed and applied according to the manufacturer's recommendations and should meet the minimum requirements of ASTM C 109 for compressive strength and ASTM C 234 for pull out strength. Acceptable manufacturers include Strong Seal or approved equivalent.
- C. REPAIR MATERIALS (ACTIVE INFILTRATION)
 - 1. A chemical grout must be used to stop very active infiltration. It shall be mixed and applied according to manufacturer's recommendations. The chemical grout should be volume stable having a minimum 1 day compressive strength of 50 psi and a 28 day compressive strength of 250 psi.
- D. REPAIR MATERIALS (PATCHING AND PROFILING MIX)
 - 1. Cementitious Compound (Quadex or equivalent product)
 - a. A quick setting cementitious material can be used to bring the substrate to profile by filling voids, cracks, missing mortar and other substrate defects. It should be mixed and applied according to the manufacturer's recommendations and should

meet the minimum requirements of ASTM C 109 for compressive strength and the minimum requirements of ASTM C 307 for tensile strength.

E. PROTECTIVE COATING MATERIAL (RESIN BASED LINER)

1. The resin based material shall be used to form the sprayed on/structural enhanced monolithic liner covering all interior surfaces of the structure including benches and inverts of manholes. The finished liner shall be SprayWall® as manufactured by Sprayroq, Inc. or approved equal and conform to the minimum physical requirements listed below.

| | | |
|----------------------------|------------|--|
| Compressive strength | ASTM D 695 | 10,500 psi |
| Tensile strength | ASTM D 638 | 7,000 psi |
| Flexural strength | ASTM D 790 | 12,000 psi |
| Bond | | Shall exceed tensile strength of substrate |
| Flexural modulus (initial) | ASTM D 790 | 730,000 psi |
| Density | | 87 ± pcf |

- a. The finished structure shall be corrosion resistant to: Hydrogen Sulfide; 20% sulfuric Acid; 17% Nitric Acid; 5% Sodium Hydroxide; road salts for winter conditions as well as other common ingredients of the sanitary sewage environment.
- b. The wall of the resin based liner will be structurally designed to withstand the hydraulic load generated by the groundwater table & restore structural integrity. The long term (50 yr.) value of the flexural modulus of elasticity will be a minimum of 500,000 psi and is an integral part of the engineering equation used to design the wall thickness of the structural liner.

2. For this reason the value of the long term flexural modulus of the proposed product will be certified by an independent, third party testing lab and submitted with the design calculations for each individual structure.

- a. Definition- Long term value will be identified as initial flexural modulus less the reduction in value caused by Creep over a fifty (50) year minimum period and verified by DMA testing.

3. Other Materials: Because of the advantages associated with rapid cure and infinite thickness capabilities, no resin based materials other than polyurethane shall be used to achieve the structural enhancement without prior approval of the Construction Manager.

- F. All mixing and application of the material shall be done in strict accordance with the printed instructions of the approved manufacturer and as directed by the Engineer. The Contractor shall submit to the Engineer (when requested) evidence indicating that the proposed applicator(s) are fully qualified to perform the work, and any proposed application found not to be qualified shall (at the written request of the Engineer) be removed forthwith by the Contractor.

1.03 SUBMITTALS

- A. The Contractor shall submit his proposed coating/lining system for the Engineer's review and approval. The submittal shall include the following:

1. Technical data sheet on each product used, including any ASTM test results necessary to verify that the product is suitable for its intended use per these specifications

2. Material Safety Data Sheets (MSDS) for products submitted for approval.
3. Project specific guidelines and recommendations.
4. Applicator qualifications.
 - a. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used.
 - b. The Applicator shall provide four (4) references which demonstrate previous successful projects of similar scope and difficulty, within the last two (2) years.
 - c. Certification that the application equipment has been approved by the protective coating manufacturer.

1.04 METHODS

A. MANHOLE INSPECTION

1. The Employees performing the inspection must be MACP trained and certified. During manhole inspection, the Contractor will physically enter the manhole, following OSHA requirements for confined space entry, to look for defects and sources of inflow and infiltration. The Contractor will mark the sections(s) of the manhole where inflow and infiltration is observed. The Contractor will fill out a manhole inspection form in accordance with these specifications. The Contractor shall submit a copy of the Manhole Inspection/Repair Form to the Engineer for approval. No manhole repairs shall be performed without review from the Engineer. This data must be submitted in MACP version 4.4 unless otherwise requested. This allows for the data to be used in the ACCELA database. If any other method is used and submitted it shall be rejected and a new survey using appropriate software shall be submitted.
2. If the Contractor is using more than 1 crew for manhole inspection, the data shall be combined into one database before submittal to LFUCG for review. The Contractor should also check the data for errors and make sure that the data is consistent. Some of the errors include making sure that the Manhole ID's matches GIS. The Contractor should be able to take a list of valid GIS manhole ID's and find the ones in their database that don't match GIS.

B. PREPARATORY CLEANING OF MANHOLES

1. Manholes that are to be plugged, patched, or coated internally shall first be cleaned by high-velocity water cleaning equipment (minimum 3,000 psi) in order to remove all foreign matter from the manhole walls and bench. Cleaning shall be incidental to the manhole rehabilitation.
2. Place covers over the invert to prevent extraneous material from entering sewer lines.
3. All interior surfaces of the manhole shall be cleaned and free from oil, grease, loose mortar, protruding bricks, paints, protective coatings, efflorescence, laitance, and curing compounds. Remove contaminants and foreign materials to sound material.

C. PLUGGING, PATCHING, AND COATING MANHOLES

1. After manhole surfaces have been cleaned, infiltrating holes and cracks shall be plugged prior to applying the coating sealant, if required.
2. Application of the materials shall be in accordance with the material manufacturer's recommendations and as defined in this specification.
3. Provide factory-trained personnel approved by the manufacturer for application of the specified products.

D. REPAIR OF MANHOLE CHIMNEY AND CORBEL

1. Any repair that is done within the LFUCG Right-of-Way Ordinance 166-2002 must meet the standards set forth in said Ordinance 166-2002.
2. Excavation and Replacement of Pavement:
 - a. The removal of the manhole frame (ring) shall be accomplished by making a square cut in the pavement of sufficient size.
 - b. Material in the exposed area shall be dug out to a sufficient depth to permit the required repairs.
 - c. Suitable materials (stockpiled) shall be tamped in place to form the sub-base for the pavement as specified in the Standard Drawings. If additional material is needed, suitable material shall be added before the pavement is replaced.
 - d. The surfacing used to cover the exposed area (concrete or asphalt) shall conform to the existing pavement. It shall be placed to the same elevation and grade as the existing pavement and meet the specifications in the LFUCG Right-of-Way Ordinance.
 - e. Pavement replacement not satisfactorily completed by the Contractor shall be replaced by the Contractor at no additional cost to the Owner.
3. Excavation and Replacement of Backfill in Unpaved Areas:
 - a. Only necessary excavation around the manhole shall be performed.
 - b. Backfill shall be replaced and compacted to prevent settlement and to restore the setting to a condition equal to or better than that found. Backfill shall not cover the manhole.
 - c. Any private property, which is removed for access to the manhole, shall be replaced by the Contractor in existing or better condition. If this replacement is not to the satisfaction of the Engineer, it shall be redone at no additional cost to the Owner.
4. The Contractor shall take all necessary precautions to prevent falling debris from damaging the manhole trough and/or entering the sewer.
5. The manhole frame and the deteriorated portions of the existing manhole riser and cone shall be removed.

6. The riser and cone shall be repaired or rebuilt with sound material, as appropriate to reconstruct the manhole to the desired elevation in accordance with the Standard Drawings.

E. INJECTION GROUTING OF MANHOLE

1. All work related to injection grouting of manholes must be performed in accordance with the latest edition of NASSCO/ASTM specifications.

F. MANHOLE REHABILITATION, PROTECTIVE COATING METHODS

1. Application Temperatures: Application of liner shall not be made unless the ambient temperature inside the structure is 50 degrees Fahrenheit or higher.
2. Bench/Invert Repair
 - a. The manhole bench must be sprayed but depending on availability and future plans, some judgment consideration will have to be made regarding the invert. Important issue here is the necessity to insure a monolithic system is achieved.
 - b. After blocking flow through the structure and thorough cleaning/preparatory work has been achieved. The sprayed on resin-based liner shall be applied to the invert, bench and wall areas in the same manner as specified for the liner application below. The spray shall be applied such that the entire structure receives a structurally enhanced monolithic liner.
 - c. The finished invert surfaces shall be smooth, free of ridges and will be sloped in the direction of flow. Special care shall be used to insure a smooth transition between the new manhole invert and intersecting pipeline inverts such that flow will not be impaired.
3. Liner Application
 - a. The resin based liner shall be manually sprayed on to all surfaces by a trained technician who is experienced in the application of a spray applied resin and has been certified by the manufacturer. Appropriate personal protection equipment shall be utilized but in every case when applying the liner, the sprayer and personnel in direct contact with the spray atmosphere, will always be protected by supplied air.
 - b. The minimum thickness of the material applied is to be no less than 250 mils (1/4") in order to support structural integrity. No other products such as cement or grouts may be used as part of the structural reinstatement, however, said products may be used as part of the repair process prior to sprayed application of the structure as specified in 2.01 IIA.
 - c. Application of the spray applied material must be completed in one (1) mobilization in order to minimize the disruption and cost of excessive bypassing, pipeline plugging, traffic control and all other support services.
 - d. The finished manhole must be returned to full service immediately after the spray application is complete.
4. Curing: The structure should be allowed to cure for 24 hours and return to ambient temperature prior to any physical testing, including vacuum testing.

G. MANHOLE FRAME (RING) AND COVER REINSTALLATION OR REPLACEMENT

1. Excavation and site restoration in paved and unpaved areas shall be as specified above and must meet the LFUCG Right-of-Way Ordinance 166-2002 when applicable.
2. The contractor shall remove the existing manhole frame and cover. If the frame and cover are to be replaced, the Contractor will dispose of them as directed by the Owner's Representative.
3. Replacement frames and covers shall be as specified in the contract documents. The frame shall be first cleaned and then installed.
4. As directed by the Engineer, manhole frames unsuitable for reuse shall be taken to a recycling operation. If the recycler pays a fee for the material, the fee belongs to the Owner. If a recycling fee is charged, it can be billed as time and material.
5. Where leveling brick manholes in existing pavement, contractor is to remove all rings of damaged bricks so as to a point where manhole is structurally sound, pour a concrete base, raise manhole to grade with precast grade rings. If frame and lid are damaged it needs to be brought to the attention of the Engineer, and then replaced with new frame and lid. Concrete no less than 6 inches thick at 4000 psi must be used to finish surface area to make as smooth as possible the transition from existing pavement to repair and back to existing pavement. If manhole to be adjusted is precast then raise according to the direction of the Engineer. There is a drawing available which can be given to the contractor upon their request.

H. EQUIPMENT FOR MANHOLE REPAIR ON TIME AND MATERIALS

1. The following equipment shall be furnished. It shall be considered incidental to "Laborer".
2. High Pressure washer and high-velocity gun for washing and scouring manhole walls and floors capable of at least 2,400 PSI. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment may be either truck or trailer mounted as long as it adequately accomplishes the cleaning and contains a water tank with a capacity of at least 250 gallons.
3. The following are considered equipment but not limited to which a Contractor would supply as incidental equipment at the job site and are to be sledge hammer, pry bars, screw drivers, socket wrenches, hack saw, trowel, putty knife, bucket (5 gallon), chisels, water barrel, hose, trash barrel, shovel, measuring tape, knives, broom, tarp, rope, chain, spud bar, rake, manhole hooks, pliers, hand held mirror, portable air tank and/or hand air pump, pipe plugs (4", 6", 8"), cones, traffic signs, traffic flags, safety vests, fire extinguisher, first aid kit, drinking water jug, a portable generator, extension cords, trouble lights, grinder, electric drill (for paint mixer), quickie saw, and hammer drill.

1.05 MANHOLE DOCUMENTATION

A. MANHOLE INSPECTION/REPAIR FORM

1. The Contractor shall use a Manhole Inspection/Repair Form MACP approved that contains manhole number, manhole type, manhole location, manhole depth, pipe diameter(s), pipe material, manhole defects, date manhole inspected, date manhole repairs performed, and a sketch showing the location of the inlet pipe(s) including any service laterals and outlet pipe.

B. RECORDS

1. The Contractor shall submit a Daily Report to the Engineer listing the manholes inspected and/or type of repairs made on each manhole.
2. On a monthly basis, the Contractor shall submit a hardcopy and digital copy to the Engineer containing a list of the manholes inspected, repairs needed, repairs made, and manholes that cannot be located. The digital records must be in a Microsoft Database format (.mdb file extension) or other format approved by the Engineer.

END OF SECTION

SECTION 02651 - CLEANING AND INTERNAL INSPECTION

PART 1 - GENERAL

1.01 CLEANING

A. GENERAL INFORMATION

1. Furnish all supervision, labor, materials, and equipment to remove grit, grease and debris from sanitary sewer lines using high-velocity jet (hydro cleaning) equipment. The Contractor is responsible for debris removal and proper disposal in accordance with federal, state, and local standards. Sanitary sewer service must be maintained during cleaning operations.
2. All cleaning, including heavy, for lines eight inches and smaller is incidental to the line item and shall not be a separate pay item. If heavy cleaning for lines ten inches and greater is required, request must be made prior to cleaning being performed for approval. This includes Routine cleaning.
3. All cleaning, root removal, and CCTV work associated with CIPP work shall be incidental to the CIPP.

B. METHODS

1. The designated sewer line and sewer manhole sections shall be cleaned using a high-velocity jet. Selection of the equipment used shall be based on the conditions of the sewers at the time the work commences. The equipment and methods selected shall be satisfactory to the Engineer. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up on the other manhole and cleaning again attempted. Extreme care should be taken to prevent flooding of public/private property. If, again successful cleaning cannot be performed or the equipment fails to traverse the entire manhole section, it will be assumed that a major blockage exists and the cleaning effort shall be abandoned and the Engineer notified.
2. Heavy cleaning is defined as cleaning necessary to remove grit or other material deposits exceeding 25% of the pipe diameter at the pipe invert for the entire reach of pipe, or to remove grease deposits at a depth past the spring line of the pipe.

C. EQUIPMENT

1. High-Velocity Jet (Hydrocleaning) Equipment: All high-velocity sewer cleaning equipment shall be constructed for ease and safety of operation. The equipment shall have a selection of two or more high-velocity nozzles. The nozzles shall be capable of producing a scouring action from 15 to 45 degrees in all size lines designated to be cleaned. Equipment shall also include a high-velocity gun for washing and scouring manhole wall and floors. The gun shall be capable of producing flows from a fine spray to a solid stream. The equipment shall have minimum of 500 feet of 1-inch ID high-pressure hose, a minimum capacity of 60 gallons per minute (GPM), and a working pressure of at least 1,200 pounds per square inch (PSI). The equipment shall carry its own water tank capable of holding a minimum of 900 gallons, auxiliary engines, pumps and hydraulically driven hose reel. The equipment may be either truck or trailer mounted as long as it adequately accomplishes the cleaning.

2. All controls shall be located so that the equipment can be operated above ground with minimal interference to traffic and/or danger to the operator.

D. MECHANICAL ROOT REMOVAL

1. Roots shall be removed in the designated sections where root intrusion is a problem. Special attention should be used during the cleaning operation to assure complete removal of roots from joints. Any roots that could prevent the proper installation of cured-in-place liners shall be removed. Procedures shall include the use of mechanical equipment such as root augers, porcupine drags or similar equipment. Line segments requiring root cutting shall be verified by CCTV inspection.
2. The root auger equipment shall be approximately the same diameter as the sewer being cleaned. The auger(s) shall be kept sharp and have an attachment mounted ahead of the cutter that will permit the tool to "ride into" the next length of pipe rather than be stopped by an irregularity or offset in the pipe wall.
3. The porcupine drag shall be of a smaller diameter than the sewer being cleaned. The porcupine shall have stiff wire bristles that project an adequate distance so as to contact the sewer walls and effectively remove the majority of roots encountered.

E. MATERIAL REMOVAL

1. All sand, rocks, roots, grease, and other solid or semisolid material resulting from the cleaning operation shall be removed at the downstream manhole of the section being cleaned. Passing material from manhole section to downstream manhole sections could cause line stoppages, accumulations of sand in wet wells, or damage pumping equipment and shall not be permitted. **If it is observed by the Engineer or his representative that materials have been allowed to be passed to the next downstream section, the Contractor will be required to both clean and CCTV that section at their cost with an inspector present to verify line is cleaned.**
2. The Contractor shall furnish all equipment and appurtenances required for removal of the debris from the sewer system. No extra payment will be made for removing or disposing of the debris since this is considered a part of the CIPP scope of work.
3. All materials shall be removed from the site no less often than at the end of each workday. Under NO circumstances will the Contractor be allowed to accumulate debris, etc., on the site of work except in totally enclosed containers approved by the Engineer.

F. DISPOSAL OF DEBRIS

1. Unit prices for CIPP shall include the cost of trapping and removing any and all roots, sediments, and residual wastes from sewer systems and manholes as cleaning progresses. Where a hydraulic jet sewer cleaner is used to scour and flush sewer lines, a vacuum unit or other suitable method as approved by the Engineer shall be used in conjunction with the hydraulic jet cleaner to remove and dewater the suspended matter from the downstream manhole.
2. The Contractor shall provide for adequate transportation and satisfactory disposal of the debris removed from the system. Debris shall be disposed of at LFUCG's Town Branch Wastewater Treatment Plant (WWTP) or other locations designated by LFUCG.

G. ACCESSIBILITY OF WATER FOR CLEANING

The Contractor shall be required to obtain all fresh water necessary for performance of work under this contract.

H. PROTRUDING TAP REMOVAL

Protruding taps shall be removed in the designated sections where service lateral pipe intrusion is a problem and protruding tap removal is specifically requested by the Engineer. A power driven cutting device shall be used to cut the service lateral pipe to a length of ¼ inch or less intrusion. Monitoring of this process through CCTV is necessary to prevent damage to the sewer pipe and/or service lateral pipe. If damage does result from operator negligence, the Contractor will be responsible for making any repairs. The Contractor should take every precaution to prevent accidental damage to the sewer pipe.

J. FINAL ACCEPTANCE

1. Acceptance of this portion of the work shall be made upon the successful completion of the subsequent internal television inspection and shall be to the satisfaction of the Engineer. Where cleaning is not found to be satisfactory, additional cleaning, up to three passes may be required by the Engineer at no cost to the Owner.
2. If cured-in-place liner is to follow the television inspection, particular attention shall be given to the adequacy of the cleaning to insure that the condition of the host pipe shall be acceptable for liner installation.

1.02 INTERNAL INSPECTION

A. GENERAL

1. All lines designated by the Engineer shall be internally inspected. The purpose of the inspection is to locate structural damage that may be present in the collection pipe. CCTV shall be performed using software that is PACP approved by an operator that is PACP certified. This data must be submitted in PACP version 4.4.2 unless otherwise requested. This allows for the data to be used in the ACCELA database. If any other method is used and submitted it shall be rejected and a new survey using appropriate software shall be submitted.
2. All CCTV work associated with CIPP work shall be incidental to the CIPP.
3. If the contractor is using more than 1 CCTV truck, the data shall be combined into one database before submittal to LFUCG for review. The Contractor should also check the data for errors and make sure that the data is consistent. Some of the errors include making sure that the Pipe ID's match GIS. The Contractor should be able to take a list of valid GIS manhole and pipe ID's and find the ones in their database that don't match GIS.
4. After cleaning, the collection pipe shall be visually inspected by means of closed circuit television (CCTV). The inspection will be done one pipe section at a time and the flow in the section being inspected will be suitably controlled as specified. (See Section 3: SEWER FLOW CONTROL.)
5. Any structural damage found in the collection pipe impairing the CCTV inspection, shall be documented and the Engineer should be notified immediately. The Engineer and Owner will evaluate the damage and, if cost-effective, the Engineer will notify the

Contractor in writing to proceed with additional repairs. These repairs will be made at the unit prices shown on the Contractor's Bid Proposal.

6. The Owner makes no guarantee that all of the sanitary sewers to be entered are clear for the passage of a camera (This includes possible utilities accidentally passing through). The methods used for securing passage of the camera are to be at the option of the Contractor, and the costs must be included in the bid price for CIPP. The cost of retrieving the television camera, under all circumstances, when it becomes lodged during inspection, shall be incidental to this portion of the work.

B. EQUIPMENT

1. The self-Propelled Lateral Inspection / Pan and Tilt Mainline Inspection System shall be designed to operate in a 6" - 30" mainline sewer pipes and lateral pipes 2" and larger in diameter. The system shall be able to accomplish pan and tilt inspection of the mainlines and view the lateral services, and a second camera will be supplied to enter the lateral service from the mainline to inspect up a maximum of 80 ft. into the lateral. The multi-conductor system shall operate a 0'-1000' cable utilizing dual cable reels only and shall have the ability to display both mainline and lateral footage. The self-propelled lateral inspection / pan and tilt mainline inspection system shall be compatible with additional main line television inspection equipment.
2. Cameras shall be "waterproofed" with capability of operating in underwater conditions up to 5 psi. Cameras shall be operable in 100% humidity conditions. The equipment shall have a built-in inclinometer to measure the slope and grade of the sewer line.
3. The Engineer and Owner shall have access to view the television monitor at all times. Videotapes shall be DVD format and shall be recorded at standard speed.

C. RECOMMENDED METHOD FOR INTERNAL INSPECTION

1. A PACP certified technician shall control the operation of the equipment from a control panel located in the vehicle and shall have control of the movement of the television camera at all times. This may be accomplished by means of a self-propelled camera unit, remote-control winches, by telephone or other suitable means of communications between the winches at either end of the line segment being inspected.
2. CCTV inspection shall meet all PACP requirements, including recording of slope and distance. **The PACP certified technician must record all defects.** A failure to pass Quality Control reviews including both adherence to PACP and ACCELA compatibility of televised lines shall result in Contractor performing another CCTV inspection of lines at the Contractors expense.
3. The camera shall be moved through the sewers in the downstream direction at a uniform rate not to exceed 25 ft./min., stopping when necessary to ensure proper documentation of the sewer's condition. Manual winches, power winches, TV cable and power rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions may be used to move the camera through the sewer line.
4. The camera will stop at each service connection and use the pan and rotate controls of the camera to inspect the condition of the service lateral. The camera operator shall perform a 360-degree rotation around each service connection and a full center view

down the centerline of the lateral opening. The minimum time frame spent at each lateral location is 15 seconds. Additional time may be required for defective laterals. This is not a separate pay item.

5. If during the inspection operation, the television camera will not pass through the entire manhole section, the Contractor shall set up his equipment so that the inspection can be performed from the opposite manhole. If the camera again fails to pass through the entire manhole section, the Contractor shall notify the Engineer of the situation.

D. INSPECTION LOGS AND CD/DVDS

1. All CD/DVDS, and logs shall be labeled with the Contractors Name, Contract number, DVD number (logs must match that number) and with each Contractor the DVD/ logs must start at number 1 and progress upward till the end of this contract (this does not include any lateral CCTV work). The contractor shall supply the LFUCG 2 CD/DVDS copies of each submittal of CCTV work. **No Pay for CIPP until an acceptable copy of the DVD and logs are received by the engineer.**
2. A log approved by the Engineer shall be provided for all line inspections listing the watershed, line segment ID, line segment location, upstream manhole depth, downstream manhole depth, pipe diameter, pipe material, defects and defect ratings, also see notes above. Printed and digital records shall be kept by the Contractor and will clearly show the location of each infiltration point observed during inspection. In addition, other points of significance such as locations of service connections, unusual conditions, roots, storm sewer connections, damaged pipe, presence of scale and corrosion and other discernable features will be recorded and a copy of such records in both hard copy and digital format will be supplied to the Engineer on a weekly basis. **The digital records must be submitted in PACP version 4.4.2 unless otherwise requested.** A key to all observations used shall be included on each log sheet.
3. The locations of all the defective areas to be repaired will be identified by logging the distance frame at each defect or point of interest measured from the center of the starting manhole to the plane of focus of the camera. The importance of accurate distance measurements is emphasized. Confirmation of measurement for location of defects shall be above ground by means of a meter device. Accuracy of the distance meter shall be checked by use of a walking meter, roll-a-tape or other suitable device, and the accuracy shall be satisfactory to the Engineer. Marking on the cable or the like, which would require interpolation for depth of manhole, will not be allowed.
4. The purpose of DVD recording shall be to supply a visual and audio record of problem areas of the lines that may be replayed. DVD recording playback shall be at the same speed that it was recorded. DVDs shall be considered property of the Owner and the Contractor shall possess backup copy of all DVDs until completion of the Contract. All CCTV work must be recorded on DVD's using a PACP approved software operated by a PACP certified operator and the Contractor must supply the LFUCG a readable copy of said software to view these DVD's.

E. FINAL ACCEPTANCE

Acceptance of this portion of work shall be made upon the successful review of the DVD submitted to the LFUCG. If the DVDs are of such poor quality and/or the sewer line needs additional cleaning that the Owner is unable to evaluate the condition of the sewer line or to locate service connections, the Contractor shall be required to re-televisе and provide a suitable DVD of the line at no additional cost. If a suitable DVD cannot be provided of such quality that the Owner can review it, no payment shall be made for additional cleaning and/or closed circuit television (CCTV). Also, no payment shall be made for portions of lines not televised or portions where manholes cannot be negotiated with the television camera.

F. MISCELLANEOUS

The Contractor's Project Coordinator shall provide the Engineer with a tentative weekly schedule, and shall also provide daily notification of those areas to be investigated.

END OF SECTION

SECTION 02700 - ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. The asphalt concrete paving replacement work includes the construction of an aggregate base course, asphalt binder and wearing courses to match existing courses and as specified herein. This work is to replace paving disturbed by the construction and any damages to paving by Contractor's operations, as well as new pavement and driveways, within the limits shown on the plans.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. The general provisions of the Contract apply to the Work specified in this Section.
- B. Section 02225 – Excavating, Backfilling and Compacting for Sewers

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All roads in Fayette County shall be constructed in accordance with the following sections of the Kentucky Transportation Cabinet's (KTC) Standard Specifications for Road and Bridge Construction. Items not covered by the KTC specifications shall require a special design by the Engineer and shall be approved by LFUCG.

| | |
|---------------------------|--------------|
| 1. Embankment | Division 200 |
| 2. Excavation | Division 200 |
| 3. Subgrade | Division 200 |
| 4. Dense Graded Aggregate | Division 300 |
| 5. Bituminous Concrete | Division 400 |
| 6. Concrete Paving | Division 500 |
| 7. Chemical Stabilization | Division 200 |

2.02 SUBGRADE

- A. The subgrade shall be free from ruts, large stones, and excessive dust. The subgrade shall be subjected to a subgrade proof-roll test so that soft, wet, or pumping areas may be identified. The minimum total weight of the loaded dump truck shall be 37 tons. The truck shall be operated at walking speed over the entire subgrade. Any excessive deflections such as rutting or pumping shall be stabilized as directed by the Engineer.
- B. Typical treatments of soft or wet areas of the pavement subgrade include removal and replacement (undercutting), "working-in" No. 2 stone, or installation of a geogrid/geotextile system and crushed stone. The extent and performance requirements of such improvements shall be set forth in the Contract Documents or as directed by the Engineer. Other means to stabilize the subgrade such as lime stabilization or cement modification as described in KTC Section 304, may be necessary.

- C. The pavement subgrade shall be compacted to a uniform density throughout according to the requirements of the Contract Documents. If the density of the subgrade has been diminished by exposure or weather, after having been previously compacted, it shall be recompactd to the required density and moisture content.
- D. Subgrade drainage systems or perforated pipe underdrains shall be installed in accordance with LFUCG Standard Drawings where indicated on the Improvement Plans.

2.03 GRANULAR BASE COURSE

- A. The granular base course shall consist of compacted dense-graded aggregate (DGA) meeting the requirements set forth in Kentucky Transportation Cabinet's (KTC) Standard Specifications for Road and Bridge Construction. The Contractor shall submit to the Engineer the results of physical tests performed on the material to verify that it meets the requirements referenced above.
- B. The DGA shall be applied in thicknesses of no less than 3 inches and no more than 6 inches in thickness. Each lift of DGA shall be compacted to a density no less than 84 percent of the solid volume density based on the oven-dry bulk specific gravity as determined by KM 64-607. A field density test of DGA placement may be required if deemed necessary by Engineer. The tests shall be conducted at a frequency of one test per 2,000 square feet with a minimum of one test per shift during which DGA is placed. The DGA shall be compacted using a vibratory roller or vibratory plate. The DGA shall be placed to achieve a moisture content less than 5%, and shall be stable with no rutting or pumping.
- C. Before arriving at the site, the DGA shall be adequately mixed with water in a pugmill. During transportation and storage on site, the DGA shall be covered to prevent loss of moisture. If drying of the DGA occurs, the Contractor shall add water to the DGA and shall thoroughly mix the material before its placement.

2.04 ASPHALT BASE AND SURFACE COURSES

- A. The materials and methods for construction for the asphalt base course and surface course shall meet the requirement of Kentucky Transportation Cabinet's (KTC) Standard Specifications for Road and Bridge Construction. The Contractor shall submit test results of the aggregate gradation and asphalt content to the Engineer.
- B. The pavement course thicknesses and construction tolerances shall be specified in the Contract Documents. The surface of each course shall be checked with templates, straightedges, and/or stringlines for uniformity. All irregularities exceeding the allowable tolerances must be repaired as required by the Contract Documents or as directed by the Engineer.

2.05 TACK COAT

- A. The tack coat shall be type SS-1h. Before applying the tack coat the area to receive pavement shall be cleaned. The tack coat shall be applied well in advance of the paving operation to allow all water to evaporate before the surface course is placed. Work shall be planned so that no more tack coat than is necessary for the day's operation is placed on the surface.

END OF SECTION

SECTION 02775 - SIDEWALKS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and services required for constructing concrete sidewalks where shown on the Drawings and as specified herein.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Sidewalks shall be in accordance with LFUCG Standard Drawings.

2.02 CRUSHED STONE

- A. Stone for sidewalk base shall be dense grade aggregate (DGA).

2.03 CONCRETE

- A. Concrete for sidewalks shall be Class A concrete per Section 03300.

2.04 PREMOLDED EXPANSION JOINT FILLER

- A. Premolded expansion joint filler shall be closed cell polyethylene foam type, Sonneborn Sonoflex F, Williams Products Expand-O-Foam, or equal. Seal joint with one-part self-leveling polyurethane sealant, Sonneborn Sonolastic SL 1, or equal, maximum 3/8 inches deep. Prepare and prime joints per manufacturer's instructions.

2.05 CURING COMPOUND

- A. A white pigmented curing compound is required on all sidewalks per LFUCG Standard Drawings.

PART 3 - EXECUTION

3.01 BASE

- A. Following finished grading, a base course of DGA shall be placed to a compacted thickness of four (4) inches. Immediately prior to placing concrete, DGA base shall be thoroughly wetted.

3.02 SURFACE

- A. Concrete shall be in thickness shown on LFUCG Standard Drawings, struck off and worked with a float until mortar appears on the top. After surface has been thoroughly floated, it shall be brushed to leave markings of a uniform type, providing non-slip finish. No dusting or plastering will be allowed.

3.03 FINISHING

- A. All joints and edges shall be finished with an edging tool. Dummy joints shall be formed about five (5) feet apart to form rectangular blocks. Expansion joints of 1/2 inch premolded expansion joint material shall be provided at the intersection of all vertical surfaces with the sidewalks slabs and at approximately 32 foot intervals along the walks.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Provide all labor, equipment, materials and services necessary for the manufacture, transportation and placement of all plain and reinforced concrete work, as shown on the Drawings or as ordered by the Engineer.
- B. Concrete shall be in accordance with the latest edition of Standard Specifications for Road and Bridge Construction issued by the Kentucky Transportation Cabinet.

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 03600 - Grout

1.03 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the Specifications, all work herein shall conform to or exceed the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.
 - 1. Kentucky Dept. of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition.
 - 2. Kentucky Building Code
 - 3. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete
 - 4. ACI 304 Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 5. ACI 305 Hot Weather Concreting
 - 6. ACI 306 Cold Weather Concreting
 - 7. ACI 318 Building Code Requirements for Structural Concrete
 - 8. ACI 350 Code Requirements for Environmental Engineering Concrete Structures
 - 9. ASTM C 31 Standard Methods of Making and Curing Concrete Test Specimens in the Field
 - 10. ASTM C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - 11. ASTM C 42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 12. ASTM C 94 Standard Specification for Ready-Mixed Concrete
 - 13. ASTM C 143 Standard Test Method for Slump of Portland Cement Concrete
 - 14. ASTM C 172 Standard Method of Sampling Fresh Concrete
 - 15. ASTM C 260 Standard Specification for Air-Entraining Admixtures for Concrete

16. ASTM C 457 Standard Recommended Practice for Microscopical Determination of Air-Void Content and Parameters of the Air-Void System in Hardened Concrete
17. ASTM C 1567 Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01300, Submittals.
 1. Sources of all materials and certifications of compliance with specifications for all materials.
 2. Certified current (less than 1 year old) chemical analysis of the Portland Cement or Blended Cement to be used.
 3. Certified current (less than 1 year old) chemical analysis of fly ash or ground granulated blast furnace slag to be used.
 4. Aggregate test results showing compliance with required standards, i.e., sieve analysis, aggregate soundness tests, petrographic analysis, mortar bar expansion testing per ASTM C 1567, etc.
 5. Manufacturer's data on all admixtures stating compliance with required standards.
 6. Concrete mix design for each class of concrete specified herein.
 7. Field experience records and/or trial mix data for the proposed concrete mixes for each class of concrete specified herein.

PART 2 - PRODUCTS

2.01 CONCRETE

- A. Sidewalks, entrance pavements, concrete pavement subbase for asphaltic surface course, concrete pavement, curb gutter, and thrust blocking shall be Class A.
- B. Concrete shall be as specified in the following table excerpted from Standard Specifications for Road and Bridge Construction, Edition of 2012, Kentucky Transportation Cabinet:

CONCRETE PROPORTIONING AND REQUIREMENTS KYDOT 601.03.03

INGREDIENT PROPORTIONS AND REQUIREMENTS FOR VARIOUS CLASSES OF CONCRETE

| Class of Concrete | Approximate Percent Fine to Total Aggregate | | Maximum Free Water by W/C Ratio (lb/lb) | 28-Day Compressive Strength ⁽¹⁾ (psi) | Slump ⁽⁴⁾ (inches) | Minimum Cement Factor (lb/yd ³) | Air Content (%) |
|---|---|-------|---|--|-------------------------------|---|-----------------------|
| | Gravel | Stone | | | | | |
| A ⁽⁵⁾ | 36 | 40 | 0.49 | 3,500 | 2-4 ⁽⁷⁾ | 564 | 6 ± 2 |
| A Mod | 36 | 40 | 0.47 | 3,500 | 4-7 | 658 | 6 ± 2 |
| AA ⁽²⁾ | 36 | 40 | 0.42 | 4,000 | 2-4 ⁽¹²⁾ | 620 | 6 ± 2 ⁽¹¹⁾ |
| AAA ⁽⁸⁾ | 36 | 40 | 0.40 | 5,500 | 3-7 | 686 | 6 ± 2 ⁽¹¹⁾ |
| B | 40 | 44 | 0.66 | 2,500 | 3-5 | 451 | 6 ± 2 |
| D ⁽³⁾ | 35 | 39 | 0.44 | 4,000 | 3-5 ⁽⁶⁾ | 639 | 6 ± 2 |
| D Mod ⁽³⁾ | 35 | 39 | 0.42 | 5,000 | 3-5 ⁽⁶⁾ | 733 | 6 ± 2 |
| M1 ⁽⁸⁾ w/Type I Cement | 36 | 40 | 0.33 | 4,000 ⁽⁹⁾ | 7 max. | 800 | 6 ± 2 |
| M2 ⁽⁸⁾ w/Type III Cement | 36 | 40 | 0.38 | 4,000 ⁽⁹⁾ | 7 max. | 705 | 6 ± 2 |
| P ⁽⁵⁾ | 35 | 38 | 0.49 | 3,500 | --- ⁽¹³⁾ | 564 ⁽¹⁰⁾ | 6 ± 2 ⁽¹¹⁾ |

- (1) The Department may direct non-payment, additional construction, or removal and replacement for concrete which test cylinders indicate low compressive strength and follow-up investigations indicate inadequate strength. The Department may require some classes to attain the required compressive strength in less than 28 hours.
- (2) When the ambient air temperature while placing slab concrete is 71°F or more, add to the concrete a water-reducing and retarding admixture. The Engineer may require or allow, water-reducing and retarding admixture in slab concrete for ambient air temperatures of less than 71°F. Only use one type of admixture for concrete placed during any individual contiguous pour.
- (3) The Department will require a compressive strength of 5,000 psi or greater when specified in the Contract, at or before 28 days of prestressed members.
- (4) The Engineer will allow slumps less than the minimum provided concrete is workable.
- (5) The Department will allow the use of JPC pavement mixture for non-structural construction.
- (6) At the option of the prestressed product fabricator, the Department will allow the slump of Class D or Class D Modified concrete to be increased to a maximum of 8 inches for all items, except products with voids. For products with voids, the slump may be increased to 7 inches. Provide a high range water reducer (Type F or G) in an amount not to exceed the following water/cement ratios:
 Summer mix designs – 0.39
 Spring and Fall mix designs – 0.37
 Winter mix designs – 0.34
- (7) The precast fabricator may increase the slump of Class A concrete to a maximum of 7 inches provided the fabricator uses a high range water reducer (Type F or G) and maximum water/cement ratio of 0.46.
- (8) Use a high range water reducer (Type F or G).
- (9) The Department will require 3,000 psi compressive strength before opening to traffic and 4,000 psi at 28 days.
- (10) 611 lb/yd³ when using coarse aggregate sizes No. 8, 78, or 9-M.
- (11) 7 ± 2% when using coarse aggregate sizes No. 8, 78 or 9-M.
- (12) The Department may allow the slump of AA concrete to be increased up to a 6 inch maximum, provided the W/C ratio does not exceed 0.40 and a high range water reducer (Type F or G) is used. Trial Batches will be required if producer has not previously supplied.
- (13) The Department does not have slump requirements for Class P concrete mixes except for the edge slump requirements of Section 501.03.19.

2.02 FLOWABLE FILL

- A. Flowable fill shall conform to Section 601 of the Standard Specifications for Road and Bridge Construction, Edition of 2012.
- B. Flowable fill shall consist of a mixture of cement, sand, fly ash, and water. The loss on ignition for Class F fly ash shall not exceed 12 percent. Ensure that the concrete producer certifies mix proportions for flowable fill as follows:

Flowable Fill for Pipe Backfill. Proportion as follows, per cubic yard batch:

| | |
|-----------------------|--------------|
| Cement | 30 pounds |
| Fly Ash, Class F | 300 pounds |
| Natural Sand (S.S.D.) | 3,000 pounds |
| Water (Maximum) | 550 pounds |

- C. Flowable fill shall obtain an average compressive strength of 50 to 100 psi at 28 days for application as pipe backfill. For applications requiring early opening to traffic or placement of pavement as soon as possible, the mixture shall conform to the following general guidelines:
 - 1. Mixture bleeds freely within 10 minutes
 - 2. Mixture supports a 150-pound person within three hours.

PART 3 – EXECUTION

3.01 PRODUCTION OF CONCRETE

- A. All concrete shall be machine mixed. Hand mixing of concrete will not be permitted. The Contractor shall supply concrete from a ready mix plant. In selecting the source for concrete production the Contractor shall carefully consider its capability for providing quality concrete at a rate commensurate with the requirements of the placements so that well bonded, homogenous concrete, free of cold joints, is assured. Ready mixed concrete shall be in accordance with ASTM C94.
- B. Each and every concrete delivery shall be accompanied by a delivery ticket containing at least the following information:
 - 1. Date and truck number
 - 2. Ticket number
 - 3. Mix designation of concrete
 - 4. Cubic yards of concrete
 - 5. Cement brand, type and weight in pounds
 - 6. Weight in pounds of fine aggregate (sand)
 - 7. Weight in pounds of coarse aggregate (stone)
 - 8. Air entraining agent, brand, and weight in pounds and ounces
 - 9. Other admixtures, brand, and weight in pounds and ounces
 - 10. Water, in gallons, stored in attached tank
 - 11. Water, in gallons, maximum that can be added without exceeding design water/cement ratio
 - 12. Water, in gallons, actually used (by truck driver)
 - 13. Time of loading
 - 14. Time of delivery to job (by truck driver)
- C. Any truck delivering concrete to the job site, which is not accompanied by a delivery ticket showing the above information will be rejected and such truck shall immediately depart from the job site.

3.02 CONCRETE PLACEMENT

- A. No concrete shall be placed prior to approval of the concrete mix design. Concrete placement shall conform to the recommendations of ACI 304.

3.03 CONCRETE WORK IN COLD WEATHER

- A. Cold weather concreting procedures shall conform to the requirements of ACI 306.
- B. The Engineer may prohibit the placing of concrete at any time when air temperature is 40°F. or lower. If concrete work is permitted, the concrete shall have a minimum temperature, as placed, of 55°F. for placements less than 12" thick, 50°F. for placements 12" to 36" thick, and 45°F. for placements greater than 36" thick. The temperature of the concrete as placed shall not exceed the aforementioned minimum values by more than 20°F, unless otherwise approved by the Engineer.
- C. The addition of admixtures to the concrete to prevent freezing is not permitted. All reinforcement, forms, and concrete accessories with which the concrete is to come in contact shall be defrosted by an approved method. No concrete shall be placed on frozen ground.

3.04 CONCRETE WORK IN HOT WEATHER

- A. Hot weather concreting procedures shall conform to the requirements of ACI 305.
- B. When air temperatures exceed 85°F, or when extremely dry conditions exist even at lower temperatures, particularly if accompanied by high winds, the Contractor and his concrete supplier shall exercise special and precautionary measures in preparing, delivering, placing, finishing, curing and protecting the concrete mix. The Contractor shall consult with the Engineer regarding such measures prior to each day's placing operation and the Engineer reserves the right to modify the proposed measures consistent with the requirements of this Section of the Specifications. All necessary materials and equipment shall be on hand in position prior to each placing operation.
- C. Preparatory work at the job site shall include thorough wetting of all forms, reinforcing steel and, in the case of slab pours on ground or subgrade, spraying the ground surface on the preceding evening and again just prior to placing. No standing puddles of water shall be permitted in those areas which are to receive the concrete.
- D. The temperature of the concrete mix when placed shall not exceed 90°F.
- E. Delivery schedules shall be carefully planned in advance so that concrete is placed as soon as practical after it is properly mixed. For hot weather concrete work (air temperature greater than 85°F), discharge of the concrete to its point of deposit shall be completed within 60 minutes from the time the concrete is batched.
- F. The Contractor shall arrange for an ample work force to be on hand to accomplish transporting, vibrating, finishing, and covering of the fresh concrete as rapidly as possible.

3.05 QUALITY CONTROL

- A. Field Testing of Concrete
 - 1. The Contractor shall coordinate with the Engineer's project representative the on-site scheduling of the testing firm's personnel as required for concrete testing.

2. Concrete for testing shall be supplied by the Contractor at no additional cost to the Owner, and the Contractor shall provide assistance to the testing laboratory in obtaining samples. The Contractor shall dispose of and clean up all excess material.

B. Consistency

1. The consistency of the concrete will be checked by the Contractor, and observed by Engineer, by standard slump cone tests. The Contractor shall make any necessary adjustments in the mix as the Engineer may direct and shall upon written order suspend all placing operations in the event the consistency does not meet the intent of the specifications. No payment shall be made for any delays, material or labor costs due to such eventualities.
2. Slump tests shall be made in accordance with ASTM C 143. Slump tests will be performed as deemed necessary by the Engineer and each time compressive strength samples are taken.

C. Compressive Strength

1. Samples of freshly mixed concrete will be taken by the Contractor and tested for compressive strength in accordance with ASTM C 172, C 31 and C 39, except as modified herein.
2. In general, one sampling shall be taken for each placement in excess of five (5) cubic yards, with a minimum of one (1) sampling for each day of concrete placement operations.
3. Each sampling shall consist of at least five (5) 6x12 cylinders. Each cylinder shall be identified by a tag, which shall be hooked or wired to the side of the container. The Contractor will fill out the required information on the tag, and the Contractor shall satisfy himself that such information shown is correct.
4. Concrete cylinders shall be stored in same environment as poured concrete.
5. When transported, the cylinders shall not be thrown, dropped, allowed to roll, or be damaged in any way.
6. Compression tests shall be performed in accordance with ASTM C 39. For 6x12 cylinders, two test cylinders will be tested at seven days and two at 28 days. The remaining cylinders will be held to verify test results, if needed.

D. Evaluation and Acceptance of Concrete

1. Evaluation and acceptance of the compressive strength of concrete shall be according to the requirements of ACI 214, ACI 318, and ACI 350.
2. The strength level of concrete will be considered satisfactory if all of the following conditions are satisfied.
 - a. Every arithmetic average of any three consecutive strength tests equals or exceeds the minimum specified 28-day compressive strength for the mix (see Article 2.08).
 - b. No individual compressive strength test results falls below the minimum specified strength by more than 500 psi.
 - c. No more than 10% of the compressive tests have strengths greater than the maximum strength specified.
3. In the event any of the conditions listed above are not met, the mix proportions shall be corrected for the next concrete placing operation.

4. In the event that concrete strength is not achieved, additional tests shall be performed as noted herein this Section.
 5. When a ratio between 7-day and 28-day strengths has been established by these tests, the 7-day strengths shall subsequently be taken as a preliminary indication of the 28-day strengths. Should the 7-day test strength from any sampling be more than 10% below the established minimum strength, the Contractor shall:
 - a. Immediately provide additional periods of curing in the affected area from which the deficient test cylinders were taken.
 - b. Maintain or add temporary structural support as required.
 - c. Correct the mix for the next concrete placement operation, if required to remedy the situation.
 6. All concrete which fails to meet the ACI requirements and these specifications is subject to removal and replacement at no additional cost to the Owner.
- E. When non-compliant concrete is identified, test reports shall be sent immediately to the Engineer for review.
- F. Additional Tests
1. When ordered by the Engineer, additional tests on in-place concrete shall be provided and paid for by the Contractor.
 2. In the event the 28-day test cylinders fail to meet the minimum strength, the Contractor shall have concrete core specimens obtained and tested from the affected area immediately.
 - a. Three cores shall be taken for each sample in which the strength requirements were not met.
 - b. The drilled cores shall be obtained and tested in conformance with ASTM C 42. The tests shall be conducted by an independent testing laboratory to be selected by the Engineer.
 - c. The location from which each core is taken shall be approved by the Engineer. Each core specimen shall be located, when possible, so its axis is perpendicular to the concrete surface and not near formed joints or obvious edges of a unit of deposit.
 - d. The core specimens shall be taken, if possible, so no reinforcing steel is within the confines of the core.
 - e. The diameter of core specimens should be at least 3 times the maximum nominal size of the course aggregate used in the concrete, but must be at least 2-inches in diameter.
 - f. The length of specimen, when capped, shall be at least twice the diameter of the specimen.
 - g. The core specimens shall be taken to the laboratory and when transported, shall not be thrown, dropped, allowed to roll, or damaged in any way.
 - h. Two (2) copies of test results shall be mailed directly to the Engineer. The concrete in question will be considered acceptable if the average compressive strength of a minimum of three test core specimens taken from a given area equal or exceed 85%

of the specified 28-day strength and if the lowest core strength is greater than 75% of the specified 28-day strength.

3. In the event that concrete placed by the Contractor is suspected of not having proper air content, the Contractor shall engage an independent test laboratory to be selected by the Engineer, to obtain and test samples for air content in accordance with ASTM Specification C 457.

3.06 CARE AND REPAIR OF CONCRETE

- A. The Contractor shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Care shall be exercised to avoid jarring forms or placing any strain on the ends of projecting reinforcing bars. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at no additional cost to the Owner.
- B. Areas of honeycomb shall be chipped back to sound concrete and repaired as directed by the Engineer.
- C. Concrete formwork blowouts or unacceptable deviations in tolerances for formed surfaces due to improperly constructed or misaligned formwork shall be repaired as directed by the Engineer. Bulging or protruding areas, which result from slipping or deflecting forms shall be ground flush or chipped out and redressed as directed by the Engineer.
- D. Areas of concrete in which cracking, spalling, or other signs of deterioration develop prior to final acceptance shall be removed and replaced, or repaired as directed by the Engineer. This stipulation includes concrete that has experienced cracking due to drying or thermal shrinkage of the concrete. Structural cracks shall be repaired using an epoxy injection system approved by the Engineer. Non-structural cracks shall be repaired using a hydrophilic resin pressure injected grout system approved by the Engineer, unless other means of repair are deemed necessary and approved by the Engineer. Extensive repair or replacement will be considered for concrete placed having compressive strengths greater than maximum strength specified. All repair work shall be performed at no additional cost to the Owner.

END OF SECTION

SECTION 03600 - GROUT

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. Furnish all materials, labor, and equipment required to provide all grout used in concrete work in accordance with the Contract Documents.

1.02 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

- A. Without limiting the generality of the other requirements of the specifications, all work herein shall conform to the applicable requirements of the following documents. All referenced specifications, codes, and standards refer to the most current issue available at the time of Bid.

1. CRD-C 621 Corps of Engineers Specification for Non-shrink Grout
2. ASTM C 109 Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch or 50 mm cube Specimens)
3. ASTM C 531 Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts and Monolithic Surfacing
4. ASTM C 579 Test Method for Compressive Strength of Chemical-Resistant Mortars and Monolithic Surfacing
5. ASTM C 827 Standard Test Method for Early Volume Change of Cementitious Mixtures
6. ASTM C 144 Standard Specification for Aggregate for Masonry Mortar
7. ASTM C 1107 Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink)

1.03 SUBMITTALS

- A. Submit the following in accordance with Section 01300 - Submittals.
 1. Certified test results verifying the compressive strength and shrinkage and expansion requirements specified herein.
 2. Manufacturer's literature containing instructions and recommendations on the mixing, handling, placement and appropriate uses for each type of grout used in the work.

1.04 QUALITY ASSURANCE

- A. Field Tests (required for pump station and storage tank projects)
 1. Compression test specimens will be taken during construction from the first placement of each type of grout and at intervals thereafter as selected by the Engineer to insure continued compliance with these Specifications. The specimens will be made by the Contractor and observed by Engineer.

- a. Compression tests and fabrication of specimens for cement grout and non-shrink grout will be performed as specified in ASTM C 109 at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days, 28 days and any additional time period as appropriate.
 - b. Compression tests and fabrication of specimens for epoxy grout will be performed as specified in ASTM C 579, Method B, at intervals during construction as selected by the Engineer. A set of three specimens will be made for testing at seven days and any other time period as appropriate.
2. The cost of all laboratory tests on grout will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing. The Contractor shall be charged for the cost of any additional tests and investigation on work performed which does not meet the specifications. The Contractor shall supply all materials necessary for fabricating the test specimens, at no additional cost to the Owner.
 3. All grout, already placed, which fails to meet the requirements of these Specifications, is subject to removal and replacement at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Non-Shrink Cement Grout (Applicable for projects with Gravity Sewers and Force Mains)

1. Non-shrink grout shall conform to CRD-C 621 and ASTM C 1107, Grade B or C when tested at a max. fluid consistency of 30 seconds per CDC 611/ASTM C939 at temperature extremes of 45°F and 90°F and an extended working time of 15 minutes. Grout shall be non-metallic, non-stain, and non-shrink and color similar to concrete. Grout shall have a min. 28-day strength of 7,000 psi. Non-shrink grout shall be, "Euco N-S" by the Euclid Chemical Company, "SikagROUT 212" by Sika Corporation, Conspec 100 Non-Shrink Non-Metallic Grout by Conspec, Masterflow 555 Grout by BASF Construction Chemicals.

B. Epoxy Grout (Applicable for projects with Structures)

1. Epoxy grout shall be "Sikadur 32 Hi-Mod" by Sika Corporation, "Duralcrete LV" by Tamms Industries, or "Euco #452 Series" by Euclid Chemical, Concsive 1090 by BASF Construction Chemicals.
2. Epoxy grout shall be modified as required for each particular application with aggregate per manufacturer's instructions.

C. Epoxy Base Plate Grout (Applicable for projects with Structures)

1. Epoxy base plate grout shall be Sikadur 42, Grout-Pak by Sika Corporation, or Masterflow MP by BASF Construction Chemicals.

PART 3 - EXECUTION

3.01 GENERAL

- A. Concrete surfaces shall be cleaned of all dirt, grease and oil-like films. Additionally, concrete surfaces shall be free of debris, including chipping or roughening the surface if a laitance or poor concrete is evident. The finish of the grout surface shall match that of the adjacent concrete.

- B. All mixing, surface preparation, handling, placing, consolidation, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the manufacturer.
- C. The Contractor, through the manufacturer of a non-shrink grout and epoxy grout, shall provide on-site technical assistance upon request, at no additional cost to the Owner.

3.02 CONSISTENCY

- A. The consistency of grouts shall such that it is able to completely fill the space to be grouted. Dry pack consistency is such that the grout is plastic and moldable but will not flow.

3.03 MEASUREMENT OF INGREDIENTS

- A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurement shall not be allowed.
- B. Prepackaged grouts shall have ingredients measured by means recommended by the manufacturer.

3.04 GROUT INSTALLATION

- A. Grout shall be placed quickly and continuously, shall completely fill the space to be grouted and be thoroughly compacted and free of air pockets. The grout may be poured in place, pressure grouted by gravity, or pumped. The use of pneumatic pressure or dry-packed grouting requires approval of the Engineer. For grouting beneath base plates, grout shall be poured form one side only and thence flow across to the open side to avoid air-entrapment.

END OF SECTION

APPENDIX A

LFUCG STANDARD DRAWINGS 2008

**Lexington Fayette Urban County
Government
Department of Public Works and Development**

Standard Drawings 2008

**Marwan A. Rayan, P.E.
Urban County Engineer
May 2008**



Mayor Jim Newberry

LEXINGTON - FAYETTE URBAN COUNTY GOVERNMENT
Division of Engineering

May 1, 2008

Users of Lexington-Fayette Urban County Engineering Standard Drawings

Re: Standard Drawings 2008

Attached is the latest edition of the LFUCG Standard Drawings for construction of storm sewers, sanitary sewers, streets and roads in Lexington-Fayette County. These drawings are to replace any and all other standard drawings previously issued by the Division of Engineering.

These drawings become effective as of May 1, 2008 and any project dedicated to public use after the above date must comply with or contain references to these Standard Drawings or revisions thereof where applicable.

Questions or comments should be directed to:

Urban County Engineer
Division of Engineering
Fourth Floor
101 E. Vine Street
Lexington, KY 40507
859-258-3410

Sincerely,

Marwan A. Rayan, P.E.
Urban County Engineer

MAR:RAB:AFG

C: File

08.1000.106.StandDrw

HORSE CAPITAL OF THE WORLD

**LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
STANDARD DRAWINGS 2008
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| 111 (N/A) | Reinforcement Detail 6' Non-Circular M.H. 8' to 15' Depth, 8" Walls, 12" Slab |
| 112 (N/A) | Reinforcement Detail 6' Non-Circular M.H. 15' to 20' Depth, 10" Walls, 12" Slab |
| 113 (N/A) | Reinforcement Detail 7' Non-Circular M.H. Less Than 10' Depth, 8" Walls, 10" Slab |
| 114 (N/A) | Reinforcement Detail 7' Non-Circular M.H. 8' to 10' Depth, 8" Walls, 12" Slab |
| 115 (N/A) | Reinforcement Detail 7' Non-Circular M.H. 10' to 20' Depth, 10" Walls, 12" Slab |
| 116-119 | (Future) |
| Surface Inlets & Catch Basins: | |
| 120 (N/A) | Surface Inlet Type "A" |
| 121 (N/A) | Surface Inlet Type "B" |
| 122-1 (N/A) | Curb Box Inlet Type "A" 4' x 4' Box 15" - 18" Pipes |
| 122-2 (N/A) | Curb Box Inlet Type "A" 4' x 4' Box 15" - 18" Pipes |
| 123-1 (N/A) | Curb Box Inlet Type "B" 5' x 5' Box 15" - 24" Pipes |
| 123-2 (N/A) | Curb Box Inlet Type "B" 5' x 5' Box 15" - 24" Pipes |
| 124-1 (N/A) | Curb Box Inlet Type "C" 4' x 3' Box Single Pipe 15" or Less |
| 124-2 (N/A) | Curb Box Inlet Type "C" 4' x 3' Box Single Pipe 15" or Less |
| 125 (N/A) | Curb Box Inlet Type "D" |
| 126 (N/A) | Spring Box Inlet Type "A" |
| 127 (N/A) | Spring Box Inlet Type "B" |
| 128 (N/A) | Security Devices for Frames and Grates |
| 129 | (Future) |

**LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
STANDARD DRAWINGS 2008
TABLE OF CONTENTS**

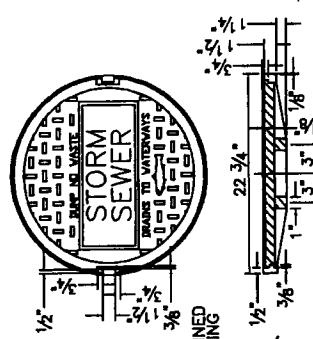
| Drawing No. | Drawing Title |
|------------------------------------|---|
| Channels & Ditches: | |
| 130-1 (N/A) | Aggregate Channel Lining |
| 130-2 (N/A) | Aggregate Channel Lining |
| 131 (N/A) | Mattress Channel Lining |
| 132 (N/A) | Paved Ditch |
| 133-139 | (Future) |
| Roadway Drainage: | |
| 140-149 | (Future) |
| Headwalls: | |
| 150 (N/A) | Straight Headwalls |
| 151 (N/A) | EII Headwalls |
| 152 (N/A) | U-Type Headwalls |
| 153 (N/A) | Pipe Culvert Headwalls 0° Skew 15" - 27" Circular Pipe |
| 154-1 (N/A) | Pipe Culvert Headwalls 0° Skew 30" - 108" Pipe |
| 154-2 (N/A) | Dimensions and Quantities 30" - 108" Headwalls Circular Pipe 0° Skew |
| 154-3 (N/A) | Bill of Reinforcement 30" - 90" Diameter Circular Pipe Headwalls 0° Skew |
| 154-4 (N/A) | Bill of Reinforcement 96" - 108" Diameter Circular Pipe Headwalls 0° Skew |
| 158 (N/A) | 18" - 24" Double & Triple Pipe Culvert Headwalls at 0° Skew |
| 159-1 (N/A) | Double & Triple Pipe Culvert Headwalls 0° Skew |
| 159-2 (N/A) | Dimensions and Quantities 30" - 48" Double & Triple Headwalls - Circular Pipe 0° Skew |
| 159-3 (N/A) | Bill of Reinforcement 30" - 48" Double & Triple Headwalls - Circular Pipe 0° Skew |
| 162 (N/A) | Sloped and Flared Box Inlet - Outlet 18" - 24" - 30" - 36" All Skews |
| 163 (N/A) | Grates for Sloped and Flared Box Inlet - Outlet |
| 164 (N/A) | Impact Stilling Basin 15" - 24" Pipes |
| 165 (N/A) | Impact Stilling Basin 27" - 48" Pipes |
| 166-169 | (Future) |
| Silt & Erosion Control: | |
| | See Chapter 11 of <i>LFUCG Stormwater Manual</i> for Approved Design Details |
| Retaining Structures: | |
| 180 (N/A) | Retaining Wall Gravity Type |
| 181-189 | (Future) |

**LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
STANDARD DRAWINGS 2008
TABLE OF CONTENTS**

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| Trenching: | |
| 200 (Incl.) | Trenching, Laying, Backfilling and Bedding Outside R/W Limits |
| 201-1 (Incl.) | Trenching, Laying, Backfilling and Bedding Under Street Pavement |
| 201-2 (Incl.) | Trenching, Laying, Backfilling, and Bedding Under Street Pavement Using Flowable Fill |
| 204 (N/A) | Sanitary Sewer Pipe: Types & Maximum Allowable Fill Heights |
| 206-209 | (Future) |
| Manholes: | |
| 210 (Incl.) | Typical Precast Concrete Shallow Manhole for Pipes 24" and Larger |
| 211 (Incl.) | Typical Standard Precast Concrete Manhole for Pipes up to 24 |
| 212 (Incl.) | Typical Precast Concrete Drop Manhole for Pipes up to 36" |
| 213 (Incl.) | Standard Manhole Junction and Water Stop Details |
| 214 (Incl.) | Sewer Manhole Adjustment Grade Rings |
| 216 (Incl.) | Manhole Size Standards and General Notes for Deep Manholes |
| 217 (Incl.) | Deflection Angle Criteria for Sanitary Manholes |
| 220 (Incl.) | Standard Circular Manhole Frame & Cover |
| 222 (Incl.) | Standard Watertight Manhole Frame & Cover |
| 223-229 | (Future) |
| Connections: | |
| 230 (Incl.) | House Lateral for Greater than 6' Deep Sewer in Soil & Rock Excavation |
| 231 (Incl.) | House Lateral for Greater than 6' Deep Sewer in Soil |
| 232 (Incl.) | House Lateral for Shallow Sewer in Soil or Rock |
| 233 (Incl.) | Lateral Cleanout in Non-Paved Areas and Yards |
| 234 (Incl.) | Right-Of-Way Easement Lateral Cleanout in Non-Paved Areas and Yards |
| 240 (Incl.) | Typical Creek Crossing for Sanitary Sewer Line |
| 250 (Incl.) | Schematic Example for Grease Interceptor |
| 260 (Incl.) | Sewer Connection to Existing Concrete Manhole |
| 261-269 | (Future) |
| Streets & Roads: | |
| 300 (Incl.) | Typical Street Sections |
| 301 (Incl.) | Curb & Gutter |
| 302 (Incl.) | Integral Curb, Header Curb, Monolithic Curb & Sidewalk |

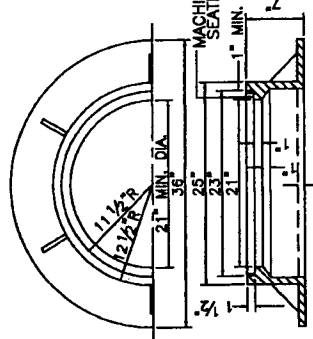
**LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
STANDARD DRAWINGS 2008
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| Drawing No. | Drawing Title |
|---------------|--|
| 303 (Incl.) | Sidewalk Construction Specifications |
| 304 (Incl.) | Sidewalk Ramps Type 1 |
| 305 (Incl.) | Sidewalk Ramp Type 2 |
| 306 (Incl.) | Sidewalk Ramp Type 3 |
| 307 (Incl.) | Residential Entrance Details |
| 307-1 (Incl.) | Commercial Entrance Details |
| 308 (Incl.) | Chain Link Fence 3' - 6' |
| 309 (Incl.) | Chain Link Fence 8' - 12' |
| 310 (Incl.) | Chain Link Gate |
| 311 (Incl.) | Plank Fence |
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| 317 (Incl.) | County Road Typical Shoulder Sections (Minimum Requirements) |
| 318 (Incl.) | Edge Key |
| 319 (Incl.) | Typical Edge Key for Minimum Overlays, Short Projects, Low Speed |
| 320 (Incl.) | Perforated Pipe Subgrade Drainage Along Roadway |
| 320-1 (Incl.) | Perforated Pipe Subgrade Drainage for Raised Non-Paved Medians |
| 321 (Incl.) | Perforated Pipe for Subgrade Drainage |
| 322 (Incl.) | Perforated Pipe Underdrains |
| 323 (N/A) | Public Improvement Sign |
| 324-330 | (Future) |

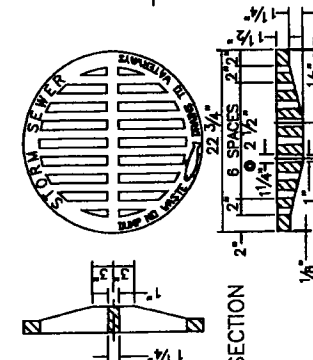


SOLID COVER

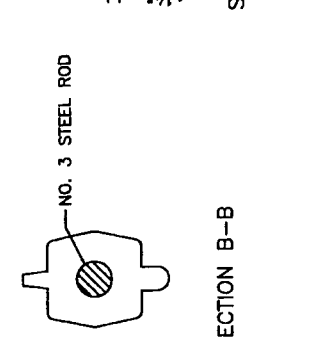
- NOTES:
1. MINIMUM WEIGHT FOR THE 7" FRAME SHALL BE 185 LBS.
 2. MINIMUM WEIGHT FOR THE SOLID COVER SHALL BE 120 LBS.
 3. CASTINGS TO MEET ASTM A-48 CLASS 35.



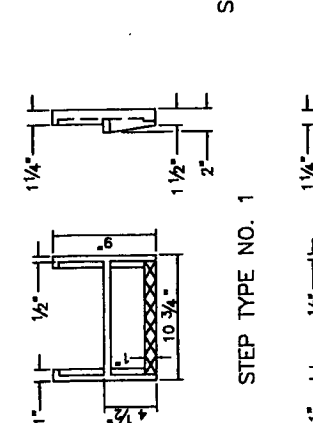
GRATING COVER



FRAME



SECTION

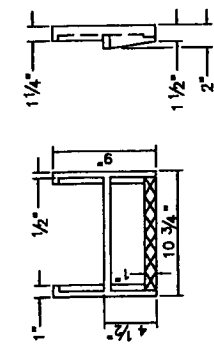


SECTION B-B

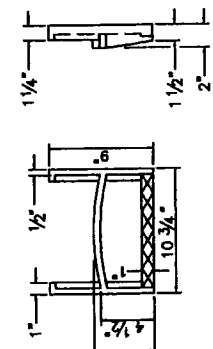
MANHOLE FRAME AND COVERS

- 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.

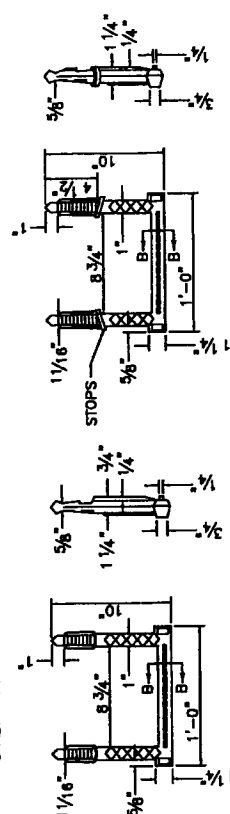
MANHOLE STEPS



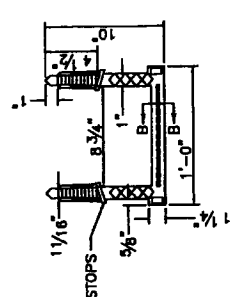
STEP TYPE NO. 1



STEP TYPE NO. 2



STEP TYPE NO. 3



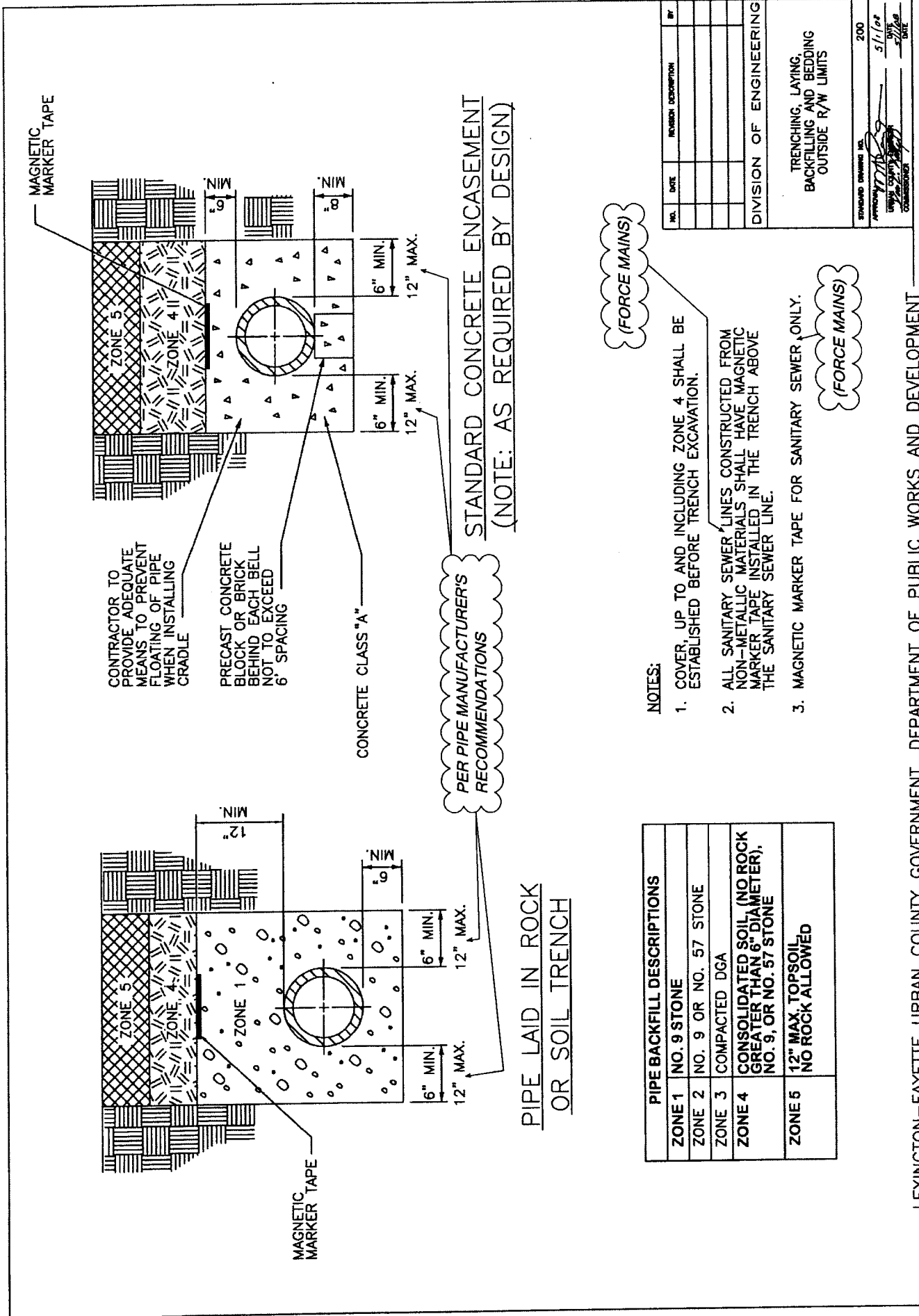
STEP TYPE NO. 4

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DIVISION OF ENGINEERING

MANHOLE FRAMES,
COVERS, & STEPS

STANDARD DRAWING NO. 103
 APPROVED: *[Signature]* 5/1/08
 CHECKED: *[Signature]*
 DESIGNED: *[Signature]*
 DATE



STANDARD CONCRETE ENCASEMENT
 (NOTE: AS REQUIRED BY DESIGN)

PIPE LAID IN ROCK OR SOIL TRENCH

CONTRACTOR TO PROVIDE ADEQUATE MEANS TO PREVENT FLOATING OF PIPE WHEN INSTALLING CRADLE

PRECAST CONCRETE BLOCK OR BRICK BEHIND EACH BELL NOT TO EXCEED 6" SPACING

CONCRETE CLASS "A"

PER PIPE MANUFACTURER'S RECOMMENDATIONS

(FORCE MAINS)

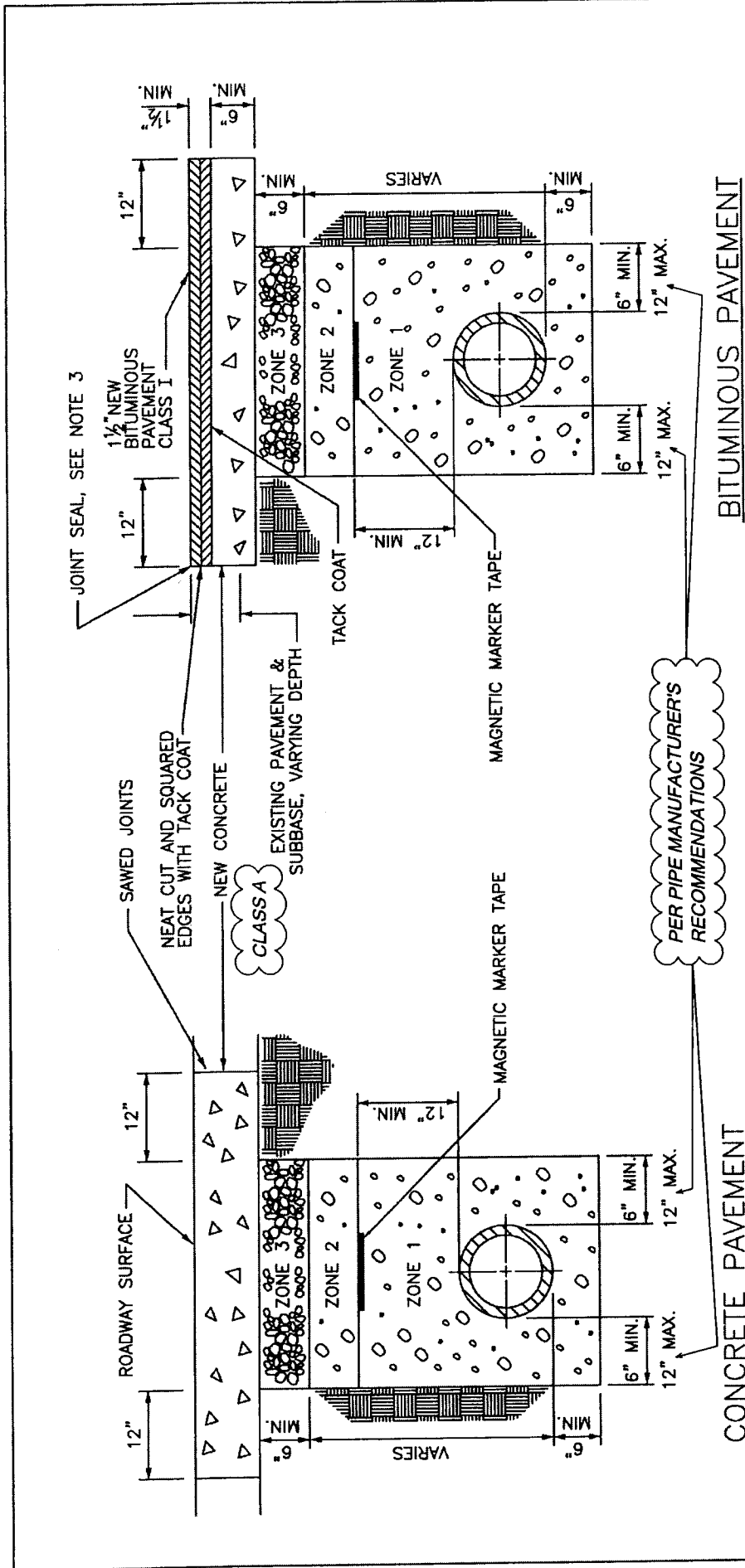
(FORCE MAINS)

| PIPE BACKFILL DESCRIPTIONS | |
|----------------------------|--|
| ZONE 1 | NO. 9 STONE |
| ZONE 2 | NO. 9 OR NO. 57 STONE |
| ZONE 3 | COMPACTED DGA |
| ZONE 4 | CONSOLIDATED SOIL (NO ROCK GREATER THAN 6" DIAMETER), NO. 9, OR NO. 57 STONE |
| ZONE 5 | 12" MAX. TOPSOIL NO ROCK ALLOWED |

NOTES:

1. COVER, UP TO AND INCLUDING ZONE 4 SHALL BE ESTABLISHED BEFORE TRENCH EXCAVATION.
2. ALL SANITARY SEWER LINES CONSTRUCTED FROM NON-METALLIC MATERIALS SHALL HAVE MAGNETIC MARKER TAPE INSTALLED IN THE TRENCH ABOVE THE SANITARY SEWER LINE.
3. MAGNETIC MARKER TAPE FOR SANITARY SEWER ONLY.

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| DIVISION OF ENGINEERING | | |
| TRENCHING, LAYING, BACKFILLING AND BEDDING OUTSIDE R/W LIMITS | | |
| STANDARD DRAWING NO. | 200 | |
| APPROVED | DATE | |
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PER PIPE MANUFACTURERS' RECOMMENDATIONS

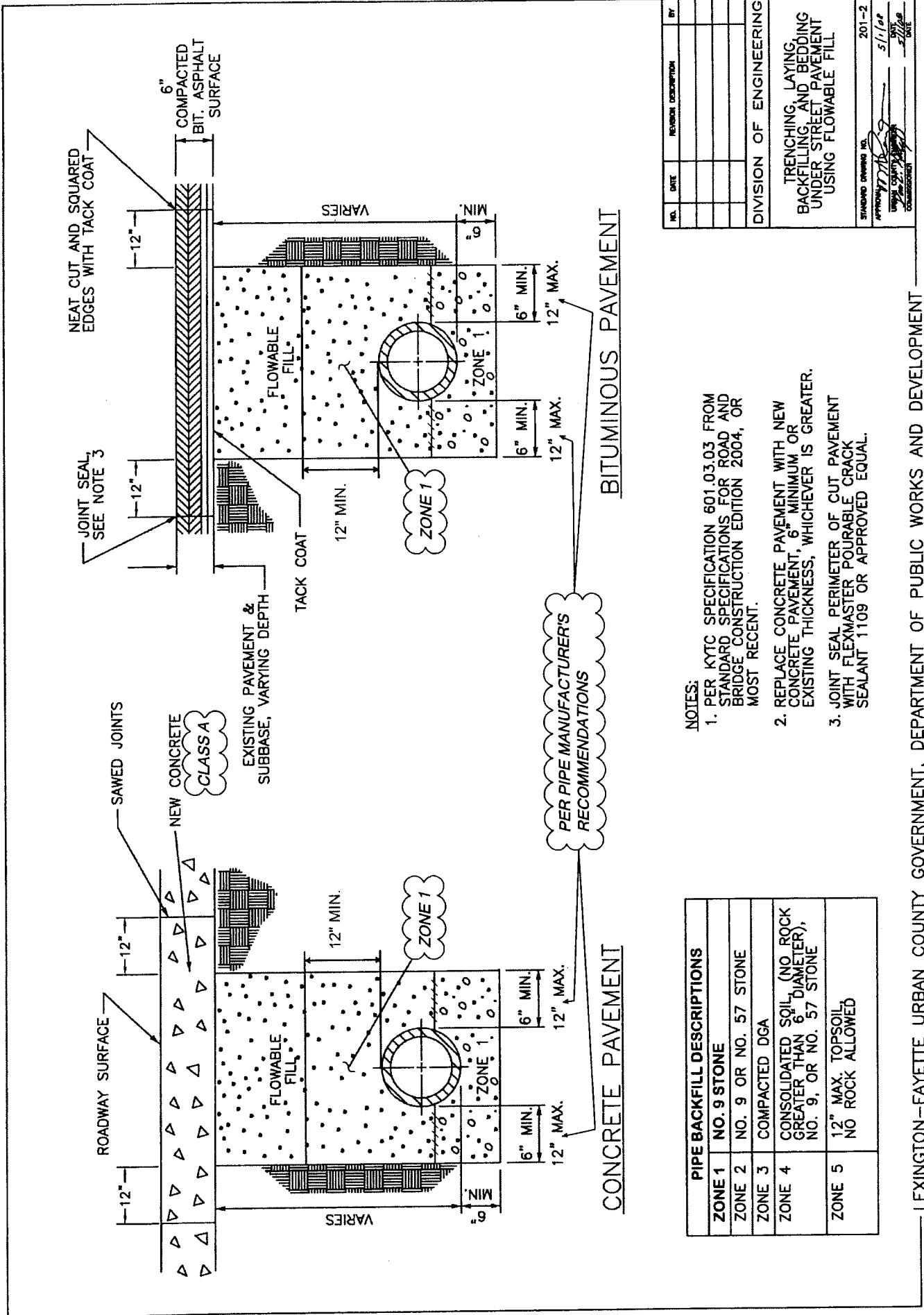
NOTES:

1. REPLACE CONCRETE PAVEMENT WITH NEW CONCRETE PAVEMENT 6" MINIMUM OR EXISTING THICKNESS, WHICHEVER IS GREATER.
2. JOINT SEAL PERIMETER OF CUT PAVEMENT WITH FLEXMASTER POURABLE CRACK SEALANT 1109 OR APPROVED EQUAL.
3. MAGNETIC MARKER TAPE FOR SANITARY SEWER ONLY.
4. #9 CRUSHED LIMESTONE IN ZONE 3 IS ACCEPTABLE ALTERNATIVE TO DGA

(FORCE MAINS)

| PIPE BACKFILL DESCRIPTIONS | |
|----------------------------|---|
| ZONE 1 | NO. 9 STONE |
| ZONE 2 | NO. 9 OR NO. 57 STONE |
| ZONE 3 | COMPACTED DGA |
| ZONE 4 | CONSOLIDATED SOIL, (NO ROCK GREATER THAN 6" DIAMETER), NO. 9, OR NO. 57 STONE |
| ZONE 5 | 12" MAX. TOPSOIL, NO ROCK ALLOWED |

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| DIVISION OF ENGINEERING | | | |
| TRENCHING, LAYING, BACKFILLING AND BEDDING UNDER STREET PAVEMENT | | | |
| STANDARD DRAWING NO. | 201-1 | | |
| APPROVAL | 5/1/68 | | |
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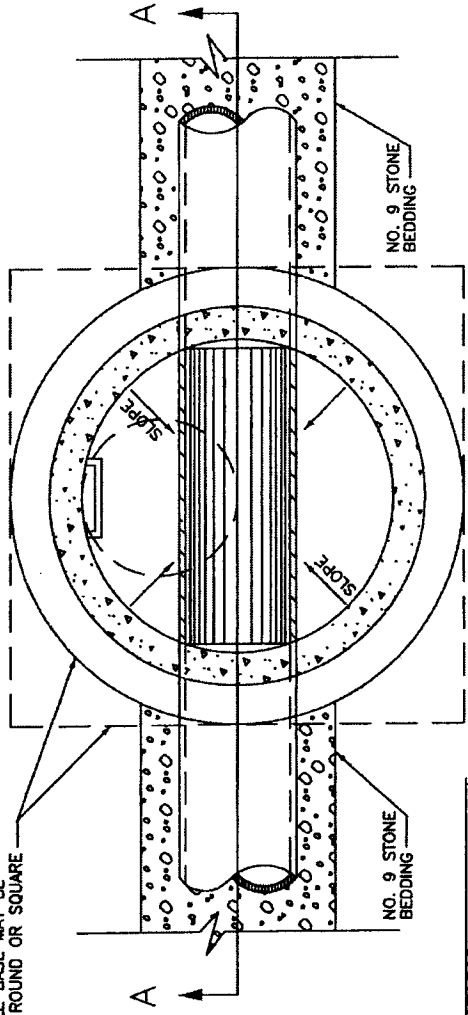


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| NO. | DATE | REVISION DESCRIPTION | BY |
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| DIVISION OF ENGINEERING | | | |
| TRENCHING, LAYING BACKFILLING AND BEDDING UNDER STREET PAVEMENT USING FLOWABLE FILL | | | |
| STANDARD DRAWING NO. | 201-2 | DATE | 5/1/04 |
| APPROVED | <i>[Signature]</i> | DATE | 5/1/04 |
| DESIGNED | <i>[Signature]</i> | DATE | 5/1/04 |

- NOTES:**
- PER KYTC SPECIFICATION 601.03.03 FROM STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION EDITION 2004, OR MOST RECENT.
 - REPLACE CONCRETE PAVEMENT WITH NEW CONCRETE PAVEMENT, 6" MINIMUM OR EXISTING THICKNESS, WHICHEVER IS GREATER.
 - JOINT SEAL PERIMETER OF CUT PAVEMENT WITH FLEXMASTER POURABLE CRACK SEALANT 1109 OR APPROVED EQUAL.

| PIPE BACKFILL DESCRIPTIONS | |
|----------------------------|--|
| ZONE 1 | NO. 9 STONE |
| ZONE 2 | NO. 9 OR NO. 57 STONE |
| ZONE 3 | COMPACTED DGA |
| ZONE 4 | CONSOLIDATED SOIL (NO ROCK GREATER THAN 6" DIAMETER), NO. 9, OR NO. 57 STONE |
| ZONE 5 | 12" MAX. TOPSOIL, NO ROCK ALLOWED |

MANHOLE BASE MAY BE EITHER ROUND OR SQUARE



SECTION B-B

NOTES:

1. ALL BARREL JOINTS BETWEEN BASE AND BARREL, BETWEEN BARREL AND TOP BETWEEN TOP AND ADJUSTING RINGS, BETWEEN ADJUSTING RINGS AND FRAME SHALL HAVE ONE OUTER MASTIC SEAL AND AN INNER SEAL OF NONSHRINK GROUT.
2. COAT OUTSIDE OF ADJUSTING RINGS WITH SEMI-FIBRATED ASPHALT DAMPROOFING COMPOUND APPLIED BY BRUSH OR SPRAY.
3. WATER STOPS SHOULD BE PROVIDED FOR INLETS AND OUTLETS OF EVERY MANHOLE, DESIGNED FOR TYPE OF PIPE USED AND WITH EXPANSIVE GROUT. SEE STD. DWG. 213 FOR WATER STOP DETAIL.
4. MANHOLES MUST PASS VACUUM TEST PER ASTM C-1244 PRIOR TO ACCEPTANCE.

5. MANHOLES SHALL HAVE MONOLITHIC BASE.
6. MANHOLE SHALL BE MANUFACTURED WITH XYPEX PER SPECIFICATION SECTION 02608.
7. MANHOLE SHALL HAVE CONCRETE ADMIXTURE, CONSISTENT WITH LOCATIONS SHOWN ON DRAWINGS AND AS SPECIFIED IN SPECIFICATION SECTION 02608.
8. MANHOLES LOCATED IN 100-YEAR FLOODPLAIN SHALL INCLUDE ANTI-FLOTATION COLLAR PER SPECIFICATION SECTION 02608.

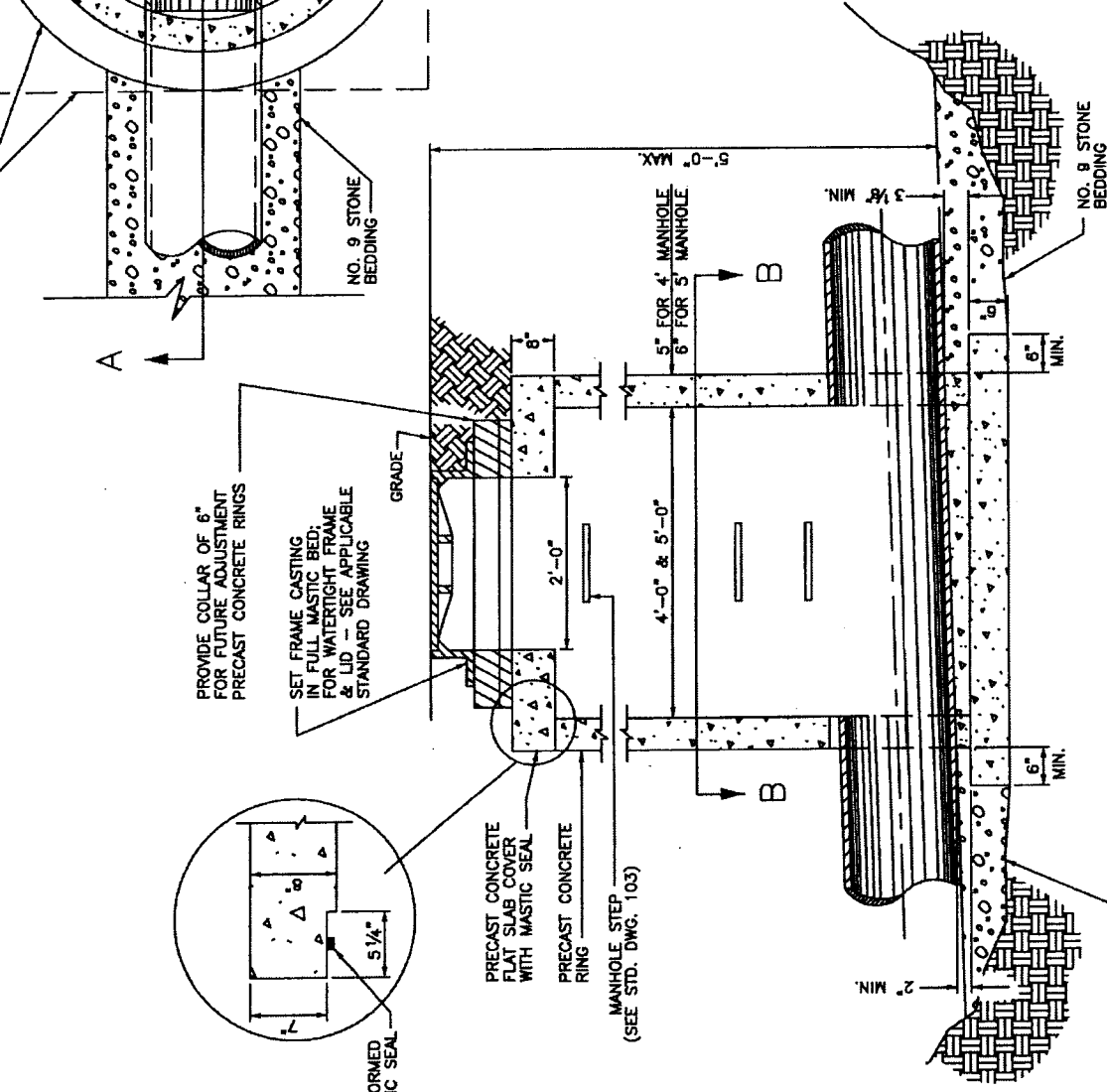
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DIVISION OF ENGINEERING

TYPICAL PRECAST CONCRETE SHALLOW MANHOLE FOR PIPES 24" AND LARGER

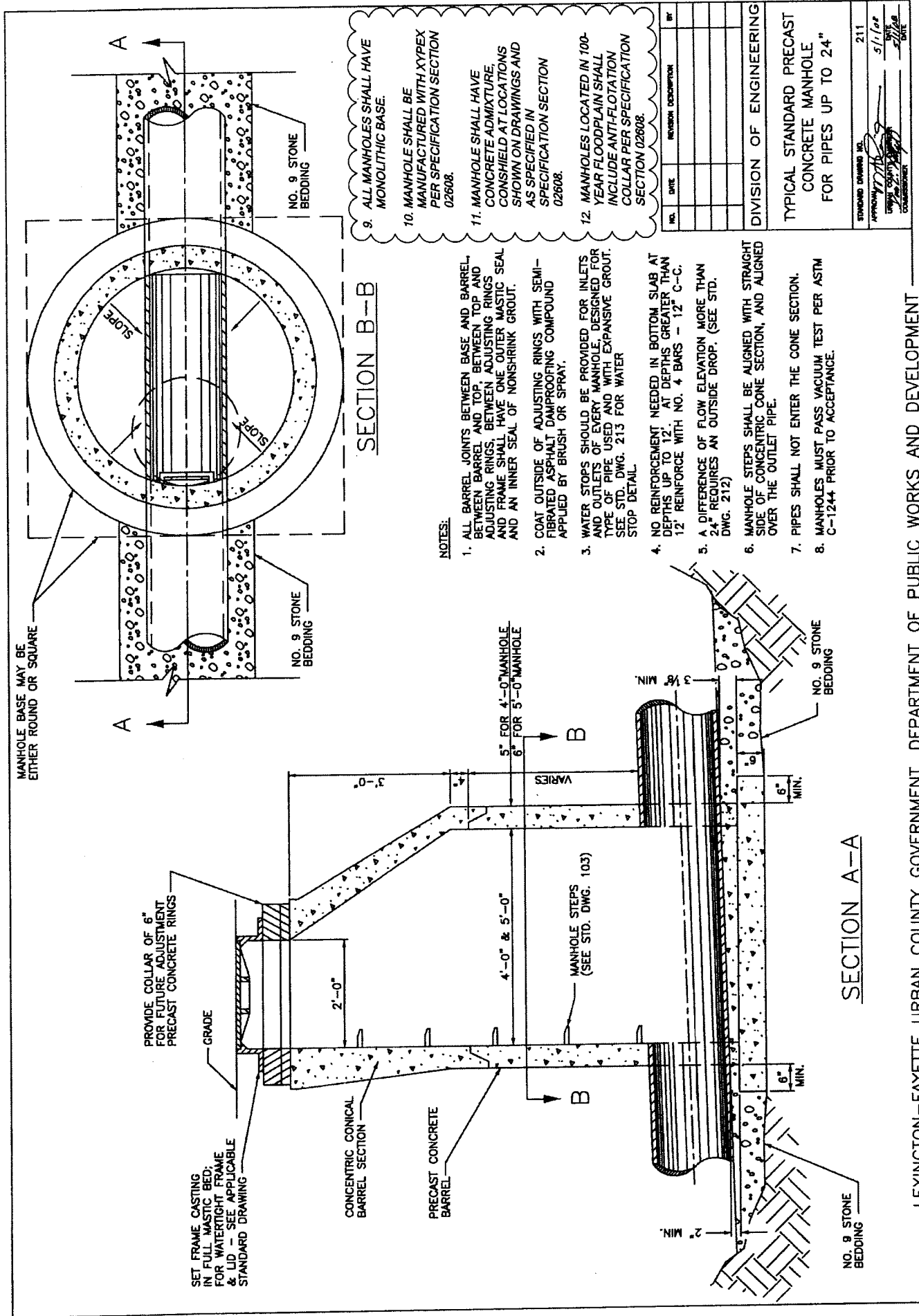
STANDARD DRAWING NO. 210
 DATE 5/1/08
 APPROVED BY [Signature]
 COMMISSIONER

MANHOLE BASE MAY BE EITHER ROUND OR SQUARE



SECTION A-A

(PIPE WITH TOP HALF REMOVED OR PAVED INVERT)



SECTION B-B

SECTION A-A

- 9. ALL MANHOLES SHALL HAVE MONOLITHIC BASE.
- 10. MANHOLE SHALL BE MANUFACTURED WITH XYPEX PER SPECIFICATION SECTION 02608.
- 11. MANHOLE SHALL HAVE CONCRETE ADMIXTURE, CONSHIELD AT LOCATIONS SHOWN ON DRAWINGS AND AS SPECIFIED IN SPECIFICATION SECTION 02608.
- 12. MANHOLES LOCATED IN 100-YEAR FLOODPLAIN SHALL INCLUDE ANTI-FLOTATION COLLAR PER SPECIFICATION SECTION 02608.

NOTES:

- 1. ALL BARREL JOINTS BETWEEN BASE AND BARREL, BETWEEN BARREL AND TOP, BETWEEN TOP AND ADJUSTING RINGS, BETWEEN ADJUSTING RINGS AND FRAME SHALL HAVE ONE OUTER MASTIC SEAL AND AN INNER SEAL OF NONSHRINK GROUT.
- 2. COAT OUTSIDE OF ADJUSTING RINGS WITH SEMI-FIBRATED ASPHALT DAMPROOFING COMPOUND APPLIED BY BRUSH OR SPRAY.
- 3. WATER STOPS SHOULD BE PROVIDED FOR INLETS AND OUTLETS OF EVERY MANHOLE, DESIGNED FOR TYPE OF PIPE USED AND WITH EXPANSIVE GROUT. SEE STD. DWG. 213 FOR WATER STOP DETAIL.
- 4. NO REINFORCEMENT NEEDED IN BOTTOM SLAB AT DEPTHS UP TO 12". AT DEPTHS GREATER THAN 12" REINFORCE WITH NO. 4 BARS - 12" C-C.
- 5. A DIFFERENCE OF FLOW ELEVATION MORE THAN 24" REQUIRES AN OUTSIDE DROP. (SEE STD. DWG. 212)
- 6. MANHOLE STEPS SHALL BE ALIGNED WITH STRAIGHT SIDE OF CONCENTRIC CONE SECTION, AND ALIGNED OVER THE OUTLET PIPE.
- 7. PIPES SHALL NOT ENTER THE CONE SECTION.
- 8. MANHOLES MUST PASS VACUUM TEST PER ASTM C-1244 PRIOR TO ACCEPTANCE.

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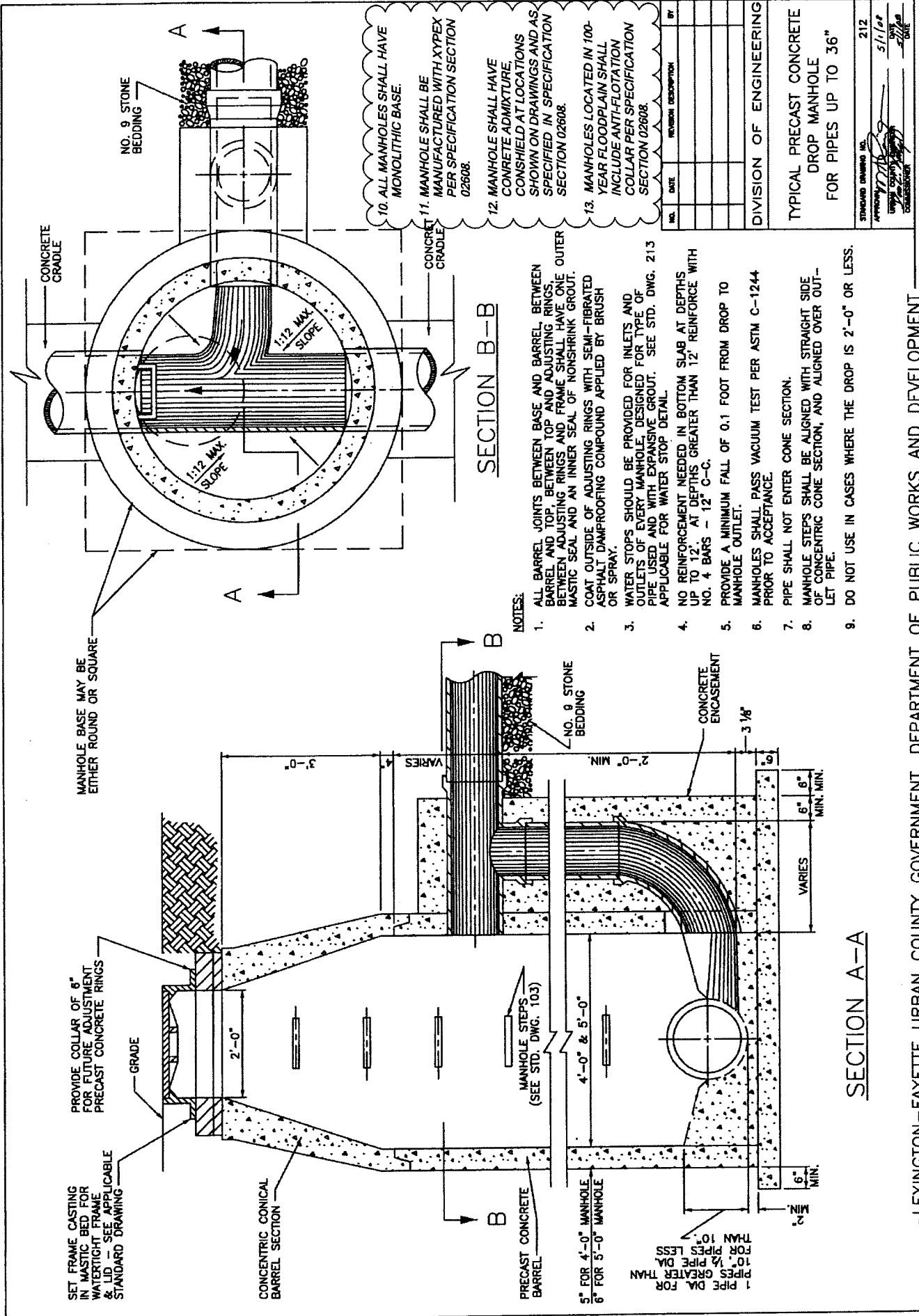
DIVISION OF ENGINEERING

TYPICAL STANDARD PRECAST CONCRETE MANHOLE FOR PIPES UP TO 24"

STANDARD DRAWING NO. 211

APPROVED: *[Signature]* DATE: 5/1/08

DESIGNED: *[Signature]* DATE: 5/1/08



SET FRAME CASTING IN MASTIC BED FOR WATERTIGHT FRAME & LID - SEE APPLICABLE STANDARD DRAWING

PROVIDE COLLAR OF 5" FOR FUTURE ADJUSTMENT PRECAST CONCRETE RINGS

MANHOLE BASE MAY BE EITHER ROUND OR SQUARE

GRADE

NO. 9 STONE BEDDING

CONCENTRIC CONICAL BARREL SECTION

PRECAST CONCRETE BARREL

MANHOLE STEPS (SEE STD. DWG. 103)

NO. 9 STONE BEDDING

CONCRETE ENCASUREMENT

SECTION B-B

SECTION A-A

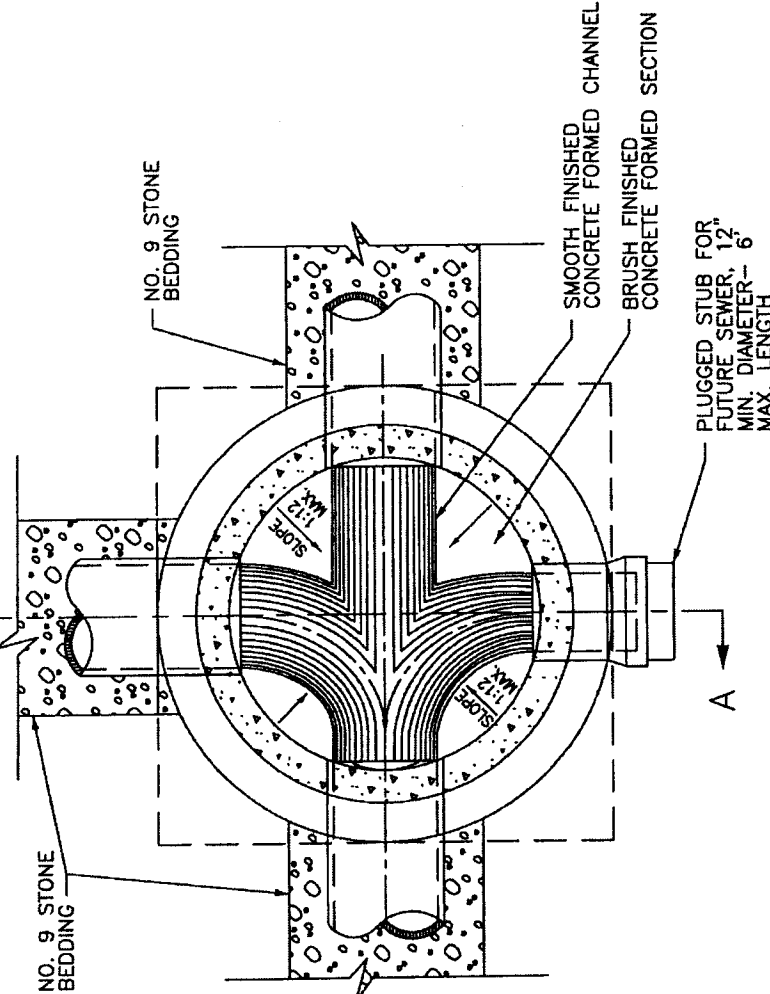
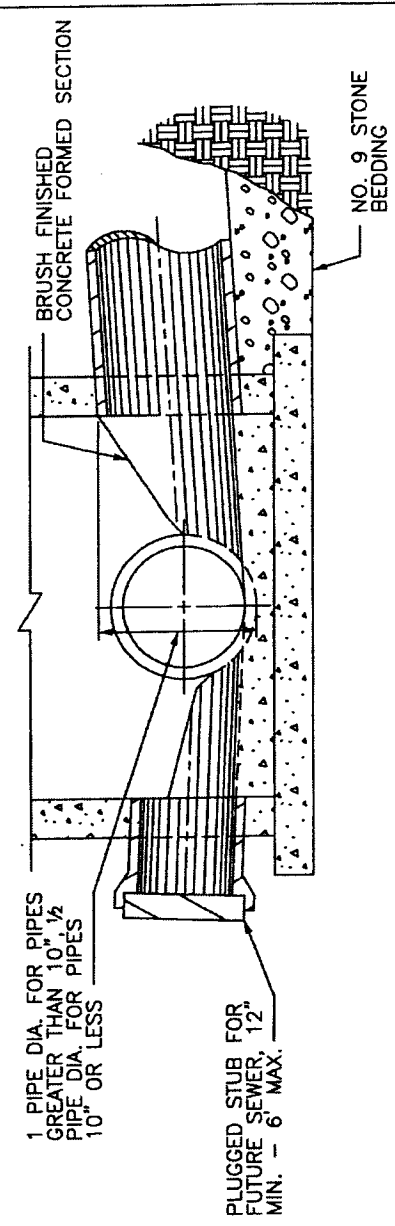
NOTES:

1. ALL BARREL JOINTS BETWEEN BASE AND BARREL, BETWEEN BARREL AND TOP, BETWEEN TOP AND ADJUSTING RINGS, BETWEEN ADJUSTING RINGS AND FRAME SHALL HAVE ONE MASTIC SEAL AND AN INNER SEAL OF NONSHRINK GROUT.
2. COAT OUTSIDE OF ADJUSTING RINGS WITH SEMI-FIBRATED ASPHALT DAMPROOFING COMPOUND APPLIED BY BRUSH OR SPRAY.
3. WATER STOPS SHOULD BE PROVIDED FOR INLETS AND OUTLETS OF EVERY MANHOLE, DESIGNED FOR TYPE OF PIPE USED AND WITH EXPANSIVE GROUT. SEE STD. DWG. 213 APPLICABLE FOR WATER STOP DETAIL.
4. NO REINFORCEMENT NEEDED IN BOTTOM SLAB AT DEPTHS UP TO 12" AT DEPTHS GREATER THAN 12" REINFORCE WITH NO. 4 BARS - 12" C-C.
5. PROVIDE A MINIMUM FALL OF 0.1 FOOT FROM DROP TO MANHOLE OUTLET.
6. MANHOLES SHALL PASS VACUUM TEST PER ASTM C-1244 PRIOR TO ACCEPTANCE.
7. PIPE SHALL NOT ENTER CONE SECTION.
8. MANHOLE STEPS SHALL BE ALIGNED WITH STRAIGHT SIDE OF CONCENTRIC CONE SECTION, AND ALIGNED OVER OUTLET PIPE.
9. DO NOT USE IN CASES WHERE THE DROP IS 2'-0" OR LESS.

10. ALL MANHOLES SHALL HAVE MONOLITHIC BASE.
11. MANHOLE SHALL BE MANUFACTURED WITH XYPEX PER SPECIFICATION SECTION 02608.
12. MANHOLE SHALL HAVE CONCRETE ADMIXTURE, CONSHIELD AT LOCATIONS SHOWN ON DRAWINGS AND AS SPECIFIED IN SPECIFICATION SECTION 02608.
13. MANHOLES LOCATED IN 100-YEAR FLOODPLAIN SHALL INCLUDE ANTI-FLOTATION COLLAR PER SPECIFICATION SECTION 02608.

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| DIVISION OF ENGINEERING | | | |
| TYPICAL PRECAST CONCRETE DROP MANHOLE FOR PIPES UP TO 36" | | | |
| STANDARD DRAWING NO. | 212 | | |
| APPROVED | | 5/1/08 | |
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- NOTES:
1. ALL MANHOLES SHALL HAVE MONOLITHIC BASE.
 2. MANHOLE SHALL BE MANUFACTURED WITH XYPEX PER SPECIFICATION SECTION 02608.
 3. MANHOLE SHALL HAVE ADMIXTURE, CONSIDERED AT LOCATIONS SHOWN ON DRAWINGS AND AS SPECIFIED IN SPECIFICATION SECTION 02608.
 4. MANHOLES LOCATED IN 100-YEAR FLOODPLAIN SHALL INCLUDE ANTI-FLOTATION COLLAR PER SPECIFICATION SECTION 02608.



SECTION A-A

WATER STOP DETAIL

| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

STANDARD MANHOLE
JUNCTION AND WATER
STOP DETAILS

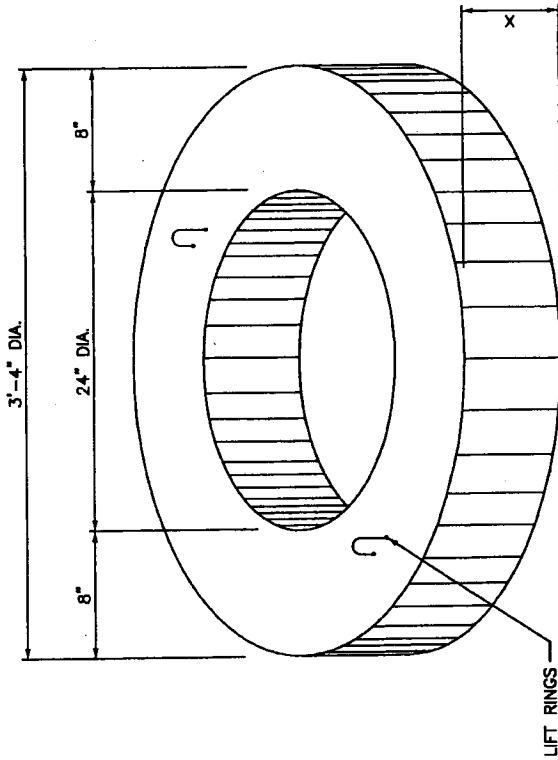
STANDARD DRAWING NO. 213
 APPROVAL: *[Signature]* 5/1/88
 DATE
 CHECKED: *[Signature]*
 DATE

NOTE:
MANHOLES SHALL PASS VACUUM TEST PER
ASTM C-1244 PRIOR TO ACCEPTANCE.

SECTION PLAN

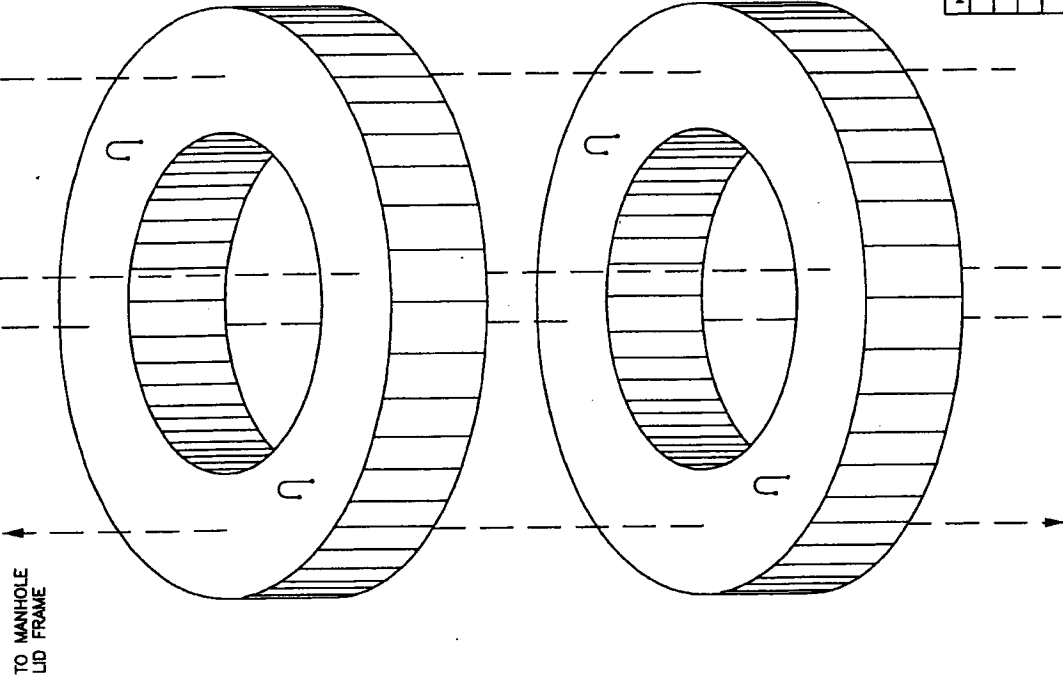
NOTES:

1. LIFT RINGS TO BE CUT BEFORE ADDING THE NEXT RING OR TOP.
2. COAT OUTSIDE AND IN BETWEEN ADJUSTING RINGS WITH SEMI-FIBRATED ASPHALT DAMPROOFING COMPOUND APPLIED BY BRUSH OR SPRAY.
3. GRADE RINGS WITH NON-PARALLEL SURFACES MAY BE USED TO ADJUST CASTING TO SLOPED SURFACE.
4. CONCRETE: CLASS "A" 3500 PSI AT 28 DAYS, AND IN ACCORDANCE WITH ASTM C-478, OR LATEST EDITION.
5. NO MORE THAN 2 GRADE RINGS MAY BE USED AT ONE LOCATION AND THE MAXIMUM HEIGHT OF ALL RINGS USED SHALL NOT EXCEED 12 INCHES.
6. APPLY MASTIC BETWEEN ALL JOINTS.



GRADE RING WIDTH CHART

| X | WEIGHT LBS. |
|-----|-------------|
| 2" | 140 |
| 3" | 210 |
| 4" | 279 |
| 6" | 419 |
| 8" | 560 |
| 12" | 730 |



| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

SEWER MANHOLE ADJUSTMENT
GRADE RINGS

STANDARD DRAWING NO. 214
 APPROVED: *[Signature]* 5/1/08
 URBAN COUNTY ENGINEER
 COMMISSIONER DATE

GENERAL NOTES

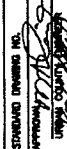
1. SHALLOW MANHOLE TYPE CONSTRUCTION SHOWN ON STD. DWG. 210 MAY BE USED FOR ALL MANHOLES UP TO 5' IN DEPTH.
2. ALL DIMENSIONS ARE BASED ON SIZE OF LARGEST PIPE IN MANHOLE.
3. MANHOLES FOR PIPE LARGER THAN 36" SHALL BE SPECIALLY DESIGNED.
4. BOTTOM SLAB OF MANHOLES SHALL BE SPECIALLY DESIGNED WITH REGARD TO AREA, THICKNESS, AND REINFORCING IN SITUATIONS WHERE HIGH WATER TABLE OR UNSTABLE SOIL CONDITIONS EXIST.
5. MANHOLE STEPS SHALL BE INSTALLED IN A VERTICAL LINE AND SHALL COMPLY WITH OSHA STANDARDS IN ALL RESPECTS.
6. ALL FLOORS OF MANHOLES SHALL SLOPE AT LEAST 1" PER FT. FROM WALL TO CHANNELS AND SHALL HAVE SMOOTH FLOAT AND BRUSH FINISH.
7. CHANNEL SURFACE OF MANHOLES FROM INLET TO OUTLET SHALL HAVE SMOOTH FLOAT FINISH.
8. 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.

9. A MINIMUM FALL OF 0.10 FOOT SHALL BE PROVIDED.
10. BASE OF MANHOLES GREATER THAN 12' DEEP TO BE REINFORCED WITH NO. 4 BARS AT 12" BOTH WAYS.
11. ASPHALT DAMPROOFING COMPOUND IS REQUIRED ON PRECAST MANHOLES IN WET AREAS OR OTHERWISE AS DIRECTED BY THE ENGINEER.
12. LEAKS IN MANHOLES OBSERVED DURING CONSTRUCTION OR INSPECTION SHALL BE CORRECTED IMMEDIATELY.
13. MANHOLES SHALL PASS VACUUM TEST PER ASTM C-1244 PRIOR TO ACCEPTANCE.
14. ALL INLETS, INCLUDING LATERALS, MUST HAVE FLOW CHANNELS.
15. NEW CONNECTIONS TO EXISTING SANITARY SEWER MANHOLES MUST REPLACE EXISTING BRICK MANHOLES OR DAMAGED MANHOLES AT NO EXPENSE TO THE LFUGG.
16. FIELD POURED BASES (DOGHOUSE MANHOLES) SHALL ONLY BE ALLOWED WITH PRIOR APPROVAL OF THE LFUGG.

DOES NOT APPLY

1. CASTINGS SHALL BE ASTM A-48, CLASS 35.
2. CONCRETE FOR MANHOLES, CRADLE ENCASEMENT, ETC. SHOWN IN THESE DETAILS SHALL BE CLASS "A".
3. CONCRETE MANHOLE BARREL CONSTRUCTION SHALL CONFORM TO ASTM C-478 OR ITS LATEST REVISION.

SPECIFICATIONS

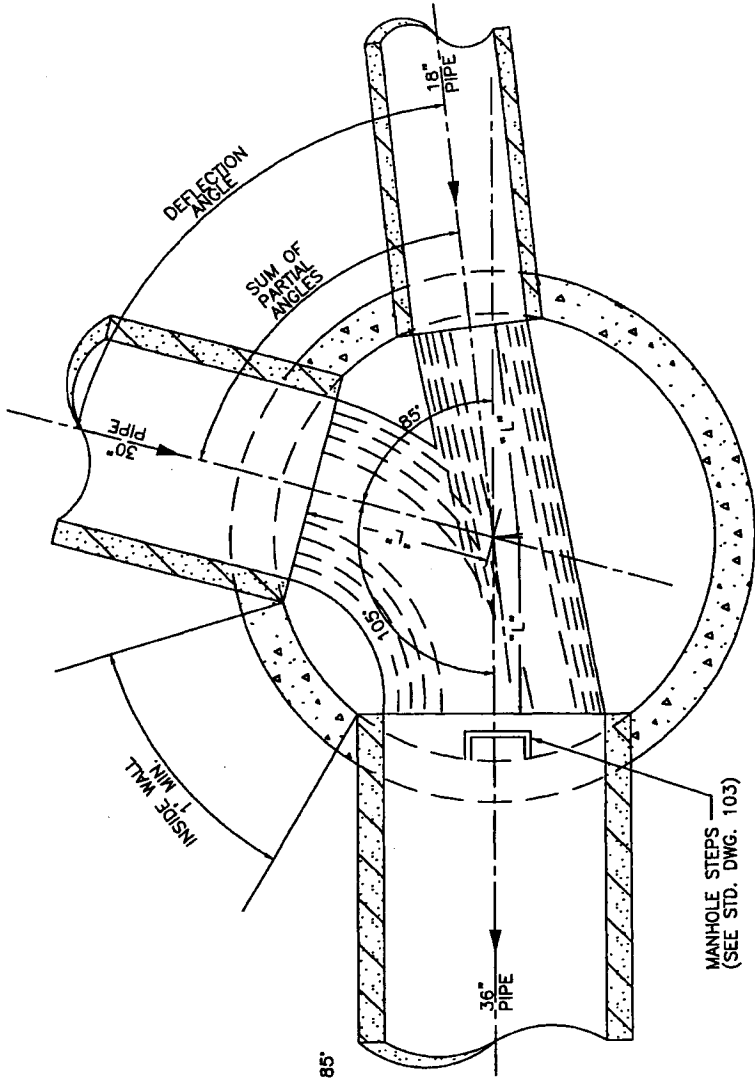
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| DIVISION OF ENGINEERING | | | |
| MANHOLE SIZE STANDARDS AND GENERAL NOTES FOR DEEP MANHOLES | | | |
| STANDARD DRAWING NO. 216 | | DATE 5/1/08 | |
| APPROVED BY  | | DATE 5/1/08 | |
| J. M. SMITH | | DATE 5/1/08 | |
| URBAN COUNTY ENGINEER | | DATE 5/1/08 | |
| CONTRACTOR | | DATE 5/1/08 | |

CIRCULAR MANHOLE NOTES:

1. THE ANGLE BETWEEN ANY TWO PIPES (e.g. ANGLE "Y" OR "Z") MUST BE GREATER THAN THE SUM OF THE PARTIAL ANGLES. REFER TO SEPARATE STANDARD DRAWINGS FOR TABLE OF MINIMUM PARTIAL ANGLES. ANGLES SMALLER THAN LISTED ON TABLE SHALL REQUIRE LARGER MANHOLE SELECTION.
2. THE MAXIMUM DEFLECTION ANGLE BETWEEN ANY INCOMING PIPE AND THE CENTERLINE EXTENSION OF THE DISCHARGE PIPE SHALL BE NO MORE THAN 90° FOR PIPES UP TO 24" IN DIAMETER. THE MAXIMUM DEFLECTION ANGLE FOR 27" TO 36" PIPES SHALL BE 75°.

EXAMPLE FOR SANITARY MANHOLE SIZE SELECTION:

FOR MANHOLE SHOWN AT RIGHT, THE ANGLE BETWEEN THE 18" AND 30" PIPES IS 85° AND THE ANGLE BETWEEN THE 30" AND 36" PIPES IS 105°. THE TABLE INDICATES THAT FOR A 5'-0" DIAMETER MANHOLE THE MINIMUM PARTIAL ANGLE FOR AN 18" PIPE IS 34° AND FOR A 30" PIPE IS 50°. THE SUM OF THE PARTIAL ANGLES IS 84°. THIS SUM IS LESS THAN THE 85° THEREFORE, A 5'-0" MANHOLE DIAMETER IS ACCEPTABLE.

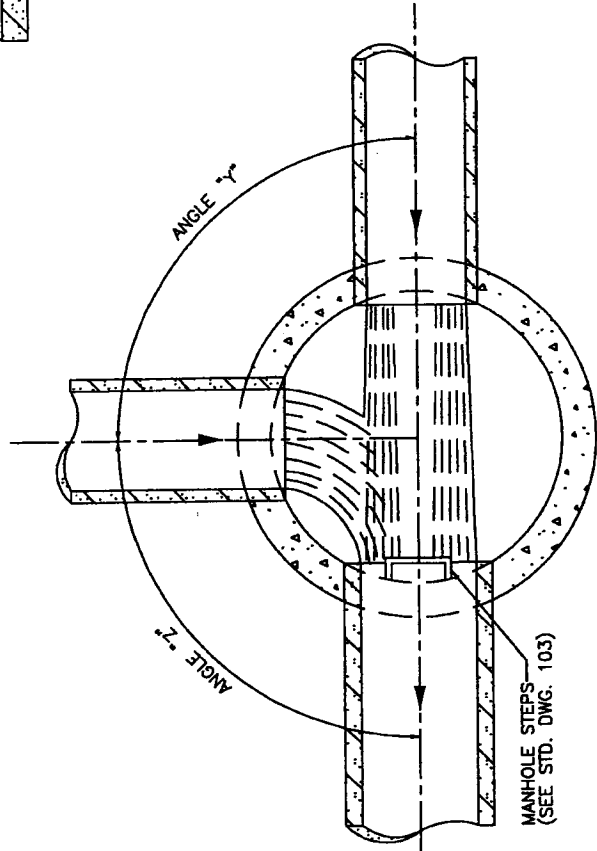


PLAN SECTION

MANHOLE STEPS
(SEE STD. DWG. 103)

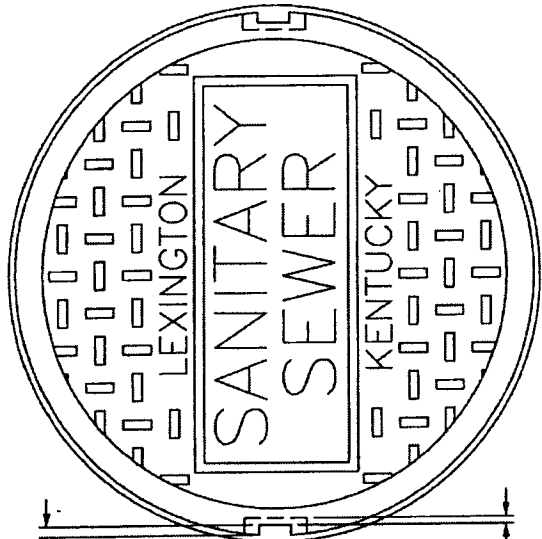
TABLE OF MINIMUM PARTIAL ANGLES FOR SANITARY MANHOLES

| PIPE SIZE | MANHOLE SIZE | | |
|-----------|--------------|----------|----------|
| | 4'-0" | 5'-0" | 5'-0" |
| | P. ANGLE | L. DIST. | L. DIST. |
| 15" | 38° | 1'-10" | 30" |
| 18" | 43° | 1'-8" | 34" |
| 24" | 53° | 1'-6" | 39" |
| 27" | - | - | 45" |
| 30" | - | - | 50" |

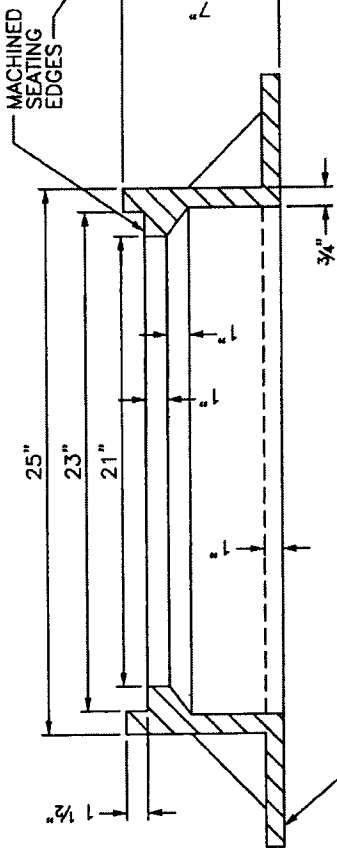
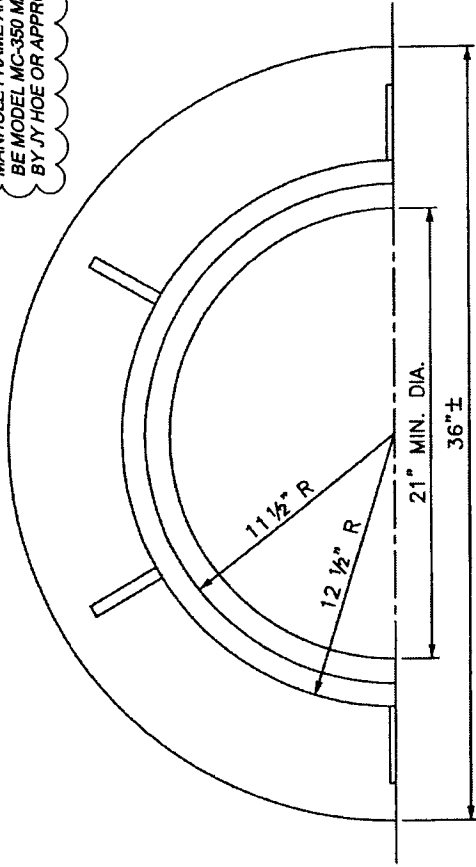


PLAN SECTION

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| DIVISION OF ENGINEERING | | | |
| DEFLECTION ANGLE CRITERIA FOR SANITARY MANHOLES | | | |
| STANDARD DRAWING NO. | 217 | | |
| APPROVED | <i>[Signature]</i> | DATE | 5/1/68 |
| DESIGNED | <i>[Signature]</i> | DATE | |
| CHECKED | <i>[Signature]</i> | DATE | |
| CONTRACTOR | | DATE | |

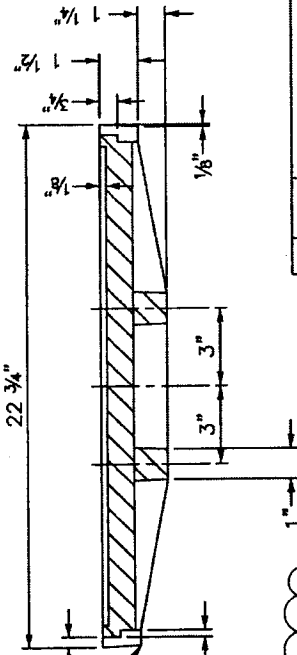


MANHOLE FRAME AND LID SHALL BE MODEL MC-350 MANUFACTURED BY JY HOE OR APPROVED EQUAL.



SET FRAME CASTING IN FULL MORTAR BED, FOR WATERTIGHT MANHOLE. FRAME AND LID - SEE APPLICABLE STANDARD DRAWING

FRAME DETAIL



COVER DETAIL

- NOTES:
1. MANHOLE FRAME & LID ASSEMBLY SHALL BE TRAFFIC H-20 RATED, HAVE A MINIMUM WEIGHT OF 125 LBS. AND A TOTAL MINIMUM FRAME AND LID WEIGHT OF 305 LBS. WITH ALL STEEL IN ACCORDANCE WITH ASTM A-48 CLASS 35 SPEC.
 2. FRAME SHALL BE SET IN BEAD OF BUTYL MASTIC SEALANT THEN MORTARED AROUND FRAME LIP.
 3. NON-TRAFFIC AREA MANHOLES SHALL BE BOLTED DOWN WITH FOUR (4) HIL-TI-TYPE S.S. ANCHOR BOLTS IN ACCORDANCE WITH SPECIFICATION SECTION 02608.

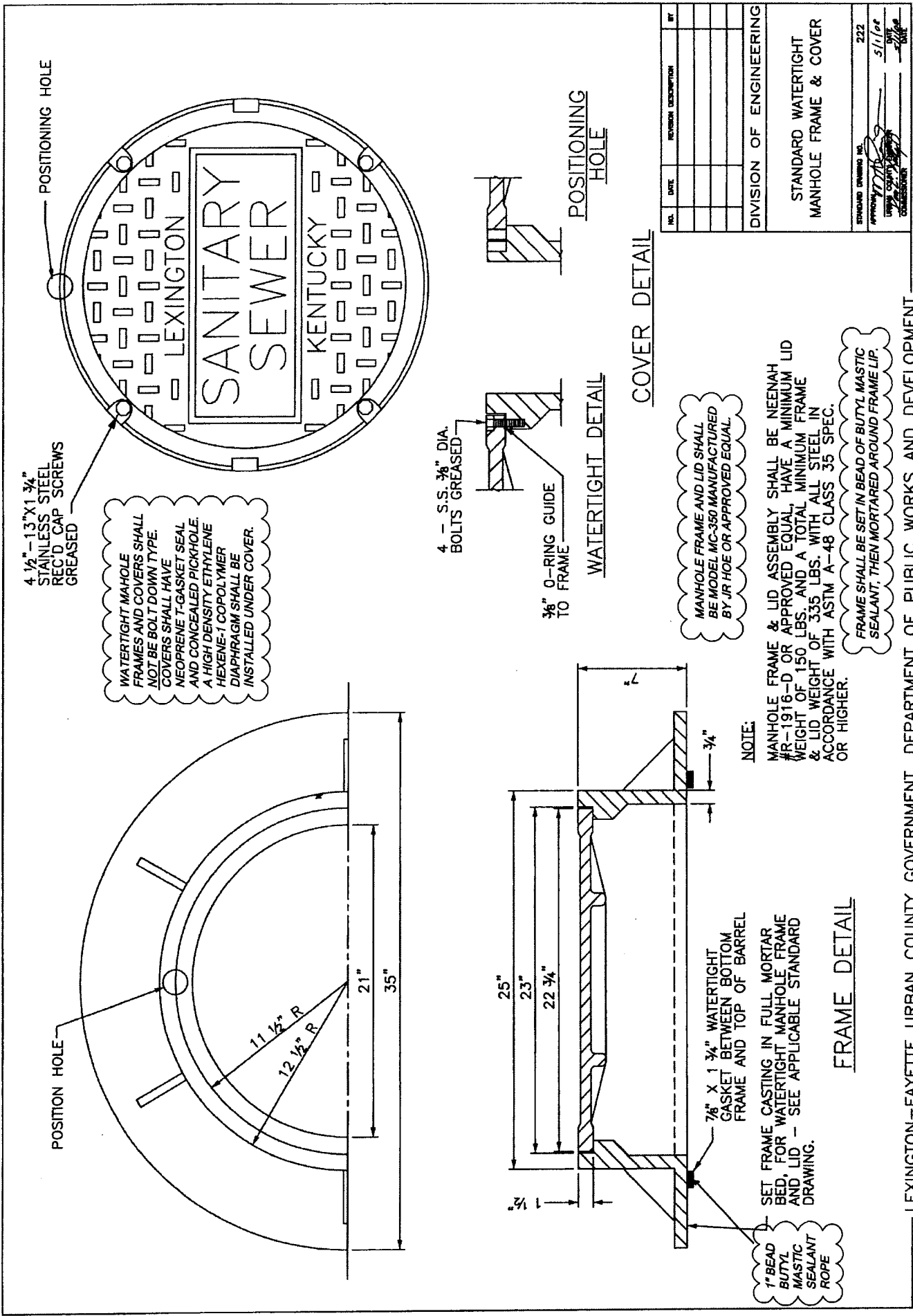
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DIVISION OF ENGINEERING

STANDARD CIRCULAR
MANHOLE FRAME & COVER

STANDARD DRAWING NO. 220

APPROVED: *[Signature]* 5/1/68
DATE



4 1/2" - 13" X 1 3/4" STAINLESS STEEL REC'D CAP SCREWS GREASED

WATERTIGHT MAHOLE FRAMES AND COVERS SHALL NOT BE BOLT DOWN TYPE. COVERS SHALL HAVE NEOPRENE T-GASKET SEAL AND CONCEALED PICKHOLE. A HIGH DENSITY ETHYLENE HEXENE-1 COPOLYMER DIAPHRAGM SHALL BE INSTALLED UNDER COVER.

4 - S.S. 3/8" DIA. BOLTS GREASED

3/8" O-RING GUIDE TO FRAME

MANHOLE FRAME AND LID SHALL BE MODEL MC-350 MANUFACTURED BY JR HOE OR APPROVED EQUAL.

NOTE:

MANHOLE FRAME & LID ASSEMBLY SHALL BE NEENAH #R-1916-D OR APPROVED EQUAL, HAVE A MINIMUM LID WEIGHT OF 150 LBS., AND A TOTAL MINIMUM FRAME & LID WEIGHT OF 335 LBS. WITH ALL STEEL IN ACCORDANCE WITH ASTM A-48 CLASS 35 SPEC. OR HIGHER.

FRAME DETAIL

1" BEAD BUTYL MASTIC SEALANT ROPE

7/8" X 1 3/4" WATERTIGHT GASKET BETWEEN BOTTOM FRAME AND TOP OF BARREL

COVER DETAIL

WATERTIGHT DETAIL

POSITIONING HOLE

| NO. | DATE | REVISION DESCRIPTION | BY |
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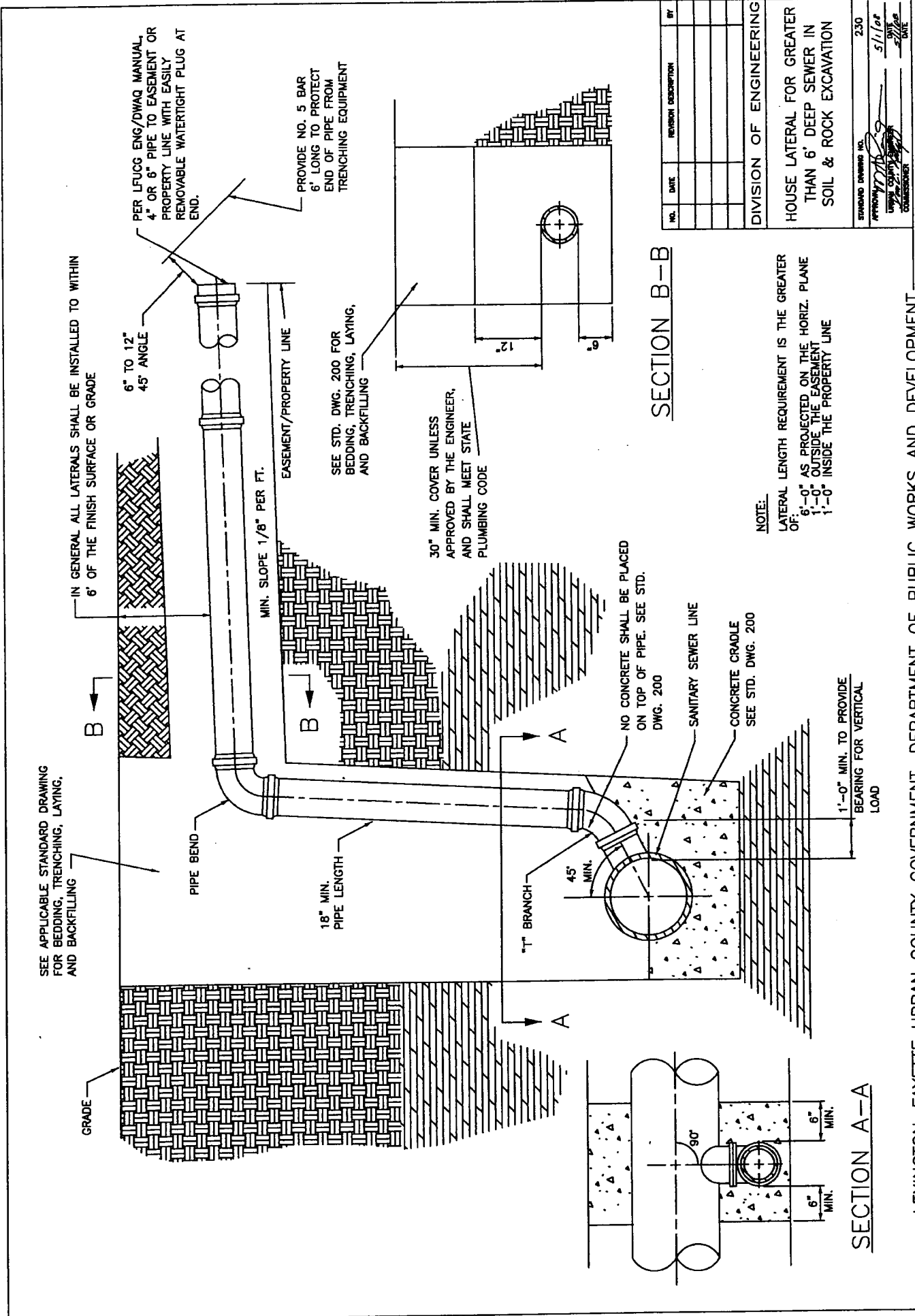
DIVISION OF ENGINEERING

STANDARD WATERTIGHT MANHOLE FRAME & COVER

STANDARD DRAWING NO. 222

APPROVED BY: *[Signature]* DATE: 5/1/68

LEXINGTON URBAN COUNTY ENGINEER: *[Signature]*



NOTE:
 LATERAL LENGTH REQUIREMENT IS THE GREATER OF:
 6'-0" AS PROJECTED ON THE HORIZ. PLANE
 1'-0" OUTSIDE THE EASEMENT
 1'-0" INSIDE THE PROPERTY LINE

SECTION B-B

| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

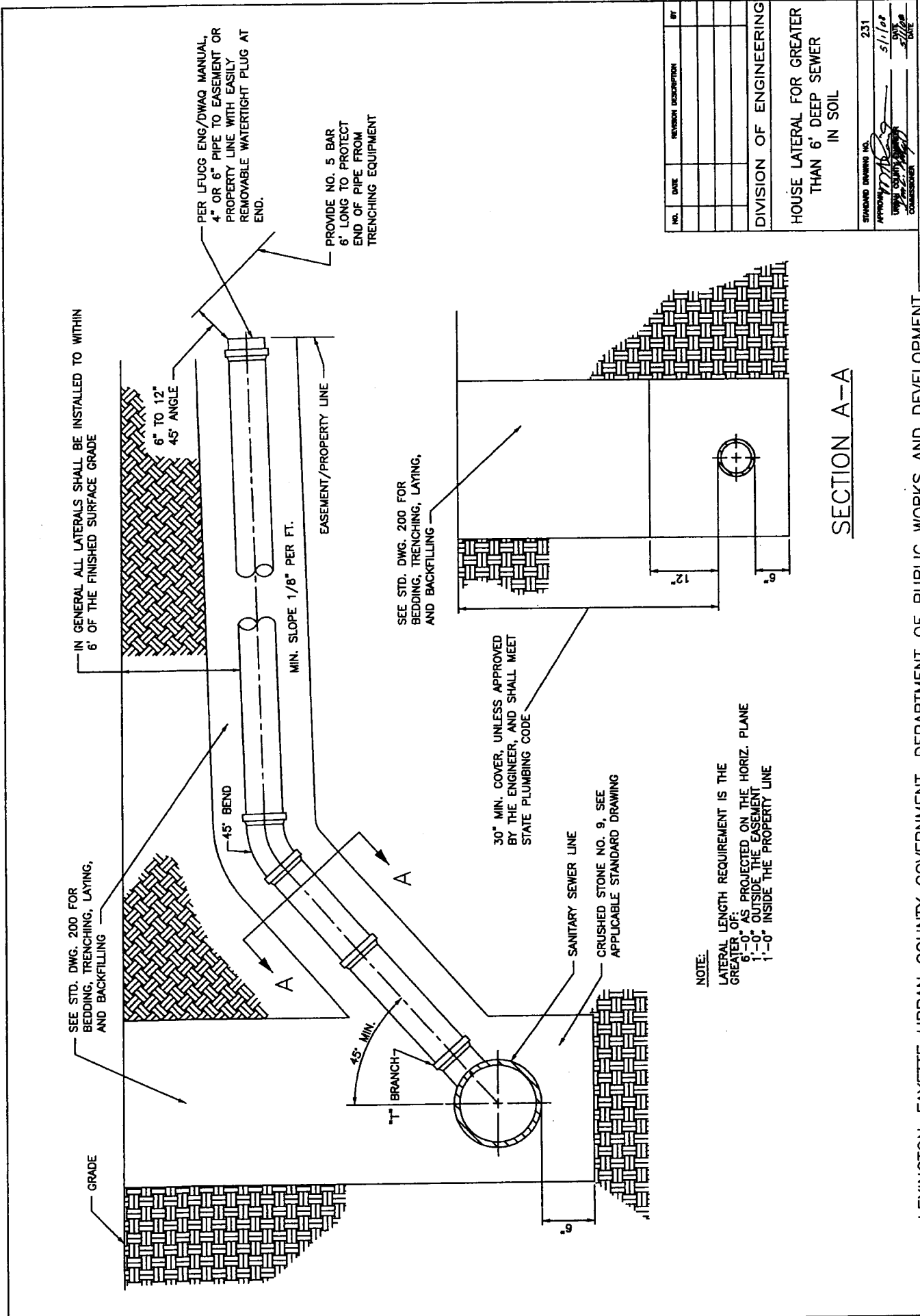
HOUSE LATERAL FOR GREATER THAN 6' DEEP SEWER IN SOIL & ROCK EXCAVATION

STANDARD DRAWING NO. 230

APPROVED: *[Signature]* 5/1/88

UNIVERSITY COUNTY ENGINEER

DATE



| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

HOUSE LATERAL FOR GREATER THAN 6' DEEP SEWER IN SOIL

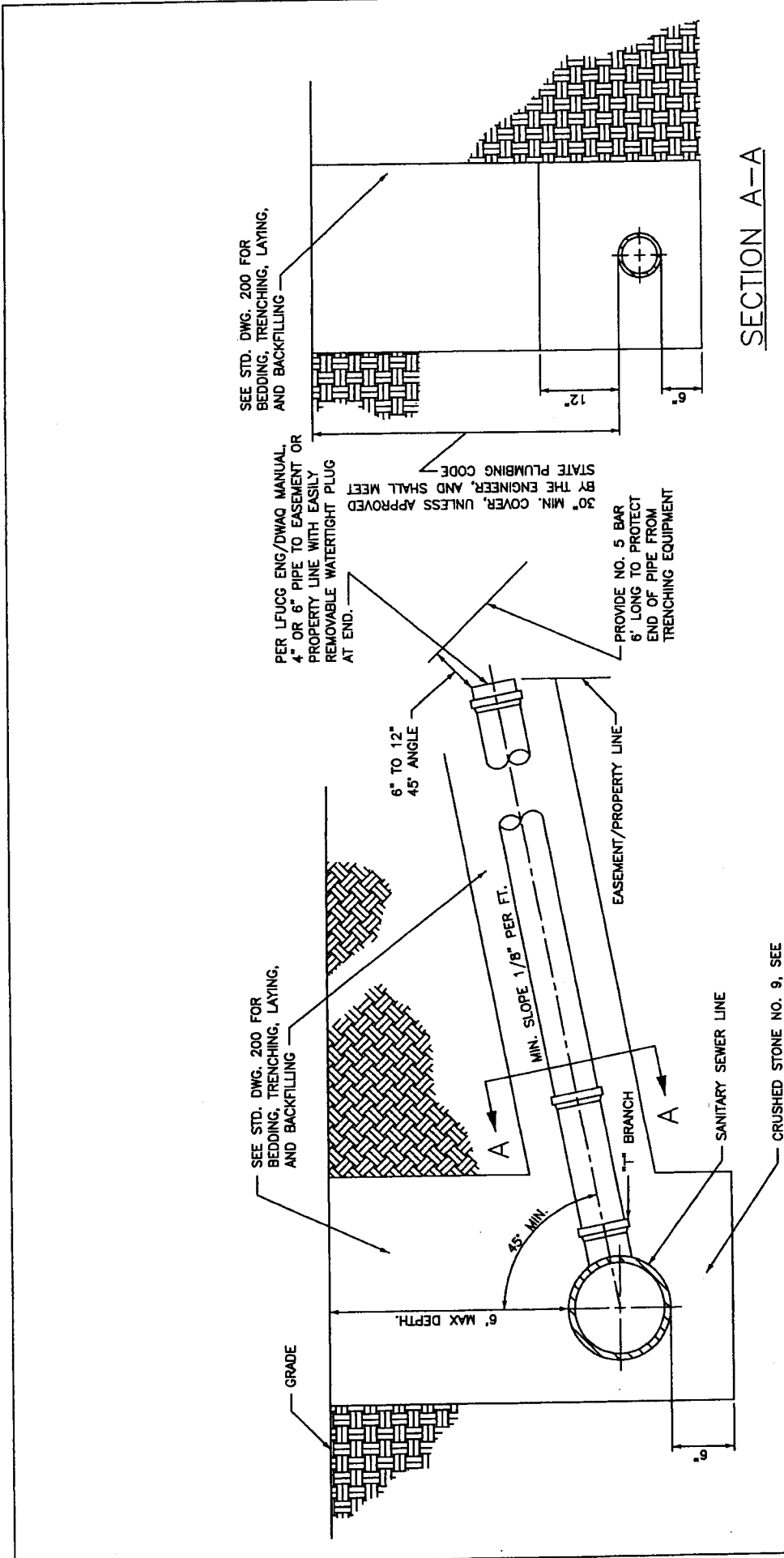
STANDARD DRAWING NO. 231

APPROVED: *[Signature]* DATE: 5/1/08

LEXINGTON COUNTY COMMISSIONER

DATE: 5/1/08

SECTION A-A



SEE STD. DWG. 200 FOR BEDDING, TRENCHING, LAYING, AND BACKFILLING

PER LFUCG ENG/DWAQ MANUAL, 4" OR 6" PIPE TO EASEMENT OR PROPERTY LINE WITH EASILY REMOVABLE WATERTIGHT PLUG AT END.

30" MIN. COVER, UNLESS APPROVED BY THE ENGINEER, AND SHALL MEET STATE PLUMBING CODE

PROVIDE NO. 5 BAR 6' LONG TO PROTECT END OF PIPE FROM TRENCHING EQUIPMENT

SEE STD. DWG. 200 FOR BEDDING, TRENCHING, LAYING, AND BACKFILLING

6" MAX DEPTH.

35° MIN.

6° TO 12° 45° ANGLE

MIN. SLOPE 1/8" PER FT.

EASEMENT/PROPERTY LINE

BRANCH

SANITARY SEWER LINE

CRUSHED STONE NO. 9, SEE STD. DWG. 200

SECTION A-A

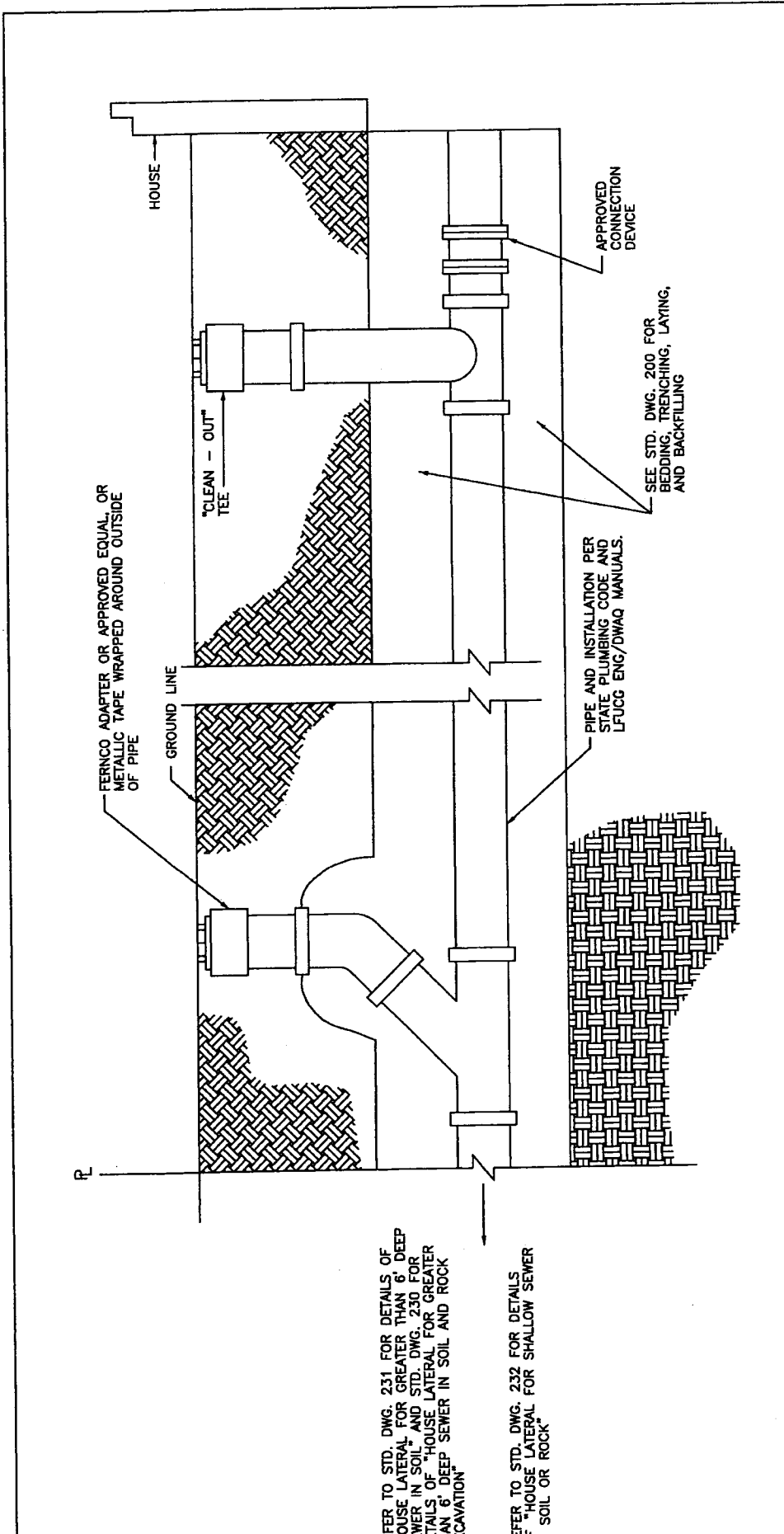
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DIVISION OF ENGINEERING

HOUSE LATERAL FOR SHALLOW SEWER IN SOIL OR ROCK

STANDARD DRAWING NO. 232
 APPROVED: [Signature] DATE: 5/1/68
 LEXINGTON COUNTY COMMISSIONER [Signature] DATE: 5/1/68

NOTE:
 LATERAL LENGTH REQUIREMENT IS THE GREATER OF:
 6'-0" AS PROJECTED ON THE HORIZ. PLANE
 1'-0" OUTSIDE THE EASEMENT
 1'-0" INSIDE THE PROPERTY LINE



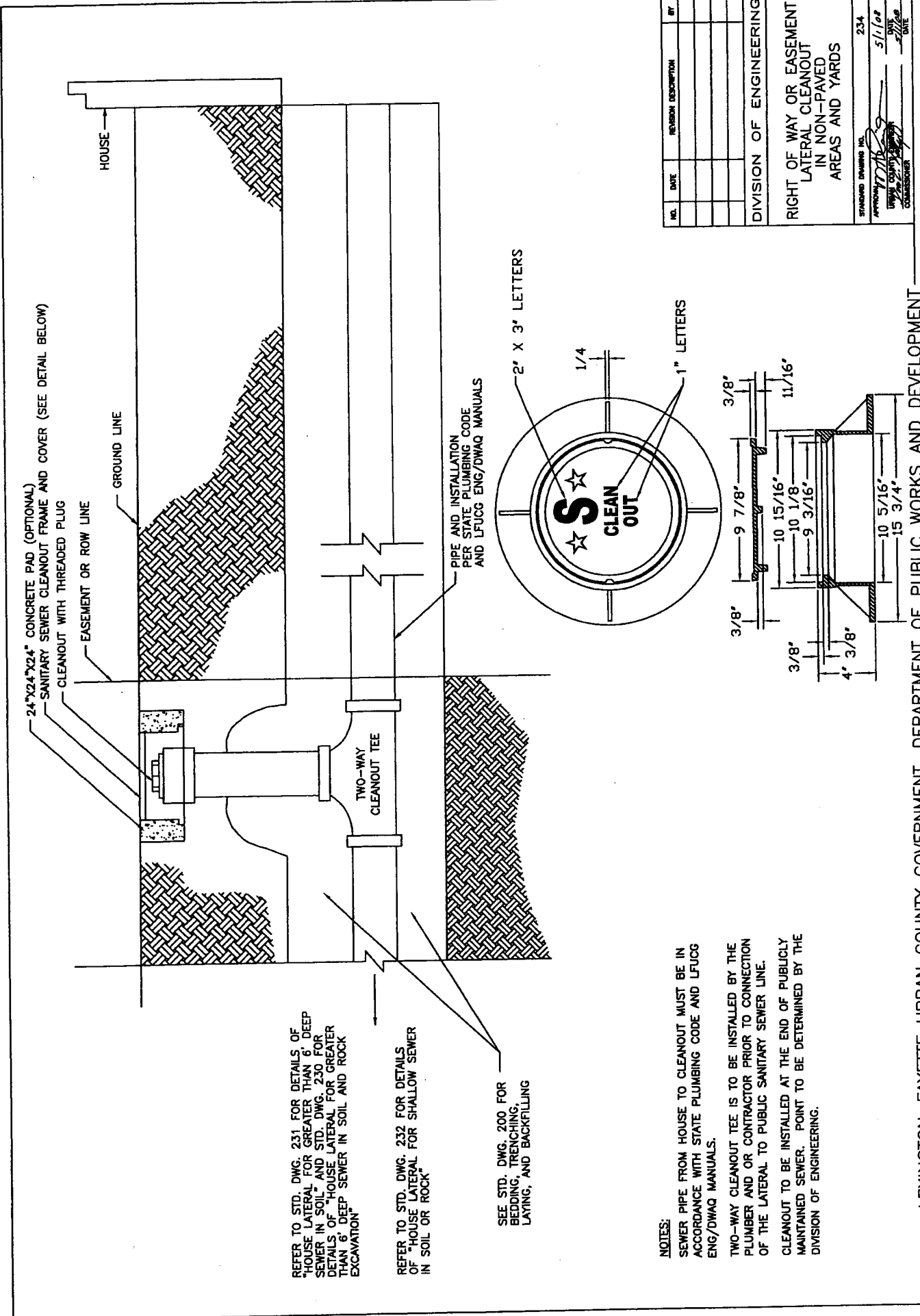
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DIVISION OF ENGINEERING

LATERAL CLEANOUT IN
NON-PAVED AREAS
AND YARDS

STANDARD DRAWING NO. 233
 APPROVED BY: [Signature] DATE: 5/1/08
 DRAWN BY: [Signature] DATE: 5/1/08
 CHECKED BY: [Signature] DATE: 5/1/08
 COMMISSIONER

NOTE:
SEWER PIPE FROM HOUSE TO THE LONG SWEEP "L" MUST BE IN ACCORDANCE WITH STATE PLUMBING CODE AND LFUGG ENG/DWAG MANUALS.



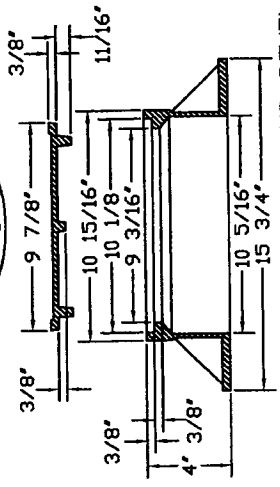
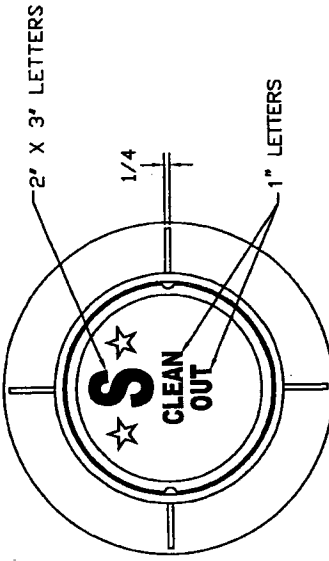
REFER TO STD. DWG. 231 FOR DETAILS OF "HOUSE LATERAL FOR GREATER THAN 6' DEEP SEWER IN SOIL" AND STD. DWG. 230 FOR DETAILS OF "HOUSE LATERAL FOR GREATER THAN 6' DEEP SEWER IN SOIL AND ROCK EXCAVATION"

REFER TO STD. DWG. 232 FOR DETAILS OF "HOUSE LATERAL FOR SHALLOW SEWER IN SOIL OR ROCK"

SEE STD. DWG. 200 FOR BEDDING, TRENCHING, LAYING, AND BACKFILLING

NOTES:
SEWER PIPE FROM HOUSE TO CLEANOUT MUST BE IN ACCORDANCE WITH STATE PLUMBING CODE AND LFUCG ENG/DWAQ MANUALS.

TWO-WAY CLEANOUT TEE IS TO BE INSTALLED BY THE PLUMBER AND OR CONTRACTOR PRIOR TO CONNECTION OF THE LATERAL TO PUBLIC SANITARY SEWER LINE. CLEANOUT TO BE INSTALLED AT THE END OF PUBLICLY MAINTAINED SEWER. POINT TO BE DETERMINED BY THE DIVISION OF ENGINEERING.



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DIVISION OF ENGINEERING

RIGHT OF WAY OR EASEMENT LATERAL CLEANOUT IN NON-PAVED AREAS AND YARDS

STANDARD DRAWING NO. 234
 APPROVED: *[Signature]* DATE 5/1/08
 URBAN COUNTY COMMISSIONER
 DATE 5/1/08

COMPACTED ORIGINAL SOIL AND ROCK MATERIALS FROM TRENCH AREA TO APPROXIMATELY ORIGINAL CONDITION

☉ CREEK OR DRAINWAY

WATER LEVEL

ZONE

DUCTILE IRON SEWER LINE PIPE WITH JOINTS TO BE DETERMINED BY APPROVING AUTHORITY

SEE STD. DWG. 200 FOR STANDARD BEDDING, TRENCHING, LAYING, AND BACKFILLING FOR ZONES 1 AND 2

NOTES:

1. A WATERSTOP SHALL BE PROVIDED ON THE UPSTREAM SIDE OF THE DOWNSTREAM MANHOLE.
2. SPECIAL DESIGN REQUIRED WHEN COVER IS 30" OR LESS.

| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

TYPICAL CREEK CROSSING FOR SANITARY SEWER LINE

STANDARD DRAWING NO. 240

APPROVED BY *[Signature]* DATE 5/1/08

PREPARED BY *[Signature]* DATE 5/1/08

COMMISSIONER



Mayor Jim Gray

LEXINGTON-FAYETTE URBAN COUNTY GOVERNMENT
Division of Engineering

Date: February 2, 2012

Re: LFUCG Standard Drawings 250 Revision

The Lexington Fayette Urban County Government, Department of Environmental Quality and Public Works, has revised the Division of Engineering **Standard Drawings 250 – Schematic Example For Grease Interceptor**. This Standard Drawing became effective on January 16, 2012 and replaces any/all previous versions.

Attached is the revised Standard Drawing.

A paper copy of the **Standard Drawings 2008** edition is available for purchase from the Lexington Fayette Urban County Government, Division of Engineering, 101 East Vine Street 4th floor.

If you have questions please contact Mr. Andrew Grunwald, P.E. with the Division of Engineering at 258-3410.

Questions or Comments should be directed to:

Urban County Engineer
Division of Engineering
Fourth Floor
101 E. Vine Street
Lexington, KY 40507
859-258-3410

Sincerely,

Marwan A. Rayan, P.E.
Urban County Engineer

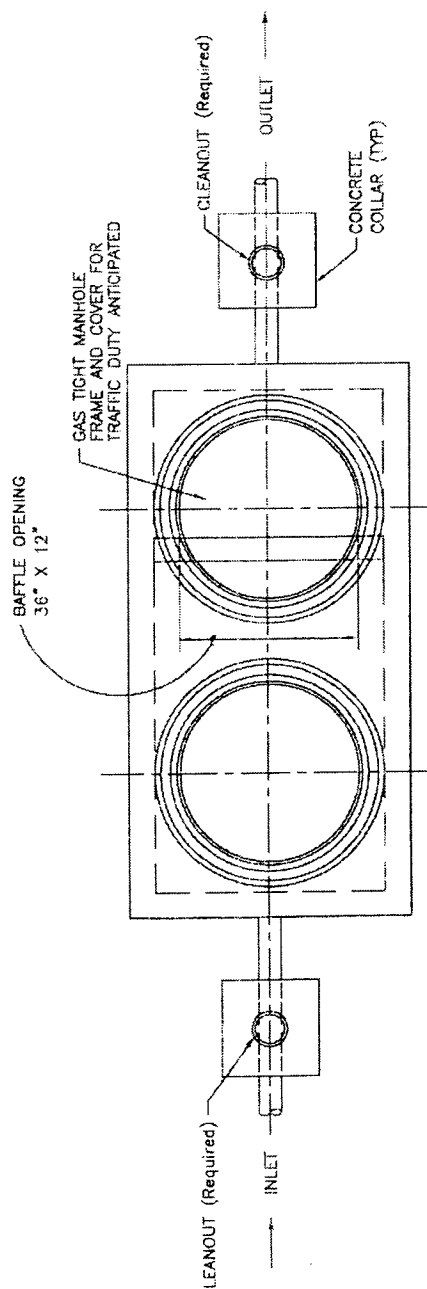
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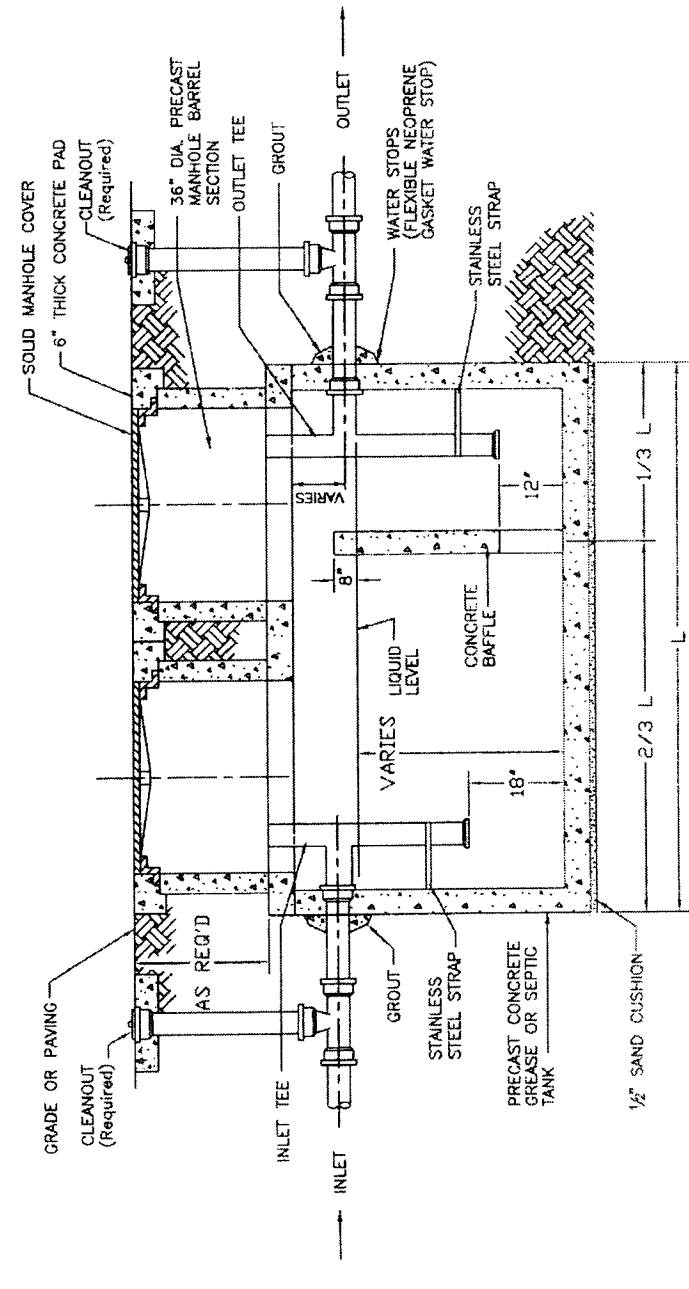
12 1000 106 Letter for Amended STD#250.doc

HORSE CAPITAL OF THE WORLD

101 East Vine Street 4th Floor Lexington, KY 40507 Ph: (859)258-3410 Fax: (859)258-3458 www.lfucg.com



TOP VIEW

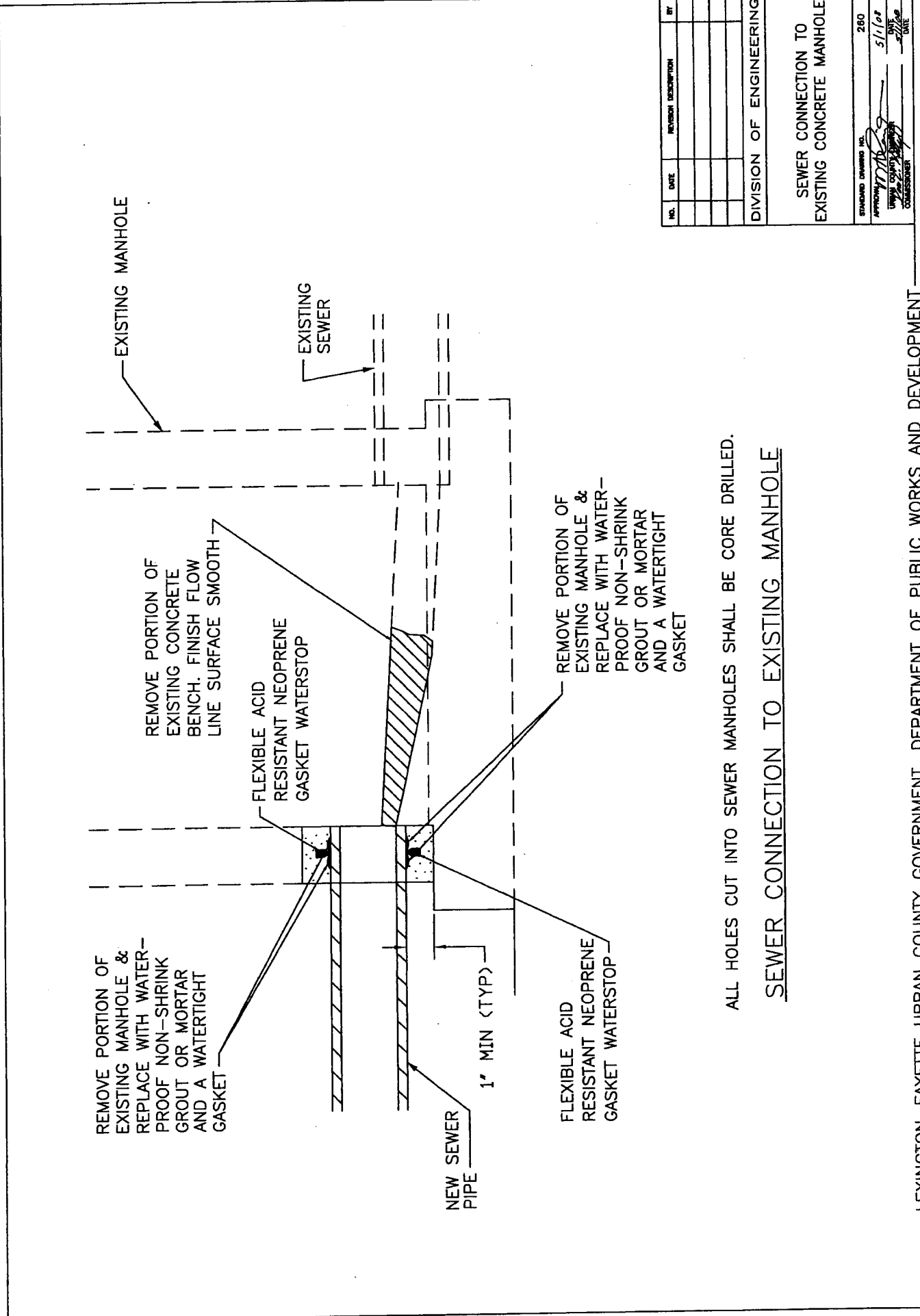


SECTION

GENERAL NOTES:

1. THIS STRUCTURE IS TO BE ACCESSIBLE FOR MAINTENANCE OR INSPECTION WITH COVERS AND CLEANOUTS BROUGHT TO GRADE.
2. DESIGN CRITERIA SHALL BE HS-20 LOADING.
3. FLOW TO THE INTERCEPTOR SHALL EXCLUDE SANITARY SEWAGE AND SURFACE DRAINAGE.
4. DESIGN AND CAPACITY OF GREASE INTERCEPTOR TO BE CERTIFIED BY ENGINEER IN ACCORD WITH KENTUCKY STATE PLUMBING CODE AND REVIEWED FOR CAPACITY BY THE DIVISION OF ENGINEERING PRIOR TO CONSTRUCTION.
5. MULTIPLE COMPARTMENT INTERCEPTORS ARE REQUIRED.
6. PIPE CLEANOUT TEE SHALL BE THE SAME SIZE AS THE PIPE AND BE WITHIN 6" OF THE GREASE INTERCEPTOR ON THE OUTLET LINE.
7. MANUFACTURER WILL PROVIDE GREASE TRAP WITH TWO(2) ACCESS POINTS AS SHOWN. PLUMBING CONTRACTOR TO INSTALL FIXTURES AS SHOWN.
8. THE MINIMUM CAPACITY OF INTERCEPTORS IS 1000 GALLONS.

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| DIVISION OF ENGINEERING | | | |
| GREASE INTERCEPTOR TYPICAL CONFIGURATION | | | |
| STANDARD DRAWING NO. 250 | | | DATE 1/14/12 |
| APPROVAL: <i>[Signature]</i> | | | DATE 1/14/12 |
| URBAN COUNTY ENGINEER | | | DATE 1/14/12 |
| CONTRACT NO. _____ | | | DATE 1/14/12 |



ALL HOLES CUT INTO SEWER MANHOLES SHALL BE CORE DRILLED.

SEWER CONNECTION TO EXISTING MANHOLE

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DIVISION OF ENGINEERING

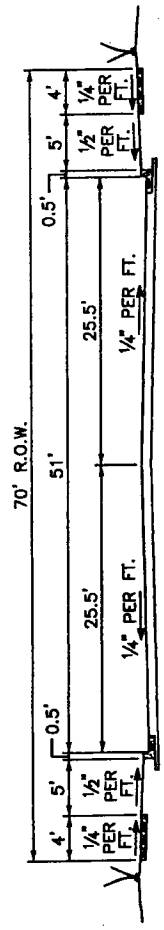
SEWER CONNECTION TO EXISTING CONCRETE MANHOLE

STANDARD DRAWING NO. 260

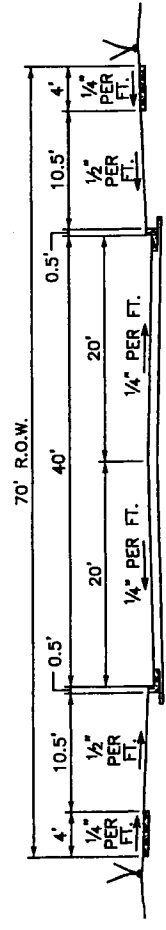
APPROVED: *[Signature]* DATE: 5/1/02

BY: *[Signature]* DATE: 5/1/02

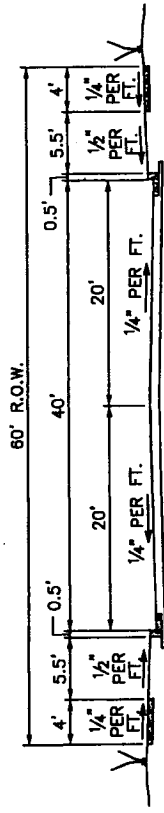
COMMISSIONER



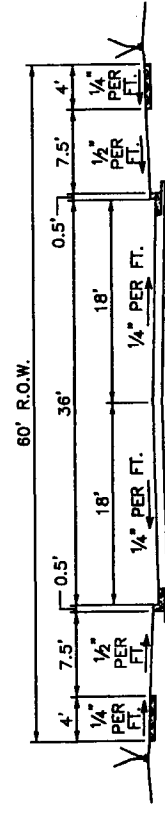
NON-RESIDENTIAL COLLECTOR



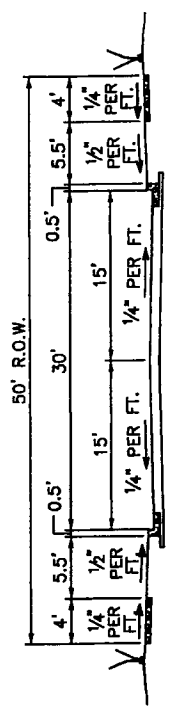
NON-RESIDENTIAL AND INDUSTRIAL COLLECTORS



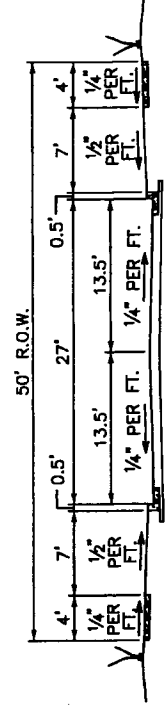
RESIDENTIAL COLLECTOR AND INDUSTRIAL LOCALS



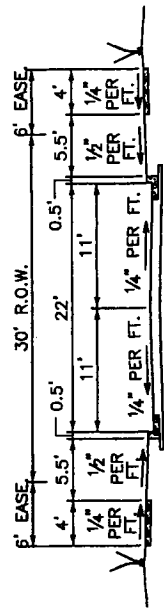
RESIDENTIAL COLLECTOR
(OBSOLETE) - USED TO COMPLETE EXISTING STREETS



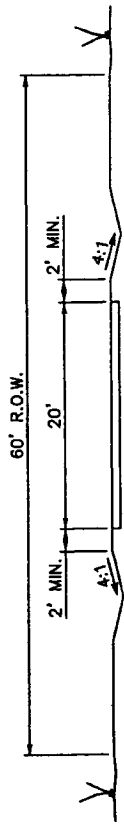
RESIDENTIAL LOCAL



RESIDENTIAL CUL-DE-SAC



URBAN RESIDENTIAL LOCAL

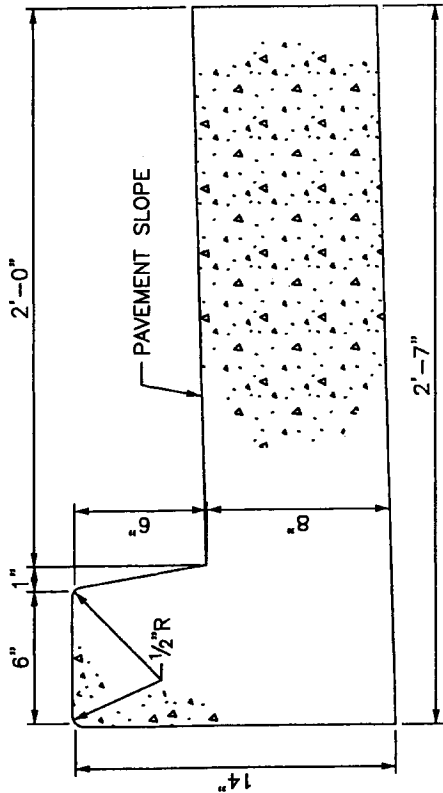


RURAL RESIDENTIAL LOCAL

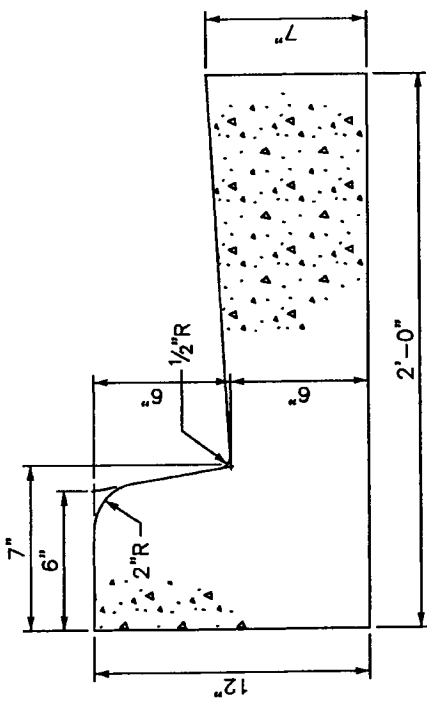
NOTES:

1. SLOPES AND DRAINAGE DITCHES OUTSIDE THE R.O.W. SHALL BE APPROVED BY THE ENGINEER.
2. THE APPLICATIONS AND USES OF THE ABOVE TYPICAL SECTIONS SHALL BE IN ACCORDANCE WITH THE L.F.U.C.G. LAND SUBDIVISION REGULATIONS, ARTICLE 6.

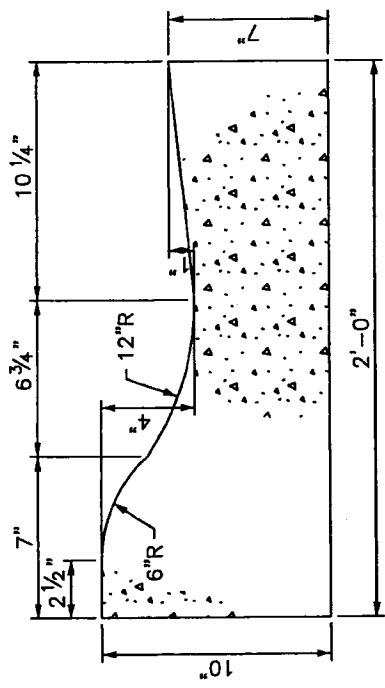
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| DIVISION OF ENGINEERING | | | |
| TYPICAL STREET SECTIONS | | | |
| STANDARD DRAWING NO. | 300 | | |
| APPROVED | 5/1/08 | | |
| DESIGNED BY | [Signature] | | |
| CHECKED BY | [Signature] | | |
| DATE | [Signature] | | |



TYPE 2



TYPE 3



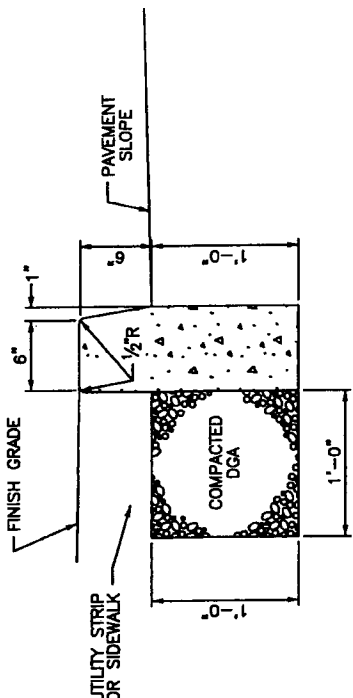
TYPE 4

(RESIDENTIAL LOCAL STREETS ONLY)

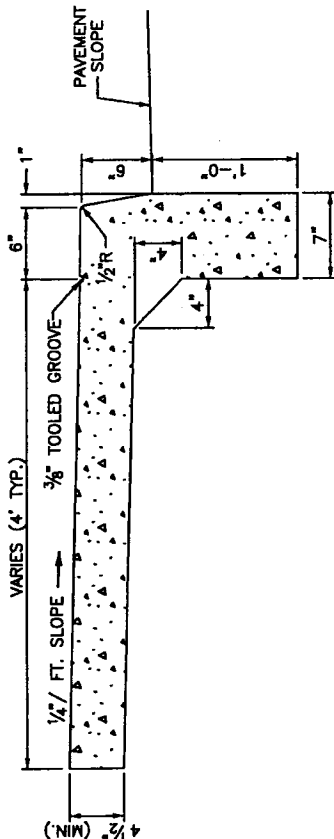
NOTES:

1. CONCRETE SHALL BE KDOT CLASS "A".
2. SAWED CONTRACTION JOINTS SHALL BE CONSTRUCTED EVERY 20 FEET, WITH A MIN. DEPTH OF 3", IN ACCORDANCE WITH KDOT STANDARD SPECIFICATION.
3. EXPANSION JOINTS SHALL BE CONSTRUCTED AT ALL BREAKS IN ALIGNMENT, AT CONTACT WITH NEW OR EXISTING CONCRETE, AT ALL DRAINAGE INLETS, AT THE BEGINNING AND ENDING POINTS OF CURVES, AND NOT TO EXCEED 200' MAXIMUM SPACING FOR SLIP FORM APPLICATION AND 30' MAXIMUM SPACING FOR HAND PLACED.
4. ALL CONCRETE SHALL BE CURED WITH WHITE PIGMENTED, MEMBRANE FORMING COMPOUND (AASHTO M 148, TYPE 2).

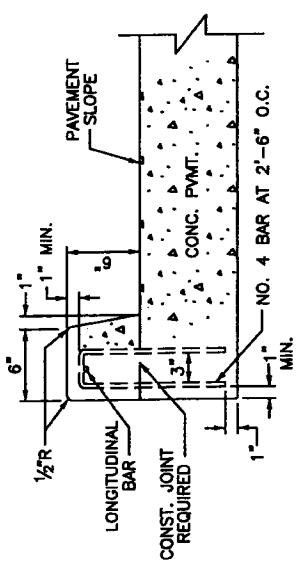
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| DIVISION OF ENGINEERING | | | |
| CURB & GUTTER | | | |
| STANDARD DRAWING NO. | 301 | | |
| APPROVED | SILCOE | | |
| DESIGNED | SILCOE | | |
| CHECKED | SILCOE | | |
| DATE | DATE | | |



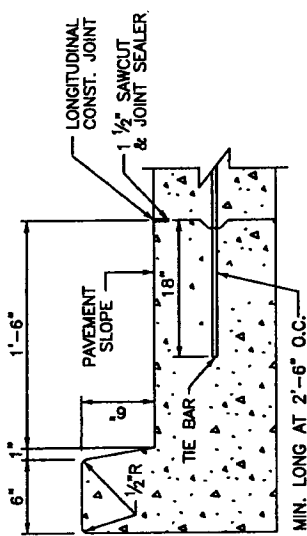
HEADER CURB



MONOLITHIC CURB AND SIDEWALK



INTEGRAL CURB, TYPE 1



INTEGRAL CURB, TYPE 2

NOTES:

1. CONCRETE SHALL BE KDOT CLASS "A".
2. SAWED CONTRACTION JOINTS SHALL BE CONSTRUCTED EVERY 20 FEET, 3" MINIMUM DEPTH.
3. THE CONTRACTOR HAS THE OPTION OF CONSTRUCTING THE STANDARD INTEGRAL CURB AS DETAILED IN EITHER TYPE 1 OR 2. IF TYPE 2 IS CHOSEN A LONGITUDINAL CONSTRUCTION JOINT SHALL BE REQUIRED AND THE REMAINING PAVEMENT AND CURB SHALL BE CONSTRUCTED MONOLITHIC WITHOUT A HORIZONTAL CONSTRUCTION JOINT AND ACCOMPANYING REINFORCING STEEL (TYPE 1).
4. EXPANSION JOINTS SHALL BE CONSTRUCTED AT ALL BREAKS IN ALIGNMENT, AT ALL DRAINAGE INLETS AND AT THE BEGINNING AND ENDING POINTS OF CURVES.
5. ALL CONCRETE, EXCEPT BONDING SURFACES, SHALL BE CURED WITH WHITE PIGMENTED MEMBRANE FORMING COMPOUND (AASHTO M 148, TYPE 2).

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DIVISION OF ENGINEERING

INTEGRAL CURB,
HEADER CURB,
MONOLITHIC CURB
& SIDEWALK

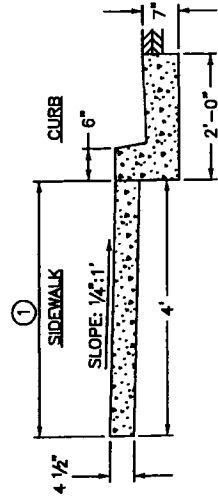
STANDARD DRAWING NO. 302

APPROVED BY: *[Signature]* DATE: 5/1/07

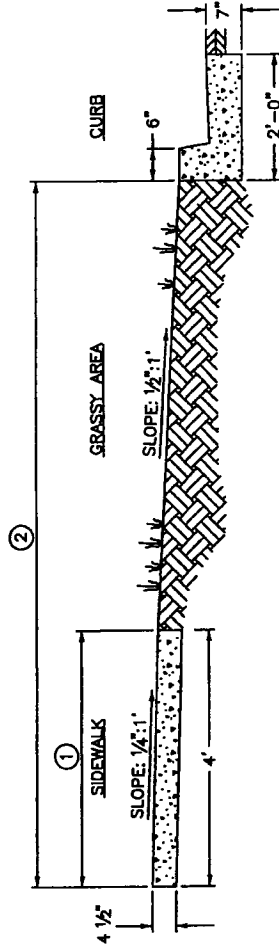
DESIGNED BY: *[Signature]* DATE: 5/1/07

CHECKED BY: *[Signature]* DATE: 5/1/07

COMMISSIONER



SIDEWALK/CURB AND GUTTER



SIDEWALK/CURB AND GUTTER WITH GRASS UTILITY STRIP

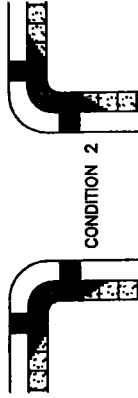
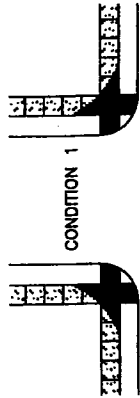
NOTES:

1. CONCRETE SIDEWALKS AND WALKWAYS SHALL BE CONSTRUCTED ON A THOROUGHLY COMPACTED SUB-GRADE AND SHALL BE FOUR AND ONE HALF (4 1/2) INCHES IN THICKNESS AND A MINIMUM WIDTH OF FOUR (4) FEET. CONCRETE SHALL HAVE SPECIFICATIONS FOR CLASS "A", KENTUCKY DEPARTMENT OF HIGHWAYS, STANDARD SPECIFICATIONS, CURRENT EDITION. WHITE PIGMENTED (TYPE 2, CLASS "A" OR "B") CURING COMPOUND IS REQUIRED (ALSO KENTUCKY DEPARTMENT OF HIGHWAYS, STANDARD SPECIFICATIONS, CURRENT EDITION).
2. EXPANSION JOINTS SHALL BE PLACED AT THIRTY-TWO (32) FOOT INTERVALS. IN EXISTING NEIGHBORHOODS, EXPANSION MATERIAL SHALL BE PLACED AT THE BEGINNING AND END OF NEWLY CONSTRUCTED AREAS.
3. THE SIDEWALKS SHALL BE PLACED ADJACENT TO THE STREET RIGHT-OF-WAY LINE. SLOPE TOWARD CURB SHALL BE ONE QUARTER (1/4) OF AN INCH TO THE FOOT. CONSTRUCTION IN EXISTING NEIGHBORHOODS SHALL REQUIRE THE CONTRACTOR TO MATCH EXISTING GRADE AND SIDEWALK WIDTH UNLESS SPECIFIED OTHERWISE BY THE DIVISION OF ENGINEERING.

SHEET NOTES:

- ① NORMAL SIDEWALK WIDTH SHALL BE 4' UNLESS CHANGE IS AUTHORIZED BY URBAN COUNTY ENGINEER'S OFFICE.
- ② DISTANCE WILL VARY WITH ROAD CROSS-SECTION.

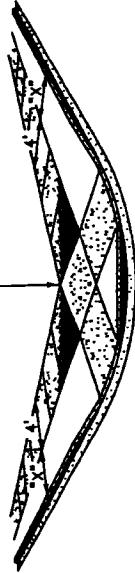
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| DIVISION OF ENGINEERING | | | |
| SIDEWALK CONSTRUCTION SPECIFICATIONS | | | |
| STANDARD DRAWING NO. | | 303 | |
| APPROVED | | 5/1/07 | |
| URBAN COUNTY ENGINEER | | DATE | |
| COMMISSIONER | | DATE | |



RAMP TYPE 1

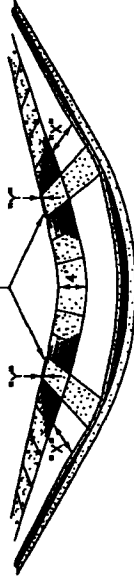
NORMAL TREATMENT FOR ARTERIALS AND SIGNALIZED INTERSECTIONS

DROP BACK OF SIDEWALK AS REQUIRED TO PROVIDE MAXIMUM 1":1" RAMP SLOPE. EXTEND RAMP WITHIN SIDEWALK AS REQUIRED. REFER TO CHART ON THIS SHEET.

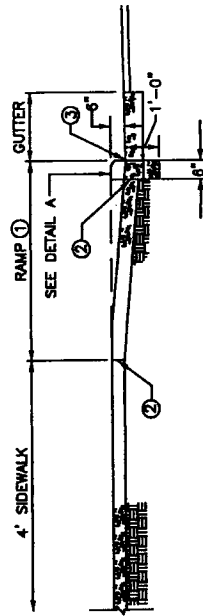


RAMP TYPE 1 CONDITION 1

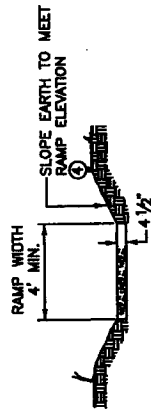
DROP BACK OF SIDEWALK AS REQUIRED TO PROVIDE MAXIMUM 1":1" RAMP SLOPE. EXTEND RAMP WITHIN SIDEWALK AS REQUIRED. REFER TO CHART ON THIS SHEET.



RAMP TYPE 1 CONDITION 2



PROFILE RAMP TYPE 1



CROSS SECTION RAMP TYPE 1

NOTE: FOR USE WITH 6" HEADER CURB OR 6" CURB AND GUTTER

| UTILITY STRIP WIDTH ① | BACK OF 4" SIDEWALK DROP FROM NORMAL ② |
|--------------------------|--|
| 0 | 3" |
| 1 | 2 1/2" |
| 2 | 2" |
| 3 | 1 1/2" |
| 4 | 1" |
| 5 | 1/2" |
| ≥6 | 0 |

- ① 1/2":1" CROSS SLOPE
 - ② 1/4":1" CROSS SLOPE
- * WHERE ROLL CURB IS USED, 1" DOES NOT APPLY.

NOTES:

- INLET LOCATIONS WILL VARY, DEPENDENT ON CROSSWALK AND RAMP LOCATION.
- THE RAMP SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE. STEP-SAFE™ TRANSPO INDUSTRIES TILE OR ENGINEER APPROVED EQUIVALENT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
- THE NORMAL GUTTER LINE SHOULD BE MAINTAINED THROUGH THE RAMP.
- RAMPS SHOULD BE LOCATED WITHIN MARKED LIMITS OF CROSSWALKS.
- WHERE NO CURB EXISTS, STREET EDGE SHALL BE SAW CUT, OR AS DIRECTED BY L.F.U.C.G. ENGINEER.

SHEET NOTES: ①

- MAXIMUM RAMP SLOPE 1":1".
- 1/2" EXPANSION JOINT AT BACK OF CURBLINE AND SIDEWALK LINE.
- NO BUMP PERMITTED.
- SLOPE VARIES UNIFORMLY TO A MAXIMUM OF 1":1" AT GUTTER LINE.

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DIVISION OF ENGINEERING

SIDEWALK RAMP TYPE 1

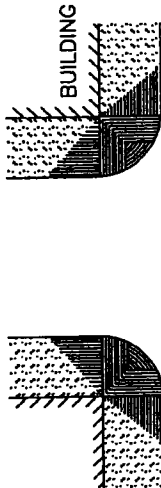
STANDARD DRAWING NO. 304

APPROVED BY *[Signature]* DATE 5/1/08

DESIGNED BY *[Signature]* DATE 5/1/08

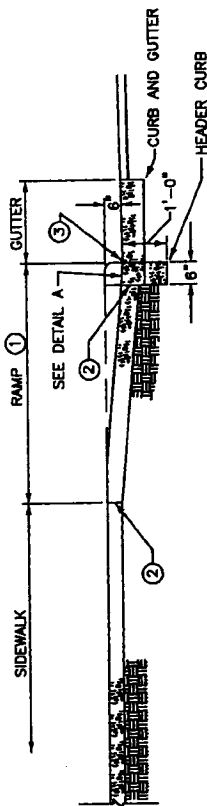
CHECKED BY *[Signature]* DATE 5/1/08

COMMISSIONER

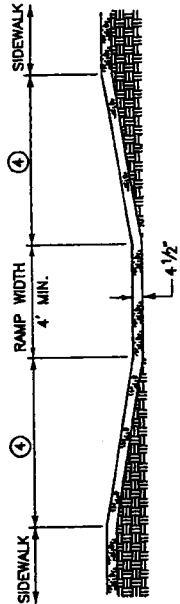


RAMP TYPE 3

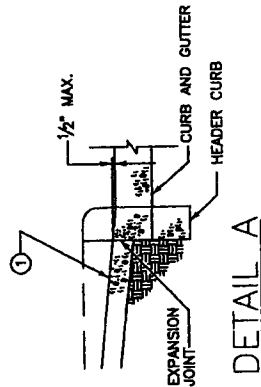
NORMAL TREATMENT FOR SIDEWALK ADJACENT TO CURB



PROFILE RAMP TYPE 3

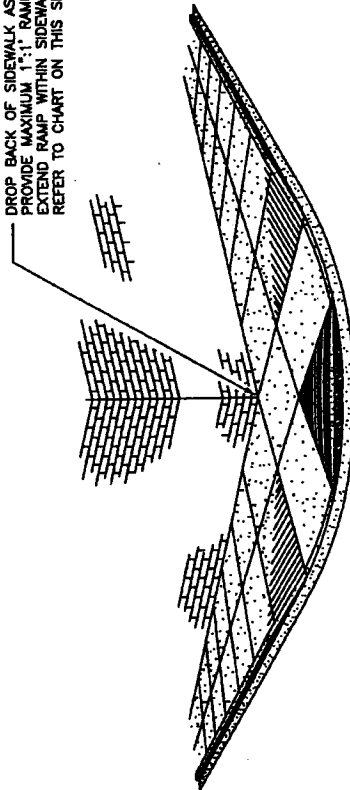


CROSS SECTION RAMP TYPE 3



DETAIL A

DROP BACK OF SIDEWALK AS REQUIRED TO PROVIDE MAXIMUM 1:1 RAMP SLOPE. EXTEND RAMP WITHIN SIDEWALK AS REQUIRED. REFER TO CHART ON THIS SHEET.



RAMP TYPE 3

NOTES:

1. INLET LOCATIONS WILL VARY, DEPENDENT ON CROSSWALK AND RAMP LOCATION.
2. THE RAMP SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE. STEP-SAFE® TRANSPO INDUSTRIES TILE OR ENGINEER APPROVED EQUIVALENT SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
3. THE NORMAL GUTTER LINE SHOULD BE MAINTAINED THROUGH THE RAMP.
4. RAMPS SHOULD BE LOCATED WITHIN MARKED LIMITS OF CROSSWALKS.

SHEET NOTES:

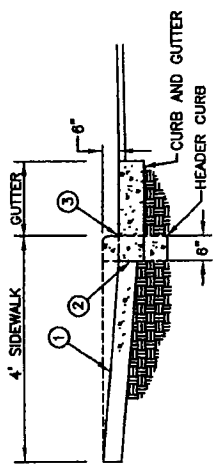
- ① MAXIMUM RAMP SLOPE 1:1.
- ② 1/2" EXPANSION JOINT AT BACK OF CURBLINE AND SIDEWALK LINE.
- ③ NO BUMP PERMITTED.
- ④ SLOPE VARIES UNIFORMLY TO A MAXIMUM OF 1:1. AT GUTTER LINE.

NOTE: FOR USE WITH 6" HEADER CURB OR 6" CURB AND GUTTER

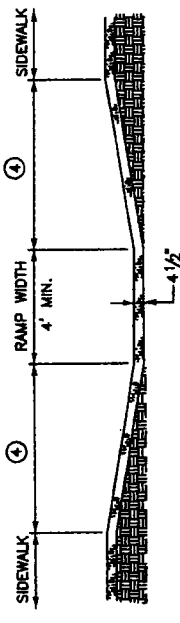
| SIDEWALK WIDTH ① "x" | BACK OF SIDEWALK DROP FROM NORMAL "y" |
|-------------------------|---|
| 4' | 3" |
| 5' | 2 1/4" |
| 6' | 1 1/2" |
| 7' | 3/4" |
| ≥ 8' | 0 |

- ① 1/4:1 CROSS SLOPE
- * WHERE ROLL CURB IS USED, "y" DOES NOT APPLY.

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| DIVISION OF ENGINEERING | | | |
| SIDEWALK RAMP TYPE 2 | | | |
| STANDARD DRAWING NO. | 305 | | |
| APPROVED | | | |
| DESIGNED | | | |
| CHECKED | | | |
| DATE | 5/1/00 | | |



RAMP PROFILE



RAMP CROSS-SECTION

4' SIDEWALK ADJACENT TO CURB

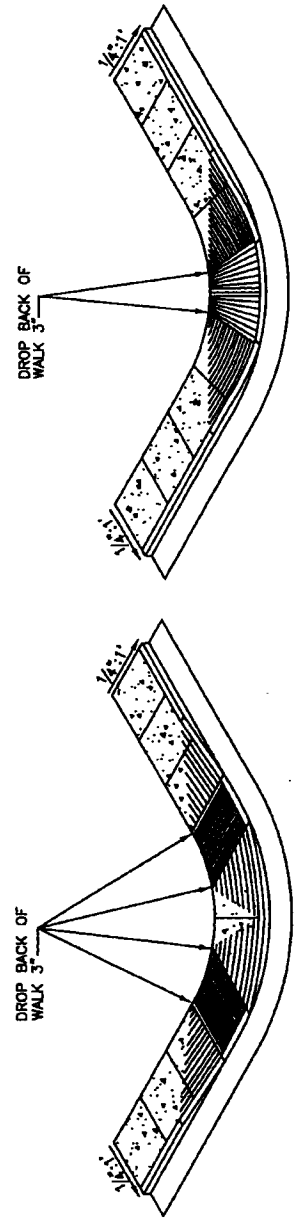


CONDITION 1



CONDITION 2

4' SIDEWALK ADJACENT TO CURB



CONDITION 1

CONDITION 2

NOTES:

1. INLET LOCATIONS WILL VARY, DEPENDENT ON CROSSWALK AND RAMP LOCATION
2. THE RAMP SHALL BE CONSTRUCTED OF CLASS "A" CONCRETE. STEP-SAFE® TRANSPO INDUSTRIES TILE OR ENGINEERS APPROVED EQUIVALENT SHALL BE INSTALLED PER MANUFACTURER'S SPECIFICATIONS.
3. THE NORMAL GUTTER LINE SHOULD BE MAINTAINED THROUGH THE RAMP.
4. RAMPS SHOULD BE LOCATED WITHIN MARKED LIMITS OF CROSSWALKS.

SHEET NOTES:

- ① MAXIMUM RAMP SLOPE 1":1'.
- ② 1/2" EXPANSION JOINT AT BACK OF CURBLINE AND SIDEWALK LINE.
- ③ NO BUMP PERMITTED.
- ④ SLOPE VARIES UNIFORMLY TO A MAXIMUM OF 1":1' AT GUTTER LINE.

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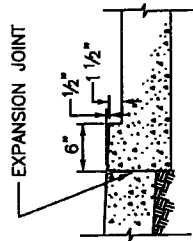
DIVISION OF ENGINEERING

SIDEWALK RAMP
TYPE 3

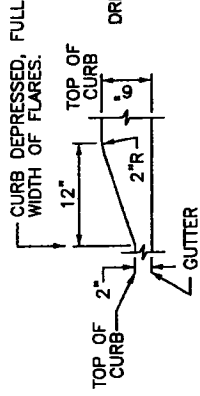
STANDARD DRAWING NO. 306
 APPROVED BY *[Signature]* DATE 5/1/09
 DRAWN BY *[Signature]* DATE 5/1/09
 CHECKED BY *[Signature]* DATE 5/1/09

MAXIMUM ALLOWABLE APRON AND DRIVEWAY WIDTHS

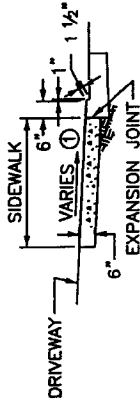
| CLASSIFICATION | DRIVEWAY | APRON |
|-----------------------------|----------|-------|
| SINGLE RESIDENTIAL | 12' | 18' |
| DOUBLE OR JOINT RESIDENTIAL | 20' | 26' |



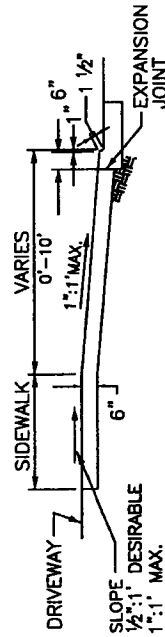
SECTION A-A



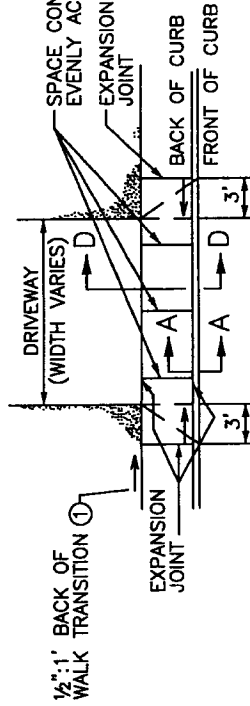
SECTION B-B



SECTION D-D

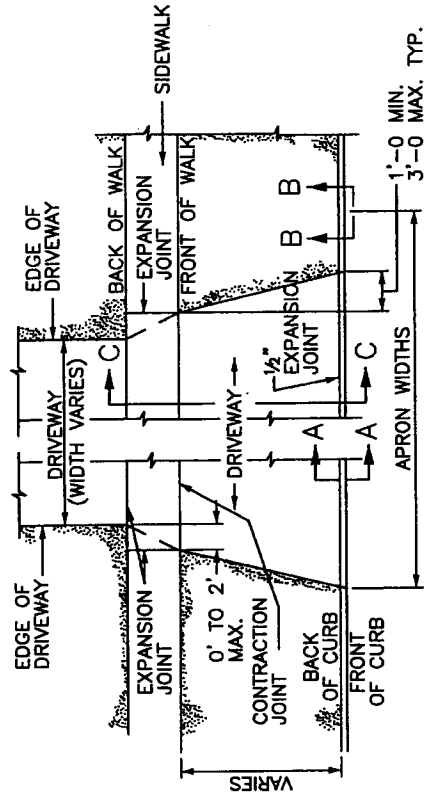


SECTION C-C



ENTRANCE WITHOUT UTILITY STRIP

STREET WITH PARKING LANE



ENTRANCE WITH UTILITY STRIP

NOTES:

1. DROP BACK OF SIDEWALK GRADE 1 1/2" OVER 3' TO PROVIDE A MAXIMUM SLOPE OF 1":1.
2. PROVIDE A SAWED JOINT ALONG CENTER LINE OF APRON.
3. MAXIMUM DROP AT BACK OF SIDEWALK SHALL NOT EXCEED 1 1/2".
4. MAXIMUM CROSS SLOPE ON SIDEWALK SHALL NOT EXCEED 1":1 (8.3%).
5. MAXIMUM SLOPE ON APRON SHALL NOT EXCEED 1":1 (8.3%).
6. ENTIRE APRON FROM BACK OF CURB TO BACK OF SIDEWALK SHALL BE CONSTRUCTED WITH A SINGLE POUR.

NOTE: FOR USE WITH 6" HEADER CURB OR 6" CURB AND GUTTER

| UTILITY STRIP WIDTH | DROP BACK OF 4' SIDEWALK | SIDEWALK SLOPE | SLOPE ON APRON |
|---------------------|--------------------------|----------------|----------------|
| 0' | 1 1/2" | 7.29% | N/A |
| 2' | 1 1/2" | 5.21% | 8.33% |
| 4' | 1 1/2" | 3.12% | 8.33% |
| 5' | 1 1/2" | 2.08% | 8.33% |
| 6' | 0" | 2.08% | 8.33% |
| 10' | 0" | 2.08% | 7.50% |

| UTILITY STRIP WIDTH | DROP BACK OF 4' SIDEWALK | SIDEWALK SLOPE | SLOPE ON APRON |
|---------------------|--------------------------|----------------|----------------|
| 0' | 1 1/2" | 7.29% | N/A |
| 2' | 1 1/2" | 4.17% | 8.33% |
| 3' | 1 1/2" | 2.60% | 8.33% |
| 4' | 0" | 2.08% | 8.33% |
| 6' | 0" | 2.08% | 7.84% |
| 8' | 0" | 2.08% | 6.25% |
| 10' | 0" | 2.08% | 5.42% |

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DIVISION OF ENGINEERING

RESIDENTIAL ENTRANCE DETAILS

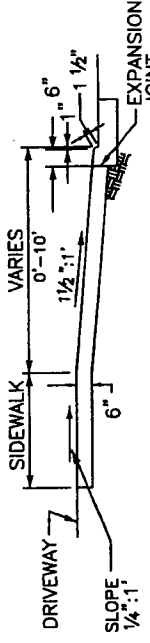
STANDARD DRAWING NO. 307

APPROVED: *[Signature]* DATE: 5/1/08

URBAN COUNTY ENGINEER

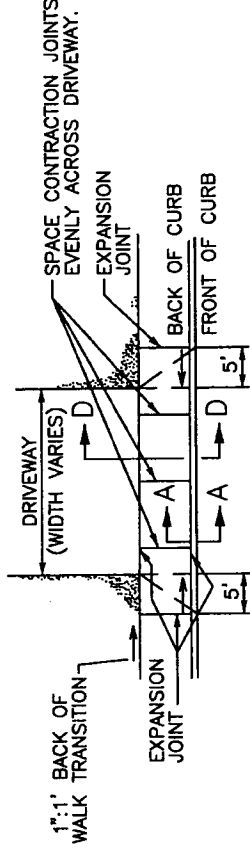
MAXIMUM ALLOWABLE APRON AND DRIVEWAY WIDTHS

| CLASSIFICATION | DRIVEWAY | STANDARD APRON | ALTERNATE APRON |
|--------------------|----------|---------------------------------|-------------------------------|
| NON-RESIDENTIAL | 30' | 5' STRAIGHT FLARE=40' CURB CUT | 10' RADIAL FLARE=80' CURB CUT |
| COMMERCIAL LOADING | 30' | 15' STRAIGHT FLARE=60' CURB CUT | 20' RADIAL FLARE=70' CURB CUT |
| INDUSTRIAL | 40' | 20' STRAIGHT FLARE=80' CURB CUT | 25' RADIAL FLARE=90' CURB CUT |



SECTION C-C

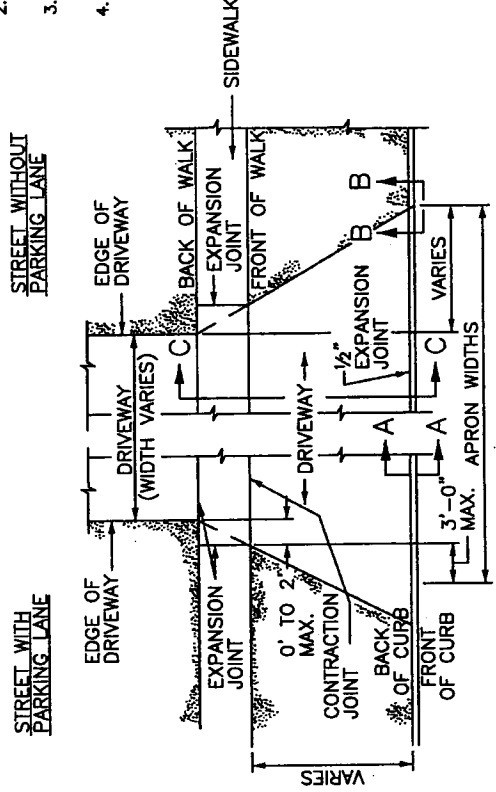
FRONT OF SIDEWALK ELEVATION DETERMINED BY ADDING 1/2" : 1" ACROSS UTILITY STRIP FROM TOP OF CURB. IF COMING OFF 1 1/2" LIP ADD ANOTHER 4 1/2" TO DETERMINE ELEVATION AT FRONT OF SIDEWALK.



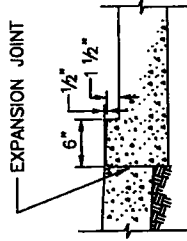
ENTRANCE WITHOUT UTILITY STRIP

NOTES:

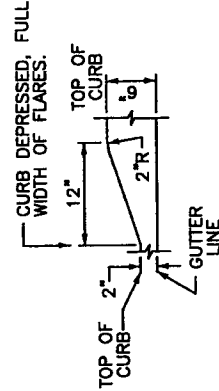
1. PROVIDE A SAWED JOINT ALONG CENTER LINE OF APRON.
2. MAXIMUM CROSS SLOPE ON SIDEWALK SHALL NOT EXCEED 1/4" : 1'.
3. MAXIMUM SLOPE ON APRON SHALL NOT EXCEED 1 1/2" : 1'.
4. NO CATCH BASINS WILL BE PUT IN APRONS.



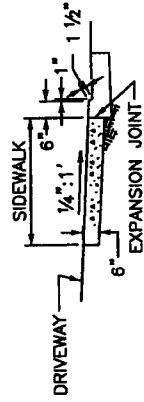
ENTRANCE WITH UTILITY STRIP



SECTION A-A



SECTION B-B



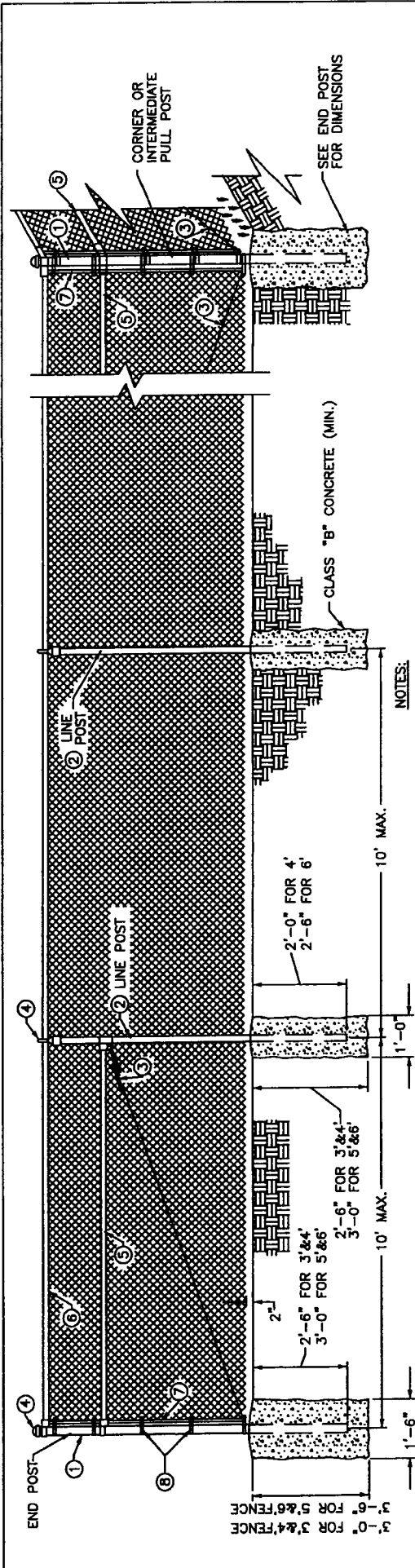
SECTION D-D

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DIVISION OF ENGINEERING

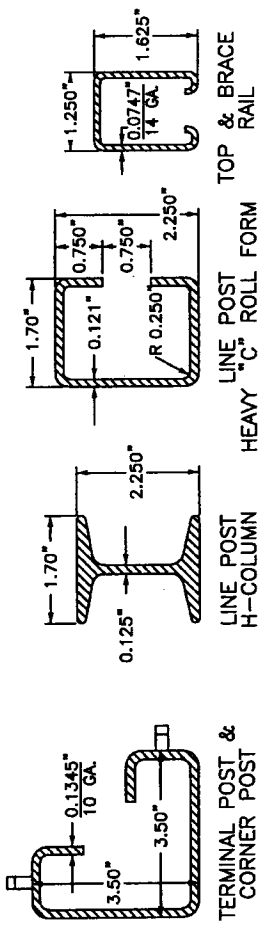
COMMERCIAL ENTRANCE DETAILS

STANDARD DRAWING NO. 307-1
 APPROVED BY _____ DATE 5/1/02
 DRAWN BY _____ DATE 5/1/02
 CHECKED BY _____ DATE _____
 COMMISSIONER



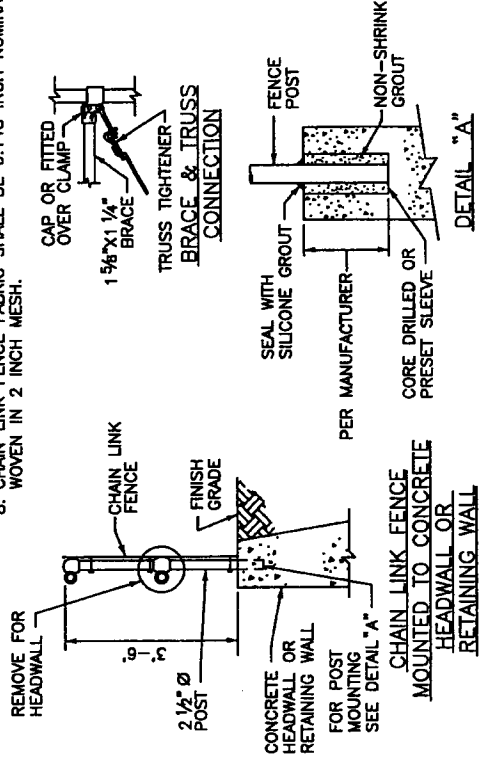
NOTES:

1. ALL POSTS SHALL BE SET IN CONCRETE TO THE DIMENSIONS AS INDICATED ON THIS DRAWING.
2. 3' HIGH FENCE SHALL HAVE 3" FABRIC HEIGHT. 4' HIGH FENCE SHALL HAVE 4" FABRIC HEIGHT. 5' HIGH FENCE SHALL HAVE 5" FABRIC HEIGHT. 6' HIGH FENCE SHALL HAVE 6" FABRIC HEIGHT.
3. BRACE BANDS SHALL BE 7/8" X 1/8" GALVANIZED STEEL 5/16" X 1 1/4" CARRIAGE BOLT.
4. POST CAPS AND SOCKET TYPE BRACE END CONNECTIONS SHALL BE GALVANIZED MALLEABLE IRON OR OTHER TYPE AS APPROVED BY THE ENGINEER. THEY SHALL BE DESIGNED IN A MANNER TO EXCLUDE MOISTURE FROM INSIDE POSTS AND RAILS.
5. O.D. DEPICTED FOR TUBULAR POSTS IS NOMINAL—ASTM A-120 SHALL GOVERN.
6. STRUCTURAL SHAPES SHALL CONFORM TO STD. SPEC. 816.07.01 EXCEPT YIELD SHALL BE A MIN. 45,000 P.S.I.
7. INDISCRIMINATE MIXING OF POSTS WILL NOT BE PERMITTED.
8. CHAIN LINK FENCE FABRIC SHALL BE 0.148 INCH NOMINAL DIAMETER (NO. 9 GAGE) WIRE WOVEN IN 2 INCH MESH.



LEGEND—(ALTERNATES)

| | TUBULAR | ROLL FORMED |
|---|---------------------------------|--|
| ① | 2 1/2" O.D. • 3.65#/L.F. | 3.5" X 3.5" • 5.14#/L.F. |
| ② | 2" O.D. • 2.72#/L.F. | 2.250" H-COL • 3.26#/L.F. OR 2.250" C-COL • 2.64#/L.F. |
| ③ | 3/8" Ø TRUSS ROD & TIGHTENER | 0.375" Ø TRUSS ROD & TIGHTENER |
| ④ | APPROVED CAPS | NOT REQUIRED |
| ⑤ | 1 5/8" BRACE • 2.27#/L.F. | 1.250" X 1.625" • 1.35#/L.F. |
| ⑥ | 1 5/8" O.D. • 2.27#/L.F. | 1.250" X 1.625" • 1.35#/L.F. |
| ⑦ | 3/16" X 3/4" FLAT STRETCHER BAR | NOT REQUIRED |
| ⑧ | BRACE BAND & TENSION BAND | NOT REQUIRED |

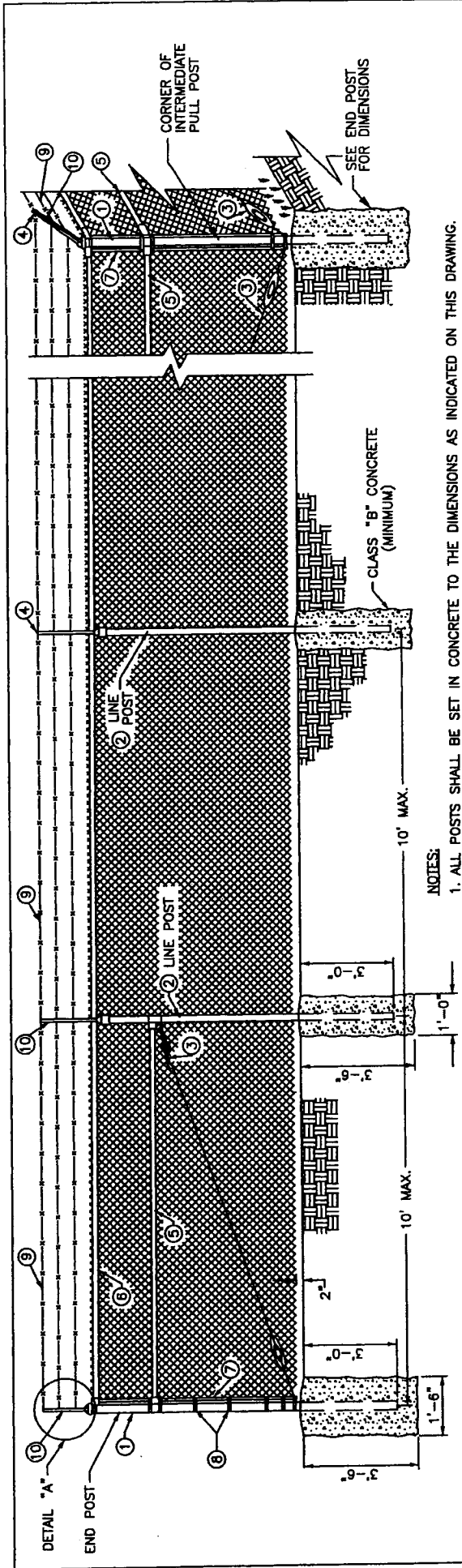


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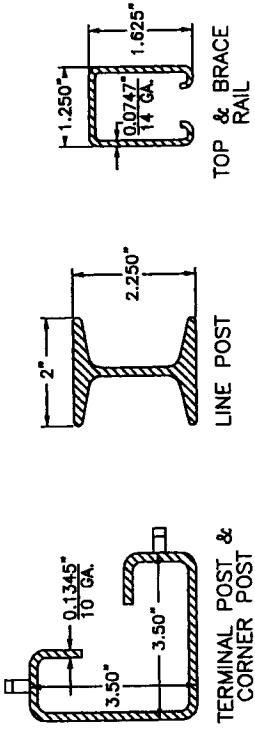
DIVISION OF ENGINEERING

CHAIN LINK FENCE
3'-6"

STANDARD DRAWING NO. 308
APPROVED BY: [Signature] DATE: 5/1/08
DRAWN BY: [Signature] DATE: 5/1/08
CHECKED BY: [Signature] DATE: 5/1/08
COMMISSIONER



- NOTES:**
1. ALL POSTS SHALL BE SET IN CONCRETE TO THE DIMENSIONS AS INDICATED ON THIS DRAWING.
 2. A 1 5/8" O.D. AT 2.27 LB. PER L.F. OR 1 1/4" X 1 5/8" ROLL FORMED SECTION AT 1.35 LB. PER L.F. BOTTOM RAIL SHALL BE REQUIRED AROUND ALL UTILITY INSTALLATIONS AND AT OTHER LOCATIONS DESIGNATED BY THE ENGINEER.
 3. 8' HIGH FENCE SHALL HAVE 7" FABRIC HEIGHT. 9' HIGH FENCE SHALL HAVE 8' FABRIC HEIGHT. 10' HIGH FENCE SHALL HAVE 9' FABRIC HEIGHT. 11' HIGH FENCE SHALL HAVE 10' FABRIC HEIGHT. 12' HIGH FENCE SHALL HAVE 11' FABRIC HEIGHT.
 4. BRACE BAND SHALL BE 7/8" X 1/8" GALVANIZED STEEL WITH 5/16" X 1 1/4" CARRIAGE BOLTS. POST CAPS AND SOCKET TYPE BRACE END CONNECTION SHALL BE GALVANIZED MALLEABLE IRON OR OTHER TYPE AS APPROVED BY THE ENGINEER. THEY SHALL BE DESIGNED IN A MANNER TO EXCLUDE MOISTURE FROM INSIDE POSTS AND RAILS.
 5. O.D. DEPICTED FOR TUBULAR POSTS IS NOMINAL - ASTM A-120 SHALL GOVERN.
 6. CHAIN LINK FENCE FABRIC SHALL BE 0.148 INCH NOMINAL DIAMETER (NO.9 GAGE) WIRE WOVEN IN 2 INCH MESH.

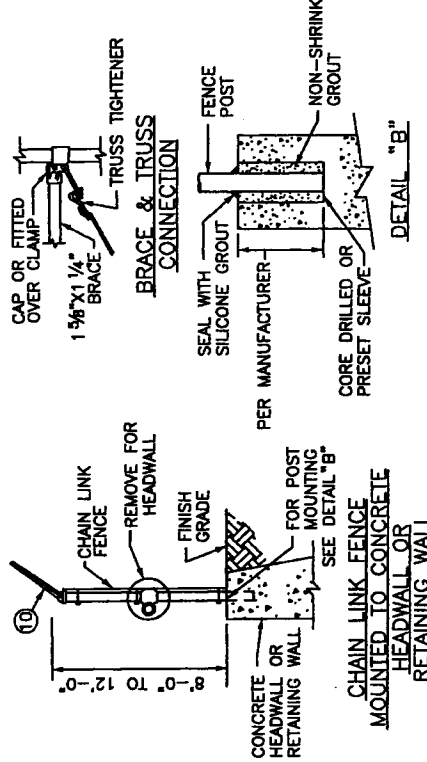


LEGEND - (ALTERNATES)

| | TUBULAR | ROLL FORMED |
|---|---------------------------------|--|
| ① | 2 1/2" O.D. • 3.65#/L.F. | 3.5" X 3.5" • 5.14#/L.F. |
| ② | 2" O.D. • 2.72#/L.F. | 2.250" H-COL. • 3.26#/L.F. OR 2.250" C-COL. • 2.64#/L.F. |
| ③ | 3/8" Ø TRUSS ROD & TIGHTENER | 0.375" Ø TRUSS ROD & TIGHTENER |
| ④ | APPROVED CAPS | NOT REQUIRED |
| ⑤ | 1 5/8" BRACE • 2.27#/L.F. | 1.250" X 1.625" • 1.35#/L.F. |
| ⑥ | 1 5/8" O.D. • 2.27#/L.F. | 1.250" X 1.625" • 1.35#/L.F. |
| ⑦ | 3/16" X 3/4" FLAT STRETCHER BAR | NOT REQUIRED |
| ⑧ | BRACE BAND & TENSION BAND | NOT REQUIRED |
| ⑨ | BARBED WIRE | BARBED WIRE |
| ⑩ | BARBED WIRE ARMS | BARBED WIRE ARMS |



DETAIL "A"
ROLL FORMED

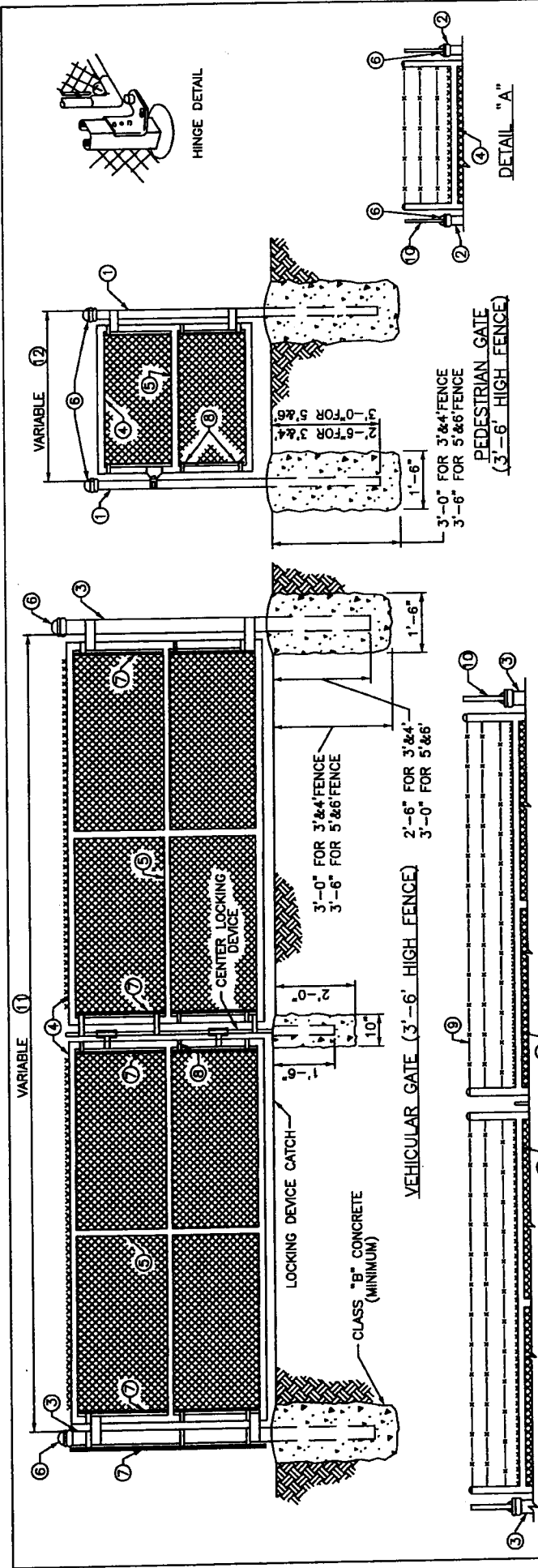


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DIVISION OF ENGINEERING

CHAIN LINK FENCE
8' - 12'

STANDARD DRAWING NO. 309
APPROVED BY: *[Signature]* 5/1/00
UNIVERSITY OF KY. COUNTY COMMISSIONER



NOTES:

1. ALL POSTS SHALL BE SET IN CONCRETE TO THE DIMENSIONS AS INDICATED ON THIS DRAWING.
2. VEHICULAR AND PEDESTRIAN GATES SHALL HAVE HEAVY PRESSED STEEL CORNERS SECURELY RIVETED OR SHALL BE MACHINE NOTCHED AND ELECTRICALLY WELDED, SO AS TO BE RIGID AND WATER TIGHT; AND EQUIPPED WITH PADLOCKING DEVICE AND GROUND STOP.
3. ALL WELDED JOINTS SHALL BE CLEANED AND PAINTED WITH TWO (2) COATS OF ALUMINUM PAINT.
4. 3' HIGH GATES SHALL HAVE 3' FABRIC HEIGHT. 4' HIGH GATES SHALL HAVE 4' FABRIC HEIGHT. 5' HIGH GATES SHALL HAVE 5' FABRIC HEIGHT. 6' HIGH GATES SHALL HAVE 6' FABRIC HEIGHT. 8' HIGH GATES SHALL HAVE 7' FABRIC HEIGHT. 9' HIGH GATES SHALL HAVE 8' FABRIC HEIGHT. 10' HIGH GATES SHALL HAVE 9' FABRIC HEIGHT. 11' HIGH GATES SHALL HAVE 10' FABRIC HEIGHT. 12' HIGH GATES SHALL HAVE 11' FABRIC HEIGHT.
5. SEE DETAIL "A" FOR BARBED WIRE INSTALLATION ON 8' TO 12' HIGH PEDESTRIAN GATES.
6. SEE DETAIL "B" FOR BARBED WIRE INSTALLATION ON 8' TO 12' HIGH VEHICULAR GATES.
7. THE CONTRACTOR IS NOT TO ORDER GATES UNTIL THEIR NECESSITY AND LOCATION HAVE BEEN CERTIFIED BY THE ENGINEER.
8. O.D. DEPICTED FOR TUBULAR POSTS IS NOMINAL - ASTM A-120 SHALL GOVERN.
9. CHAIN LINK FENCE FABRIC SHALL BE 0.148 INCH NOMINAL DIAMETER (NO.9 GAGE) WIRE WOVEN 2 INCH MESH.

LEGEND - (ALTERNATES)

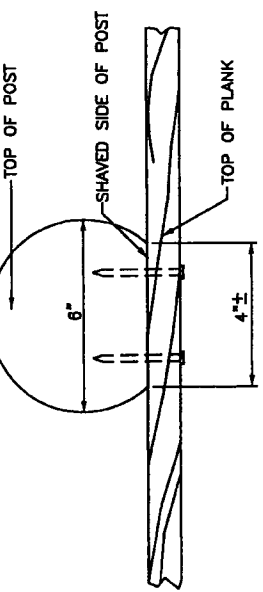
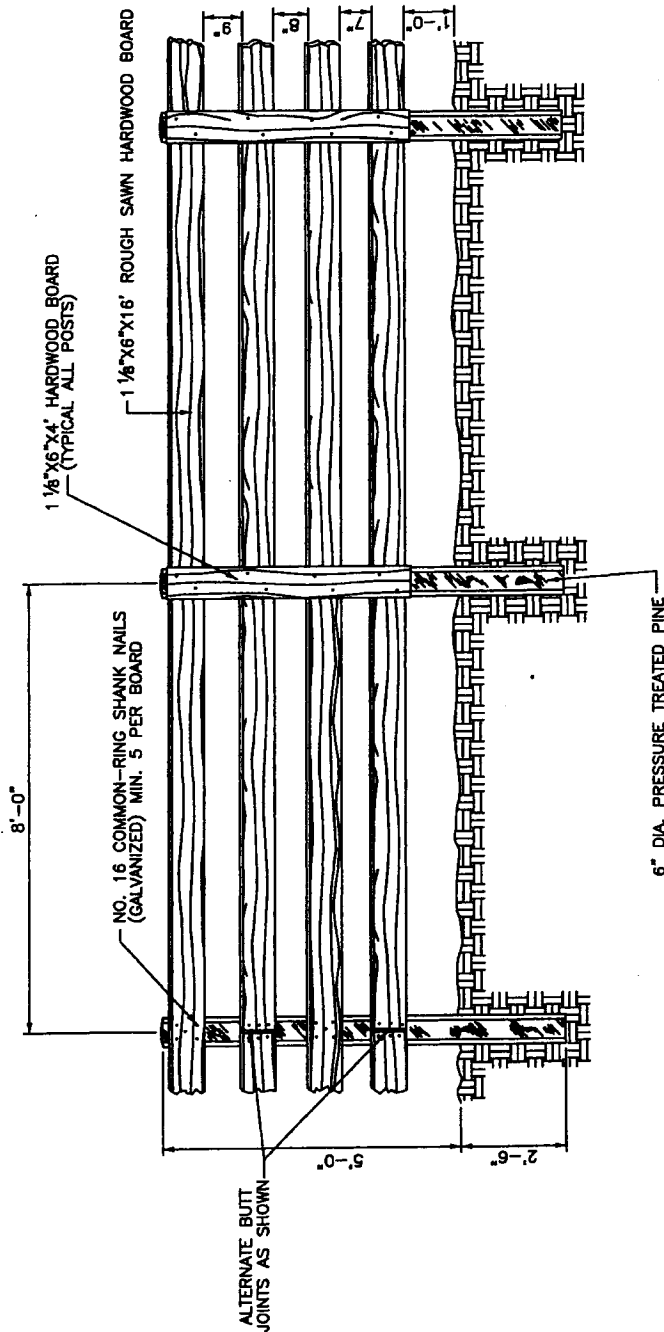
| | TUBULAR | ROLL FORMED |
|---|-----------------------------------|------------------------------|
| ① | END POST 2 1/2" O.D. • 3.65#/L.F. | 3 1/2" X 3 1/2" • 5.14#/L.F. |
| ② | END POST 3" O.D. • 3.65#/L.F. | 3 1/2" X 3 1/2" • 5.14#/L.F. |
| ③ | 4" O.D. • 9.1#/L.F. GATE POST | NO ALTERNATE |
| ④ | 2" O.D. • 2.72#/L.F. GATE FRAME | NO ALTERNATE |
| ⑤ | 1 5/8" O.D. • 2.27#/L.F. | NO ALTERNATE |
| ⑥ | APPROVED CAPS | NOT REQUIRED |
| ⑦ | 3/16" X 5/8" FLAT STRETCHER BAR | NOT REQUIRED |
| ⑧ | BRACE BAND & TENSION BAND | NOT REQUIRED |
| ⑨ | BARBED WIRE | BARBED WIRE |
| ⑩ | BARBED WIRE ARMS | BARBED WIRE ARMS |

| NO. | DATE | REVISION DESCRIPTION | BY |
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DIVISION OF ENGINEERING

CHAIN LINK GATE

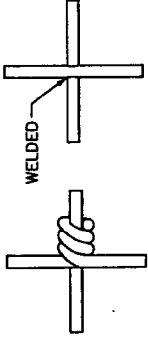
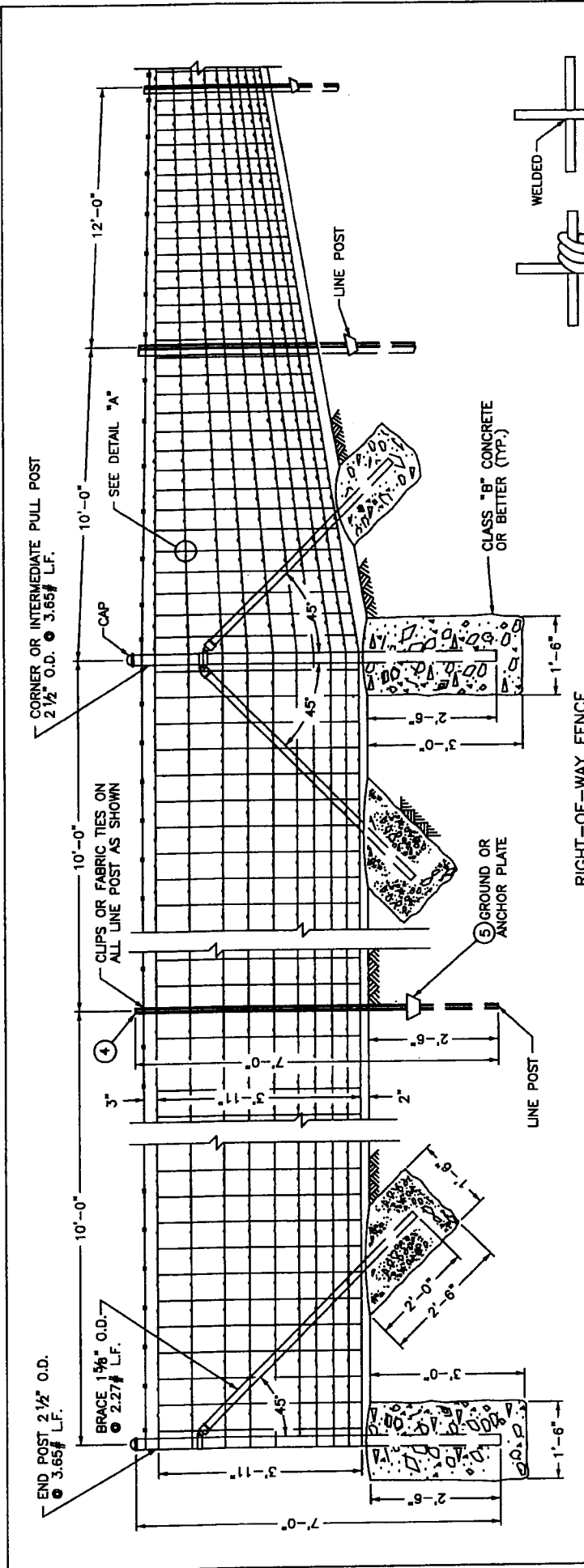
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| STANDARD DRAWING NO. | 310 |
| APPROVAL | <i>[Signature]</i> 5/1/68 |
| DESIGNED BY | <i>[Signature]</i> |
| CHECKED BY | <i>[Signature]</i> |
| DATE | 5/1/68 |



NOTES:

1. POSTS ARE TO BE DRIVEN 2'-6" INTO GROUND AND TOPS CUT AT AN ANGLE TO DRAIN WATER.
2. FENCE SHALL BE PAINTED BLACK OR WHITE WITH PAINT AND APPLICATION RATE AS APPROVED BY THE ENGINEER.
3. HARDWOODS APPROVED ARE RED OAK, WHITE OAK, AND POPLAR.

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| DIVISION OF ENGINEERING | | | |
| PLANK FENCE | | | |
| STANDARD DRAWING NO. 311 | | | |
| APPROVED BY: <i>[Signature]</i> | | | 5/1/08 |
| DATE: 5/1/08 | | | |
| DRAWN BY: <i>[Signature]</i> | | | |
| CHECKED BY: <i>[Signature]</i> | | | |
| COMMISSIONER | | | |



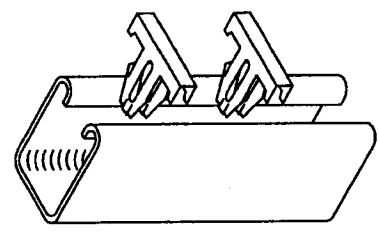
ALTERNATE METHODS OF SECURING VERTICAL STAY WIRE TO THE HORIZONTAL WIRE OF THE FABRIC.

DETAIL "A"

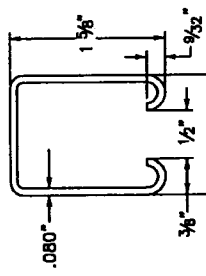
RIGHT-OF-WAY FENCE

NOTES:

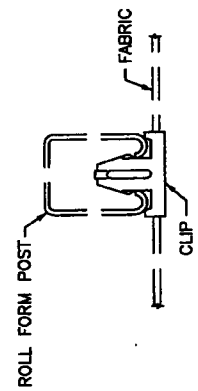
1. WOVEN-WIRE USED FABRIC IN RIGHT-OF-WAY FENCE SHALL BE EITHER ALUMINUM-COATED STEEL NO. 1047-6-9 OR ZINC-COATED STEEL NO. 1047-6-9.
2. ALL FENCE FITTINGS SHALL COMPLY WITH ASTM F 626.
3. O.D. DEPICTED FOR TUBULAR POSTS IS NOMINAL - ASTM F 1083 SHALL GOVERN.
- ④ STUDDED "T" POST AT 1.33 LBS. PER FOOT. - OR -
- ⑤ ROLL FORM POST AT 1.35 LBS. PER FOOT. (SEE DETAIL) NOT REQUIRED FOR ROLL FORM POST.



ISOMETRIC EXPLODED VIEW OF ROLL FORM POST AND CLIPS
CLIPS SHALL BE SPRING STEEL ALUMINUM - FINISHED

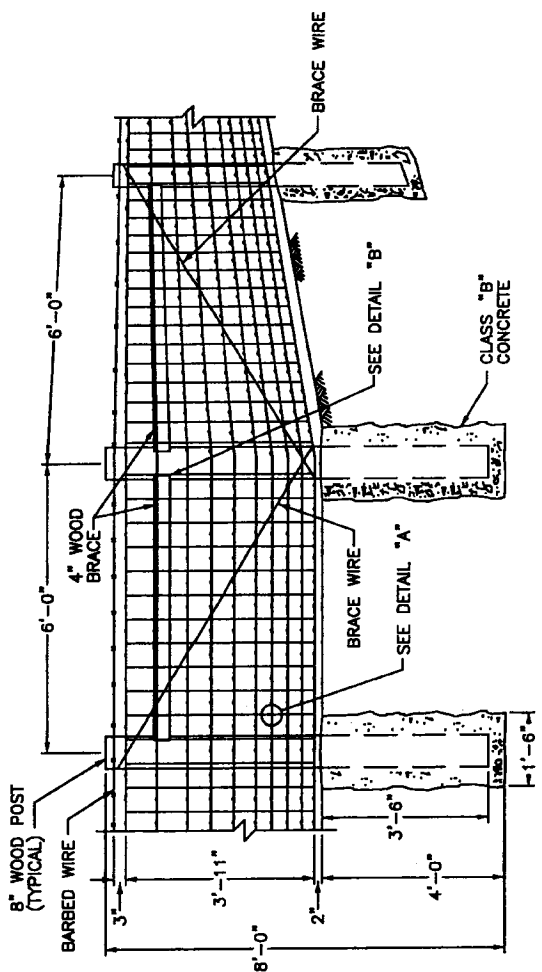


PLAN VIEW OF ROLL FORM POST

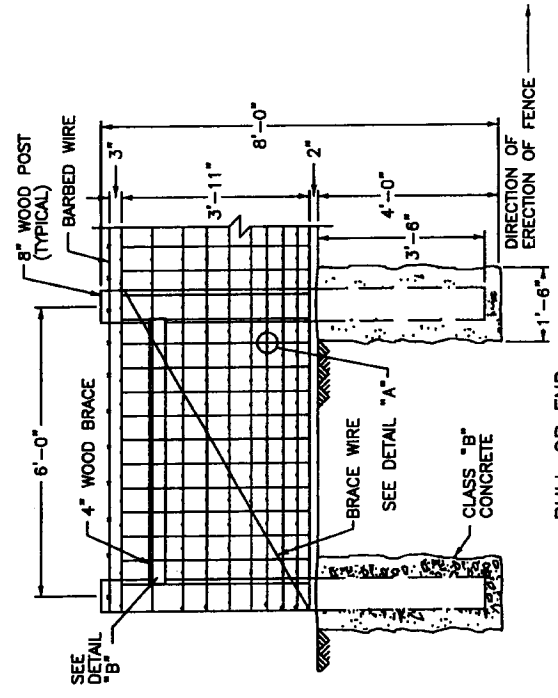


PLAN VIEW OF CLIP INSTALLED IN ROLL FORM POST

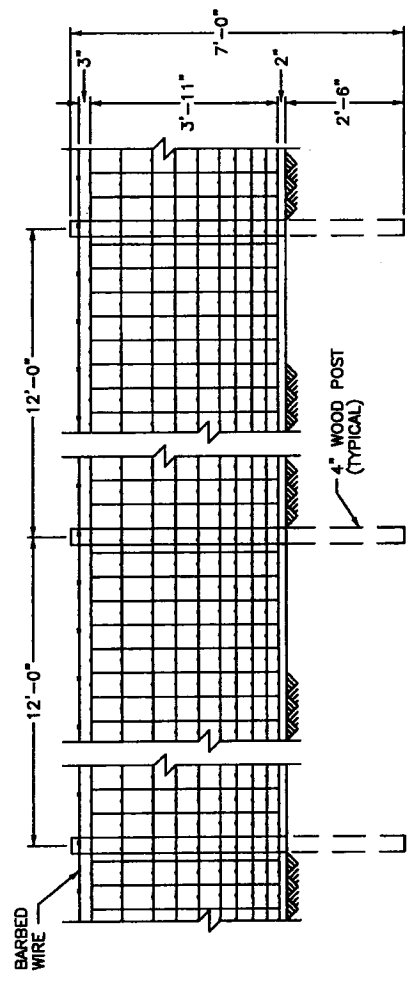
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| DIVISION OF ENGINEERING | | | |
| WOVEN WIRE RIGHT-OF-WAY FENCE TYPE 1 | | | |
| STANDARD DRAWING NO. | 312 | | |
| APPROVED BY | <i>[Signature]</i> | DATE | 5/11/68 |
| DESIGNED BY | <i>[Signature]</i> | CHECKED BY | <i>[Signature]</i> |
| COMMISSIONER | | DATE | |



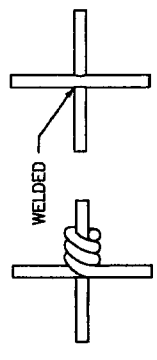
CORNER POST ASSEMBLY



PULL OR END POST ASSEMBLY

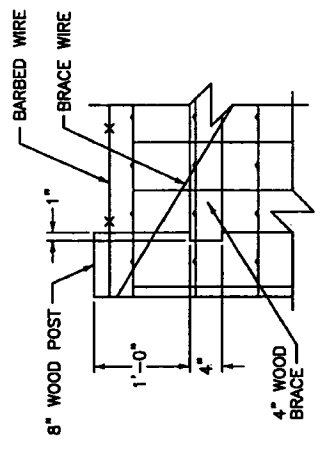


LINE POST



ALTERNATE METHODS OF SECURING VERTICAL STAY WIRE TO THE HORIZONTAL WIRE OF THE FABRIC.

DETAIL "A"



DETAIL "B"

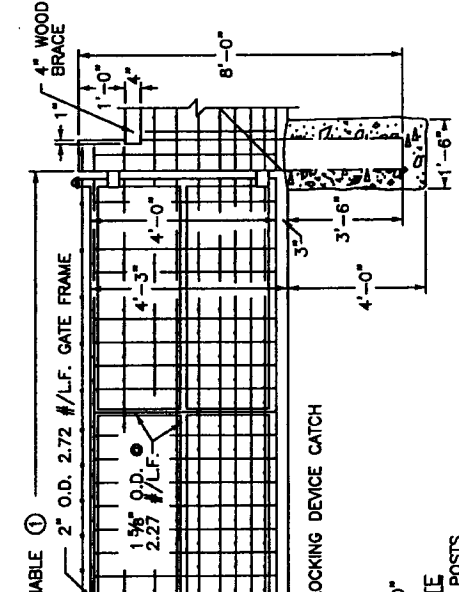
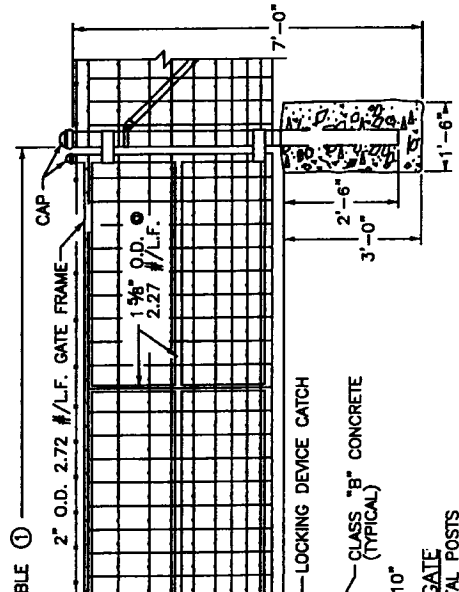
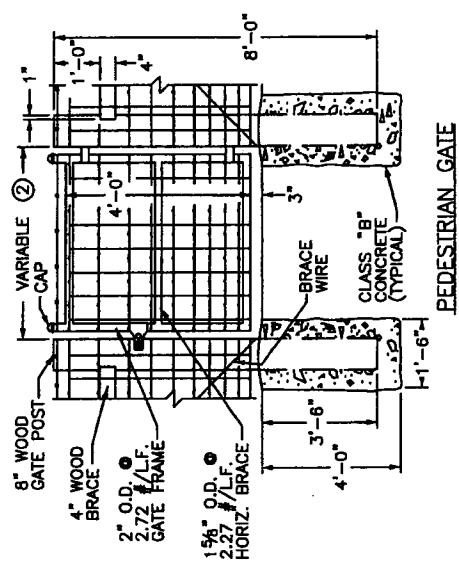
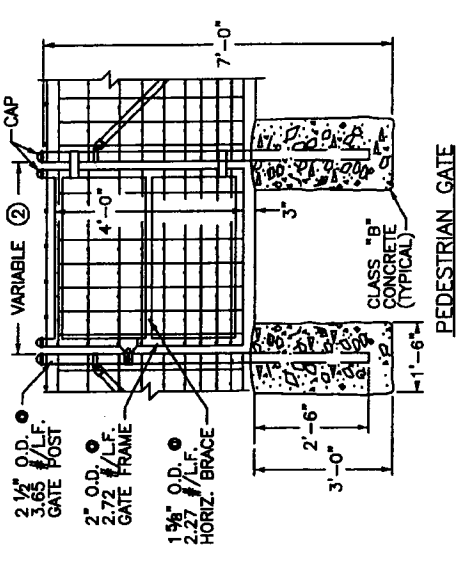
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DIVISION OF ENGINEERING

WOVEN WIRE
RIGHT-OF-WAY FENCE
TYPE 2

| | |
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| STANDARD DRAWING NO. | 313 |
| APPROVED | <i>[Signature]</i> |
| DATE | 5/1/68 |
| DESIGNED BY | <i>[Signature]</i> |
| DATE | 5/1/68 |
| CHECKED BY | <i>[Signature]</i> |
| DATE | 5/1/68 |
| COMMISSIONER | <i>[Signature]</i> |

- NOTES:**
1. ON INTERMEDIATE PULL POST ASSEMBLIES, BRACE WIRES SHALL BE REQUIRED FOR BOTH DIRECTIONS.
 2. WOVEN-WIRE FABRIC USED IN RIGHT-OF-WAY FENCE SHALL BE EITHER ALUMINUM-COATED STEEL NO. 1047-6-8 OR ZINC-COATED STEEL NO. 1047-6-9.



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| DIVISION OF ENGINEERING | | | |
| WOVEN WIRE GATES | | | |
| STANDARD DRAWING NO. | | | 314 |
| APPROVED | | | 5/11/07 |
| DRAWN BY | | | |
| CHECKED BY | | | |
| DATE | | | |

GENERAL:

① 6' to 13' WIDTH FOR SINGLE GATE AND 12' TO 26' WIDTH FOR DOUBLE GATE.

② 4' TO 6' WIDTH

CONSTRUCTION REQUIREMENTS:

FABRIC TIE WIRES SHALL BE SPACED 12 INCHES ON CENTERS. THE CONTRACTOR IS NOT TO ORDER GATES UNTIL THEIR NECESSITY AND LOCATION HAVE BEEN CERTIFIED BY THE ENGINEER.

NOTES:

BASIS OF PAYMENT:

THE CONTRACT UNIT PRICE FOR WOVEN WIRE GATES SHALL BE:

- ① FEET WIDE SINGLE VEHICULAR WOVEN WIRE GATE
- ② FEET WIDE DOUBLE VEHICULAR WOVEN WIRE GATE
- ③ FEET WIDE PEDESTRIAN WOVEN WIRE GATE

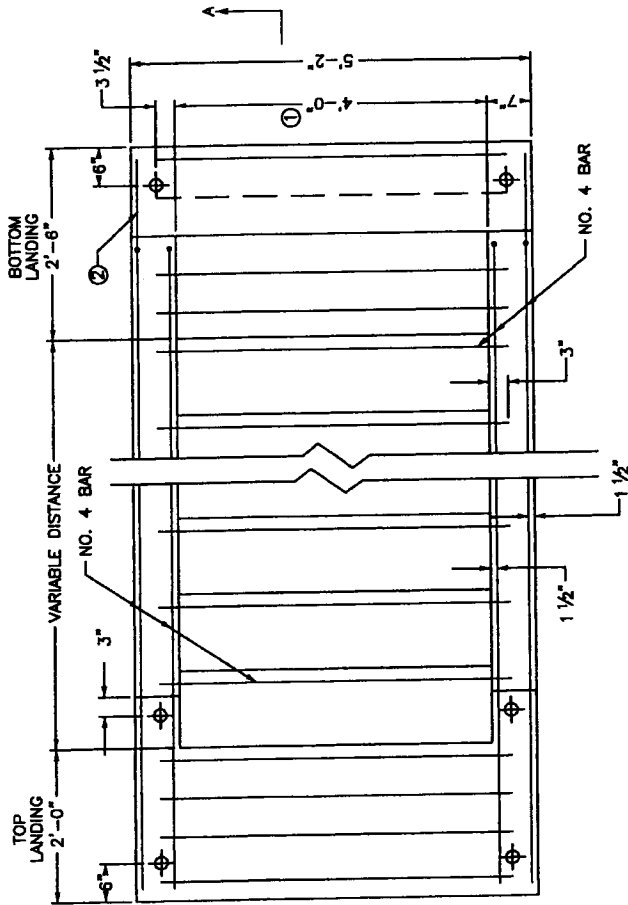
① - ② AS SHOWN ON PLANS

MATERIALS:

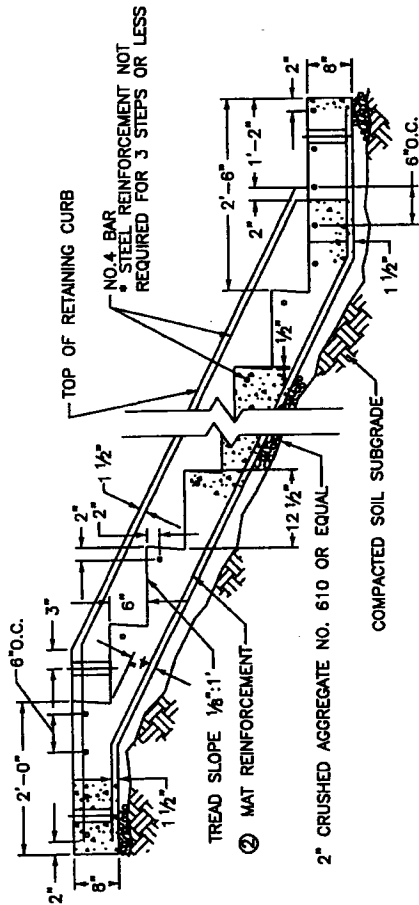
WOVEN-WIRE FABRIC USED IN THE GATES SHALL EITHER BE ALUMINUM-COATED STEEL NO. 1047-6-9 OR ZINC-COATED STEEL NO. 1047-8-9.

O.D. DEPICTED FOR TUBULAR POSTS IS NOMINAL - ASTM F 1083 SHALL GOVERN.

GATES SHALL HAVE HEAVY PRESSED STEEL CORNERS SECURELY RIVETED OR SHALL BE MACHINE NOTCHED AND ELECTRICALLY WELDED SO AS TO BE RIGID AND WATER TIGHT. ALL WELDED JOINTS SHALL BE CLEANED AND PAINTED WITH TWO (2) COATS OF ALUMINUM PAINT.



PLAN



SECTION A-A 2:1 SLOPE

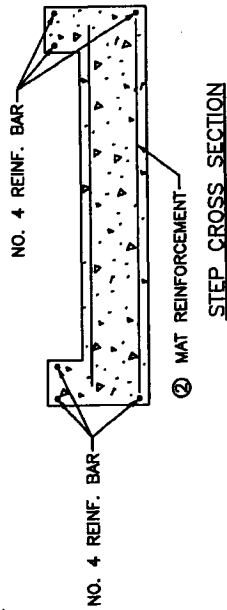
NOTES:

1. MAT REINFORCEMENT ②
- NO. 4 REINFORCEMENT BARS, LONG BARS 6" O.C. AND TRANSV. BARS 12" O.C., MIN. GRADE 40, OR WELDED WIRE FABRIC-6X6-W4XW4, 58 LBS./100 SQ. FT.
2. NO. 4 REINFORCEMENT BARS ADDITIONALLY AS SHOWN.
3. ROUND ALL EXPOSED EDGES AND CORNERS 1/4" R.
4. MAT REINFORCEMENT IN BOTTOM OF THE STEPS SHALL BE WIRE FABRIC OR BAR MAT ②.
5. HANDRAIL SHALL BE REQUIRED WITH THREE OR MORE STEPS.

TABLE OF QUANTITIES

| SLOPE | LOCATION | ADDITIONAL NO. 4 BAR REINF. (LBS) | | MAT REINFORCEMENT WIRE FABRIC(SQ.FT.) | | BAR MAT (LBS) | | CU. YDS. CLASS "A" CONCRETE | |
|---------|-------------------|-----------------------------------|-------|---------------------------------------|-------|---------------|-------|-----------------------------|-------|
| | | 4' WIDTH | ① | 4' WIDTH | ① | 4' WIDTH | ① | 4' WIDTH | ① |
| 2:1 | BOTTOM LANDING | 23,547 | 3,340 | 11,776 | 2,375 | 27,388 | 5,177 | 0.337 | 0.059 |
| | INTERMEDIATE STEP | 8,015 | 1,356 | 5,991 | 1,208 | 12,191 | 2,283 | 0.16 | 0.025 |
| | TOP LANDING | 22,483 | 3,340 | 9,504 | 1,917 | 20,708 | 3,897 | 0.285 | 0.051 |
| 1 1/2:1 | BOTTOM LANDING | 23,603 | 3,340 | 12,602 | 2,542 | 28,613 | 5,400 | 0.36 | 0.062 |
| | INTERMEDIATE STEP | 7,431 | 1,356 | 5,268 | 1,063 | 11,119 | 2,088 | 0.17 | 0.027 |
| | TOP LANDING | 22,545 | 3,340 | 9,710 | 1,958 | 21,014 | 3,952 | 0.281 | 0.054 |

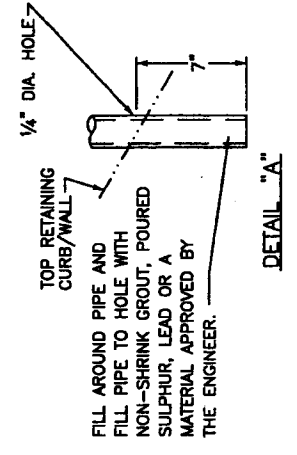
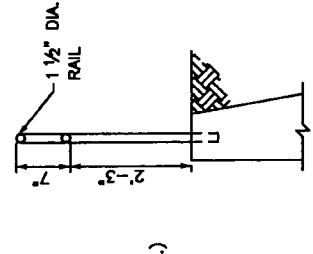
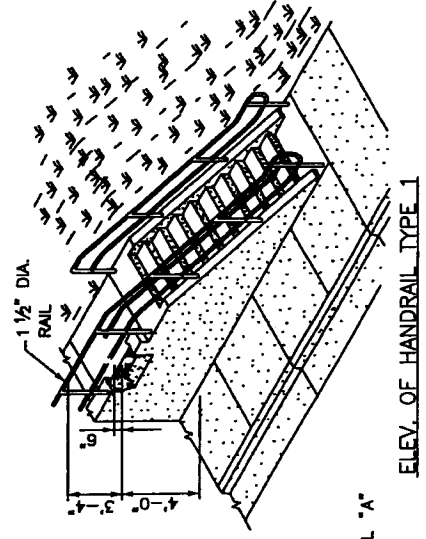
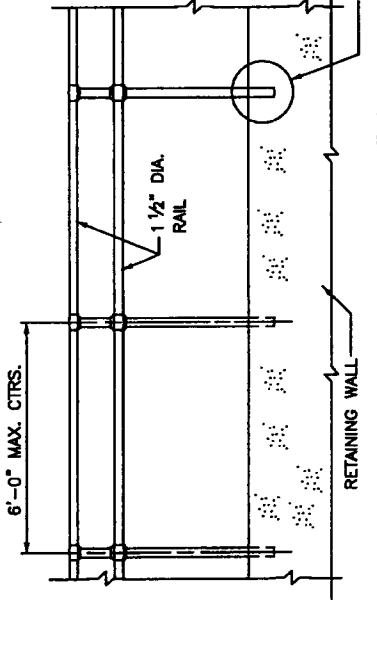
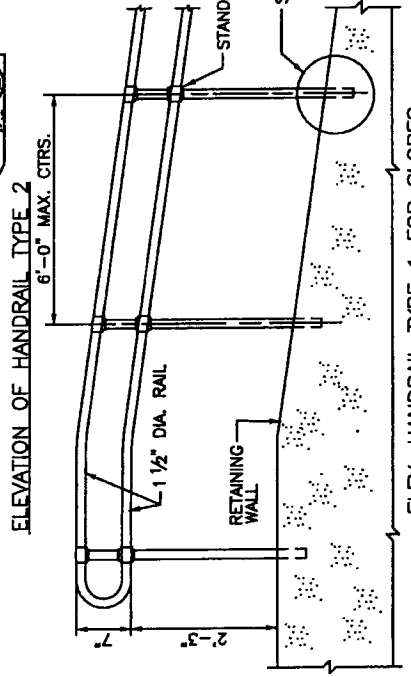
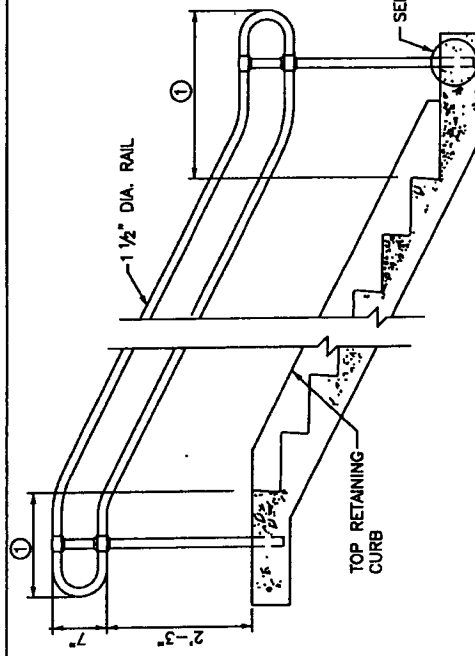
① APPROXIMATE QUANTITY TO ADD FOR EACH ADDITIONAL FOOT OF WIDTH OVER 4'-0".



STEP CROSS SECTION

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| DIVISION OF ENGINEERING | | | |
| CONCRETE STEPS | | | |
| STANDARD DRAWING NO. | | 315 | |
| APPROVED | | 5/1/08 | |
| DESIGNED BY | | | |
| CHECKED BY | | | |
| DATE | | | |

STEP DETAIL FOR 1 1/2:1 SLOPE



NOTES:

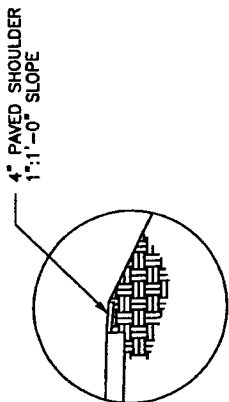
1. ALL HANDRAILS SHALL COMPLY WITH THE LATEST EDITION OF THE AMERICANS WITH DISABILITIES ACT (ADA) GUIDELINES.
2. ANCHOR POST IN CORED OR FORMED HOLES (SEE DETAIL "A").
3. HANDRAIL SHALL BE REQUIRED WITH THREE OR MORE STEPS.
4. HANDRAIL USED AS A TOP HANDRAIL ON STEPS AND HANDRAIL USED ON A RETAINING WALL SHALL BE REQUIRED WHEN THE ADJACENT FLOOR, GROUND LEVEL (ROAD, WALK, ETC.) IS 4" OR MORE BELOW THE TOP OF THE RETAINING WALL. HANDRAIL SHALL BE UNIFORMLY CONSTRUCTED.
5. THE TOP OF THE RETAINING WALL OR CURB SHALL BE A MINIMUM OF 6" ABOVE THE ADJOINING SIDEWALK.
6. RAILS SHALL NOT ROTATE IN FITTINGS AND SHALL HAVE WELDED CONNECTIONS.
7. THE CLEAR SPACE BETWEEN HANDRAILS AND WALL SHALL BE 1 1/2".
8. HANDRAILS SHOULD BE CONSTRUCTED OF DN 40 SCHEDULE 40 ALUMINUM PIPE IN ACCORDANCE WITH ASTM-B221 OR B210 ALLOY 6061-T6.

SHEET NOTE: ○

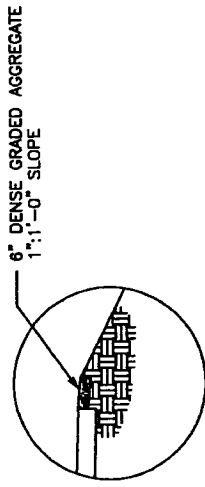
○ HANDRAILS SHALL EXTEND 12" BEYOND THE TOP RISER AND AT LEAST 12" PLUS THE WIDTH OF ONE TREAD BEYOND THE BOTTOM RISER. AT THE TOP, THE EXTENSION SHALL BE PARALLEL WITH THE FLOOR OR GROUND SURFACE. AT THE BOTTOM, THE HANDRAIL SHALL CONTINUE TO SLOPE FOR A DISTANCE OF THE WIDTH OF ONE TREAD FROM THE BOTTOM RISER, THE REMAINDER OF THE EXTENSION SHALL BE HORIZONTAL.

| NO. | DATE | REVISION DESCRIPTION | BY |
|-------------------------|--------------------|----------------------|--------|
| | | | |
| | | | |
| | | | |
| DIVISION OF ENGINEERING | | | |
| HANDRAIL | | | |
| STANDARD DRAWING NO. | 316 | | |
| APPROVED | <i>[Signature]</i> | DATE | 5/1/08 |
| DESIGNED | <i>[Signature]</i> | DATE | 5/1/08 |
| CHECKED | <i>[Signature]</i> | DATE | 5/1/08 |
| COMMISSIONER | <i>[Signature]</i> | DATE | 5/1/08 |

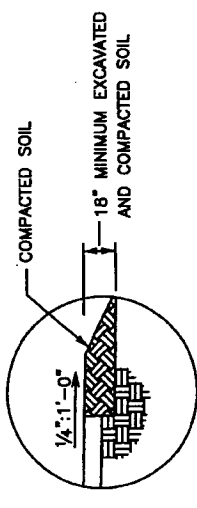
ELEVATION OF HANDRAIL TYPE 2



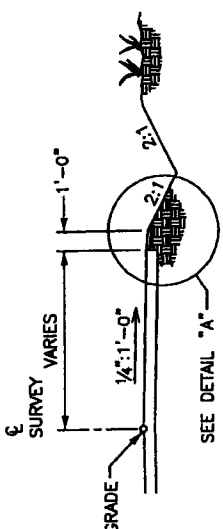
DETAIL "A"



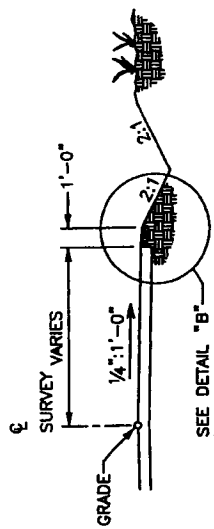
DETAIL "B"



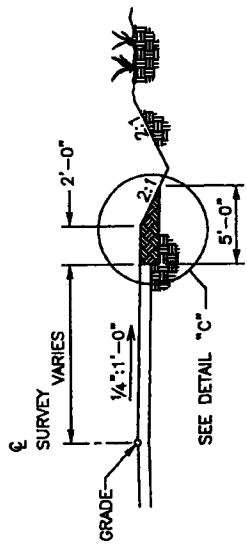
DETAIL "C"



PAVED SHOULDER



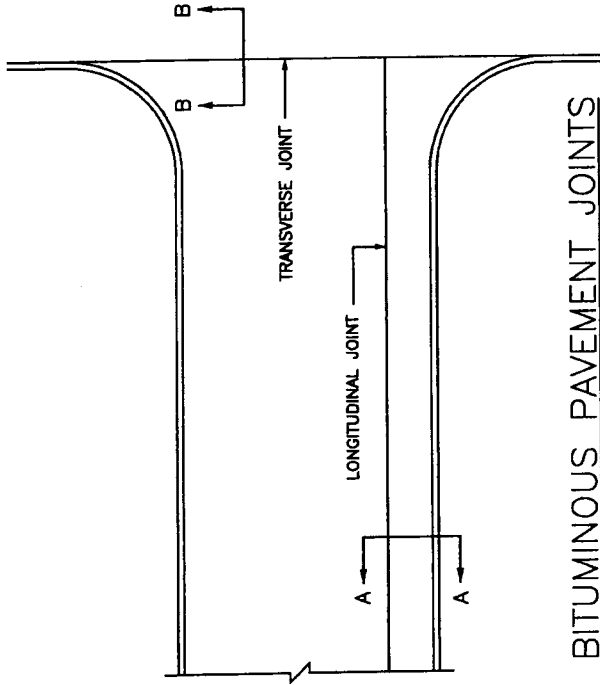
ROCK SHOULDER



SOIL SHOULDER

- NOTES:
1. SLOPES AND DRAINAGE DITCHES OUTSIDE THE R/W SHALL BE APPROVED BY THE ENGINEER.
 2. DRAINAGE DITCH SIDE SLOPES SHALL BE 2:1 MAXIMUM.

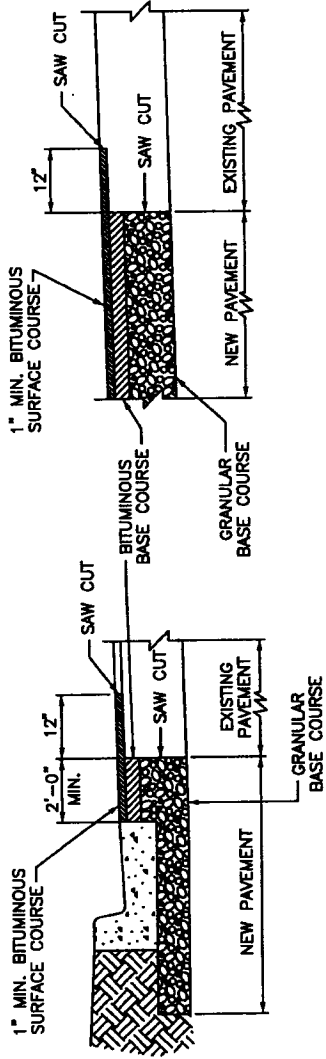
| NO. | DATE | REVISION DESCRIPTION | BY |
|---|--------|----------------------|----|
| | | | |
| | | | |
| | | | |
| DIVISION OF ENGINEERING | | | |
| COUNTY ROAD | | | |
| TYPICAL SHOULDER SECTIONS (MINIMUM REQUIREMENTS) | | | |
| STANDARD DRAWING NO. | 317 | | |
| APPROVED | | | |
| DATE | 5/1/02 | | |
| | | | |
| | | | |



BITUMINOUS PAVEMENT JOINTS

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.



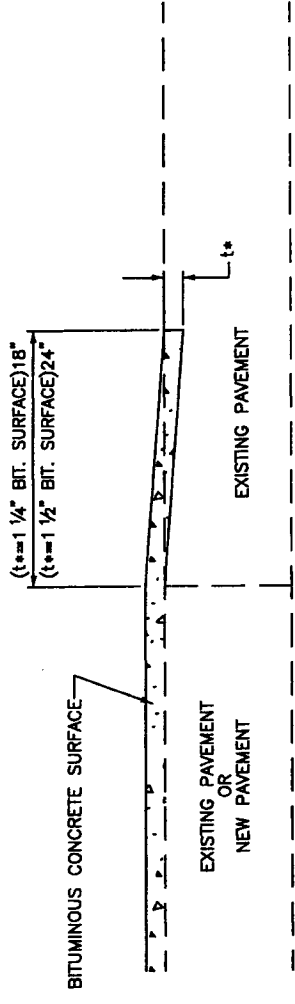
SECTION A-A

LONGITUDINAL EDGE KEY

SECTION B-B

TRANSVERSE EDGE KEY

| NO. | DATE | REVISION DESCRIPTION | BY |
|-------------------------|--------------------|----------------------|----|
| | | | |
| | | | |
| | | | |
| DIVISION OF ENGINEERING | | | |
| EDGE KEY | | | |
| STANDARD DRAWING NO. | 318 | | |
| APPROVED BY | <i>[Signature]</i> | 5/1/68 | |
| DESIGNED BY | <i>[Signature]</i> | | |
| CHECKED BY | <i>[Signature]</i> | | |
| DATE | | | |



EDGE KEY

| NO. | DATE | REVISION DESCRIPTION | BY |
|-----|------|----------------------|----|
| | | | |
| | | | |
| | | | |
| | | | |

DIVISION OF ENGINEERING

TYPICAL EDGE KEY
FOR
MINIMUM OVERLAYS,
SHORT PROJECTS,
LOW SPEED

STANDARD DRAWING NO. 319

APPROVED BY: *[Signature]* DATE: 5/1/02

DESIGNED BY: *[Signature]* DATE: 5/1/02

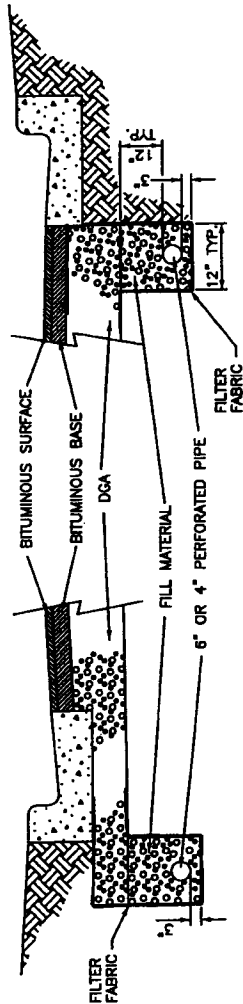
CHECKED BY: *[Signature]* DATE: 5/1/02

COMMISSIONER

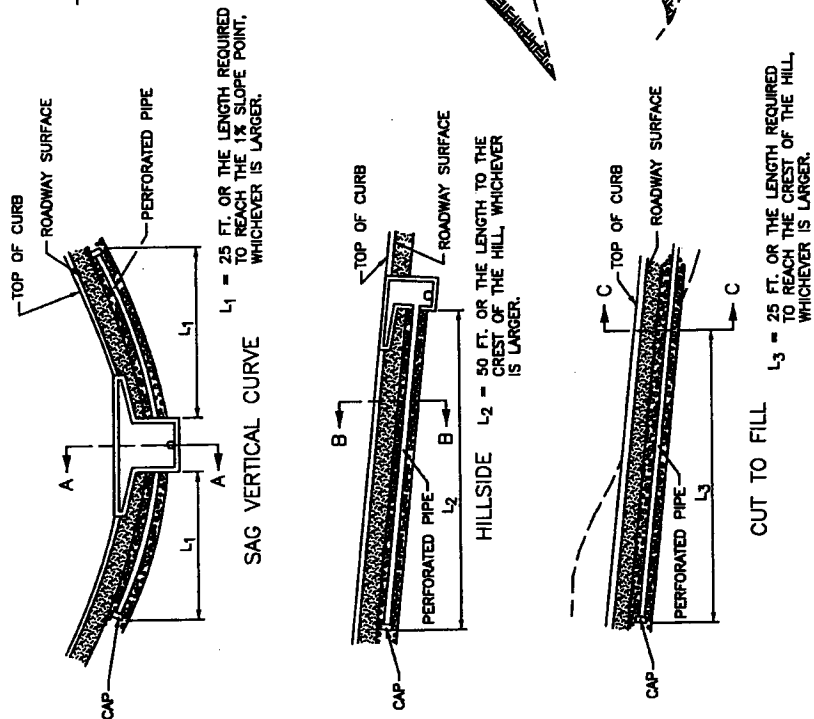
TYPICAL SECTION

CASE 1

CASE 2

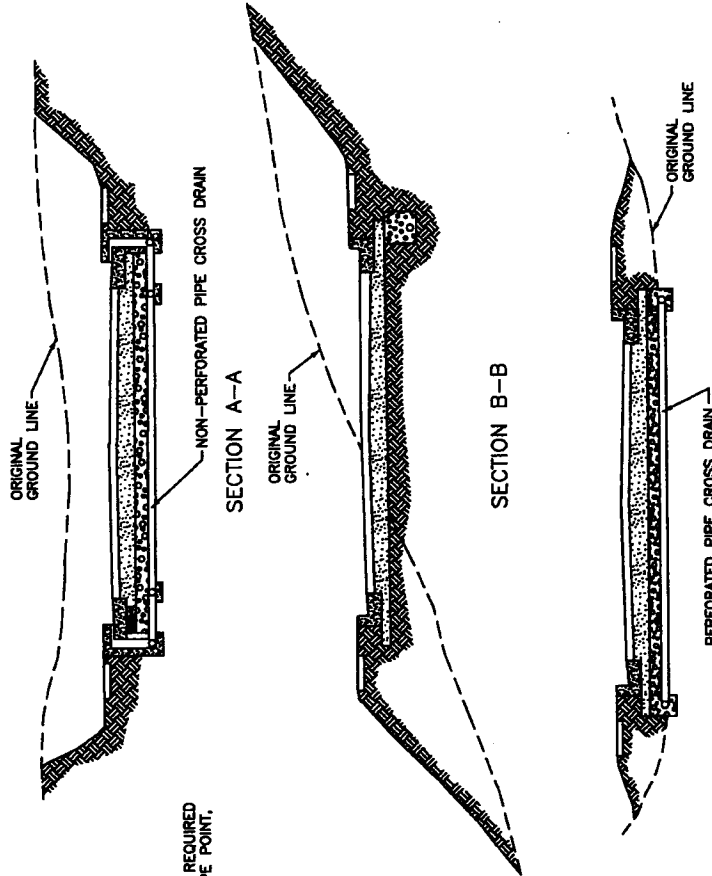


TYPICAL SUBGRADE DRAINAGE LOCATIONS



NOTES:

1. SUBGRADE DRAINAGE, AS DEPICTED, IS INTENDED FOR USE WITH THE SURFACING PHASE OF CONSTRUCTION, AND SHALL BE INSTALLED ONLY AFTER THE SUBGRADE HAS BEEN COMPLETED, AND PRIOR TO CONSTRUCTING PAVING MATERIALS.
2. THE CAP SHALL BE A STANDARD MANUFACTURED ITEM FURNISHED BY THE PIPE SUPPLIER.
3. TERMINATE PERFORATED PIPE IN CATCH BASIN AT AN ELEVATION WHICH PROVIDES POSITIVE DRAINAGE (MAY REQUIRE ADDITIONAL OPENING IN CATCH BASIN WALL).
4. BACKFILL TO CONSIST OF NO. 78, 8, 9M COARSE AGGREGATE OR NATURAL SAND. THE FILL MATERIAL SHALL BE THOROUGHLY COMPACTED IN LAYERS NOT EXCEEDING 6 INCHES LOOSE MEASUREMENT.
5. CONNECTIONS TO DRAINAGE STRUCTURES AND PIPE TERMINI SHALL BE NON-PERFORATED PIPE MEETING THE REQUIREMENTS OF THE PERFORATED PIPE EXCEPT FOR PERFORATIONS.
6. ALL RAISED NON-PAVED MEDIANS SHALL HAVE SUBGRADE DRAINAGE ASSOCIATED WITH CURB AND GUTTER.

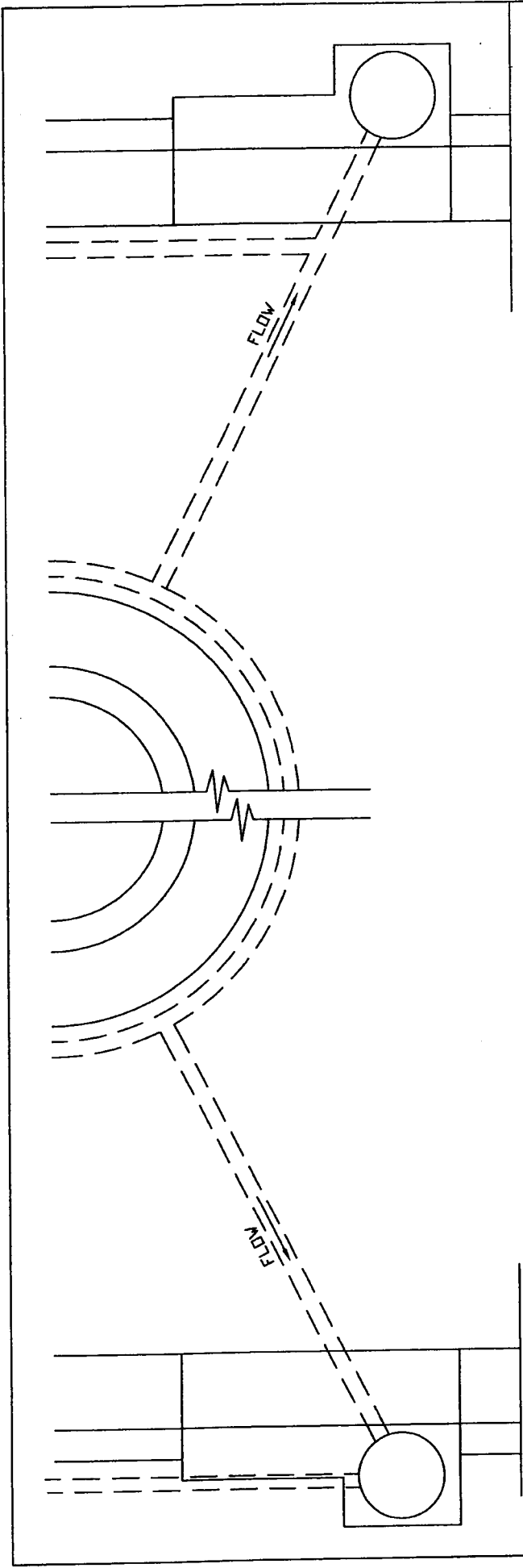


| NO. | DATE | REVISION DESCRIPTION | BY |
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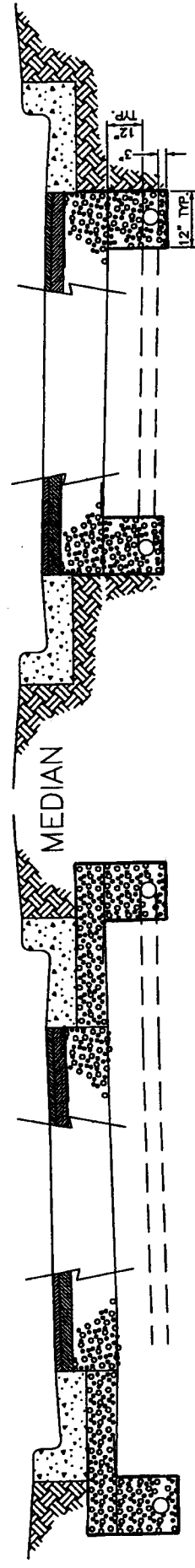
DIVISION OF ENGINEERING

PERFORATED PIPE
SUBGRADE DRAINAGE
ALONG ROADWAY

| | |
|----------------------|-------------|
| STANDARD DRAWING NO. | 320 |
| DATE | 5/1/68 |
| DESIGNED BY | [Signature] |
| CHECKED BY | [Signature] |
| APPROVED BY | [Signature] |
| COMMISSIONER | [Signature] |



CURB ON SOIL



TYPICAL SECTION

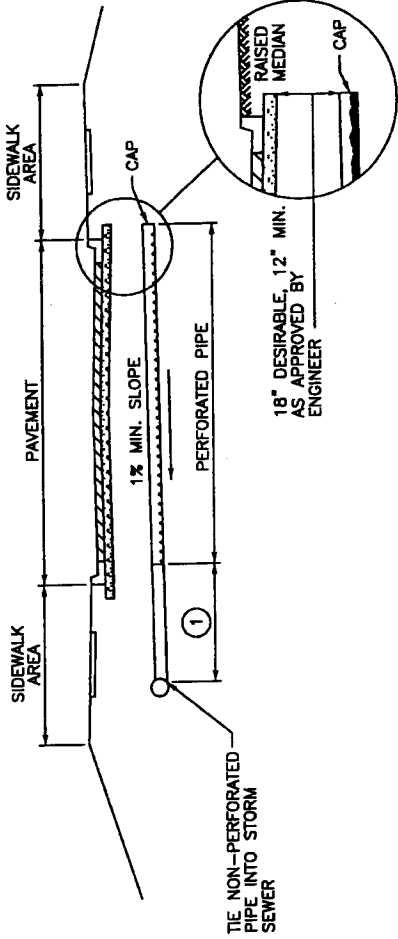
1. For installation of perforated pipe see Detail Sheet #320
2. Perforated pipe shall completely surround all islands
3. For islands greater than 50" long or wide, perforated pipe surrounding island and leading to the curb inlet shall be 6" diameter.

| NO. | DATE | REVISION DESCRIPTION | BY |
|-----|------|----------------------|----|
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| | | | |

DIVISION OF ENGINEERING

PERFORATED PIPE
SUBGRADE DRAINAGE
FOR RAISED
NON-PAVED MEDIANS

STANDARD DRAWING NO. 320-1
 APPROVED BY: *[Signature]* 5/1/07
 PROJECT ENGINEER: *[Signature]*
 CHECKED BY: *[Signature]*
 COMMISSIONER: *[Signature]* DATE



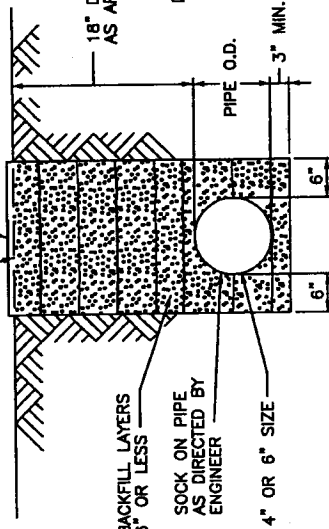
18" DESIRABLE, 12" MIN.
AS APPROVED BY
ENGINEER



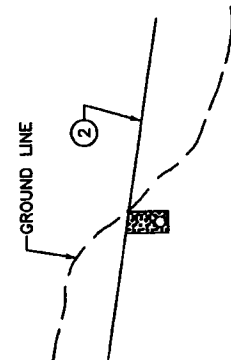
SAG VERTICAL CURVES

BRIDGES

PLACE FILTER FABRIC PER
MANUFACTURER INSTRUCTIONS
AS DIRECTED BY ENGINEER



TRENCH DETAIL



CUT TO FILL

NOTES:

1. SUBGRADE DRAINAGE, AS DEPICTED, IS INTENDED FOR USE WITH THE ROADWAY CONSTRUCTION PHASE, AND SHALL BE INSTALLED ONLY AFTER THE SUBGRADE HAS BEEN COMPLETED, AND PRIOR TO PLACING PAVING MATERIALS.
2. SUBGRADE DRAINAGE WILL NOT BE REQUIRED WHEN:
 - A. AGGREGATE SUBGRADE OR NATURAL BANK GRAVEL IS SPECIFIED.
 - B. POROUS OR FREE DRAINING SUBGRADES ARE EVIDENT.
 - C. DIRECTED BY THE ENGINEER.
3. THE CAP SHALL BE A STANDARD MANUFACTURED ITEM FURNISHED BY THE PIPE SUPPLIER.
4. FLOW SHALL BE DIRECTED TOWARD THE FILL SIDE OF THE ROADWAY WHEN POSSIBLE.
5. IF ROCK IS ENCOUNTERED WITHIN 24" OF SUBGRADE, PERFORATED PIPE IS REQUIRED THE FULL LENGTH OF ROCK. POSITIVE OUTLET IS REQUIRED.
6. A MIN. OF 50' OF PERFORATED PIPE IS REQUIRED UPHILL FROM BASINS ON GRADE AND 25' OF PERFORATED PIPE IS REQUIRED EACH WAY FROM SAG BASINS.

- ① APPROXIMATELY 8 TO 12 FEET OF PIPE AT THE OUTLET SHALL BE NON-PERFORATED PIPE MEETING THE REQUIREMENTS OF THE PERFORATED PIPE, EXCEPT FOR PERFORATIONS.
- ② SUBGRADE ELEVATION

| NO. | DATE | REVISION DESCRIPTION | BY |
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| | | | |
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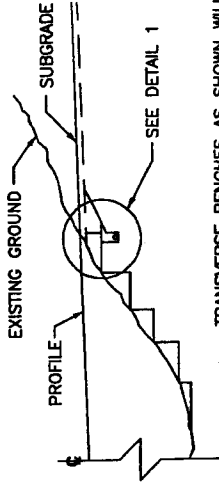
DIVISION OF ENGINEERING

PERFORATED PIPE FOR
SUBGRADE DRAINAGE

STANDARD DRAWING NO. 32.1
APPROVED: *[Signature]* DATE: 5/1/08
DRAWN: *[Signature]* DATE: 5/1/08
CHECKED: *[Signature]* DATE: 5/1/08
COMMISSIONER

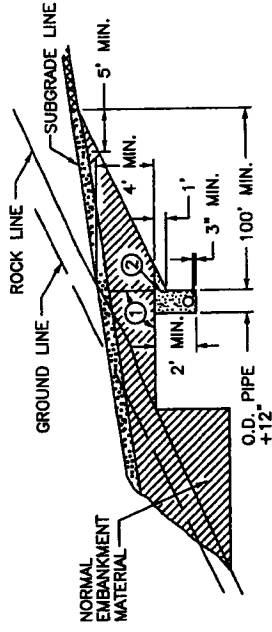
TYPICAL SUBGRADE DRAINAGE LOCATIONS

DETAIL FOR TRANSVERSE UNDERDRAIN CUT TO FILL CONDITION



TRANSVERSE BENCHES AS SHOWN WILL BE REQUIRED WHERE PROPOSED GRADE INTERSECTS EXISTING GROUND.

1. UNDERDRAINS WILL BE REQUIRED ON UPGRADE BENCH. THIS PERFORATED PIPE UNDERDRAIN SHOULD BE PLACED IN ROCK OR SHALE FORMATIONS IF POSSIBLE. EXACT LOCATIONS TO BE DETERMINED BY THE ENGINEER ON CONSTRUCTION.
2. BENCHING AND UNDERDRAIN SHALL BE REQUIRED AT ALL TRANSITIONS FROM ROCK CUTS TO FILL WHETHER OR NOT UNDERDRAIN IS REQUIRED.
3. IF ROCK IS ENCOUNTERED WITHIN 24" OF SUBGRADE, PERFORATED PIPE IS REQUIRED THE FULL LENGTH OF ROCK. POSITIVE OUTLET IS REQUIRED.



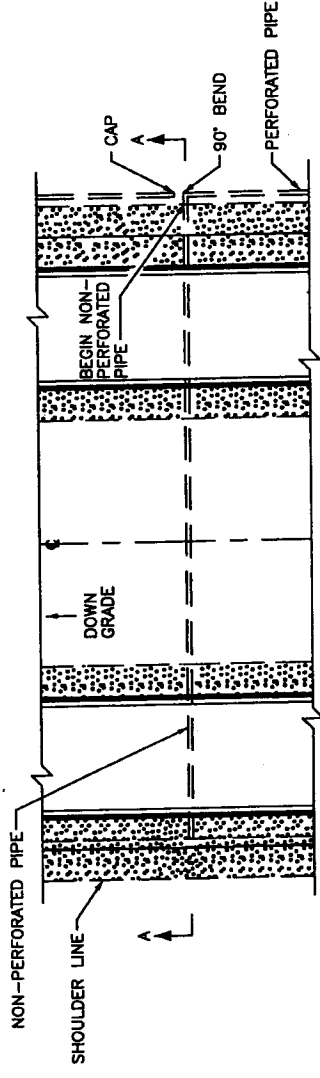
DETAIL 1

| NO. | DATE | REVISION DESCRIPTION | BY |
|-----|------|----------------------|----|
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| | | | |

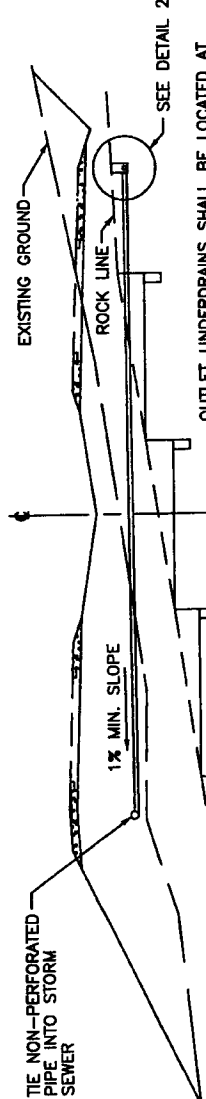
DIVISION OF ENGINEERING

PERFORATED PIPE UNDERDRAINS

STANDARD DRAWING NO. 322
 APPROVED BY: *[Signature]*
 URBAN COUNTY ENGINEER
 DATE: 5/1/00



PLAN VIEW

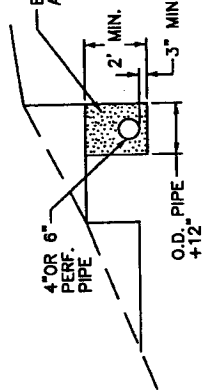


SECTION A-A

OUTLET UNDERDRAINS SHALL BE LOCATED AT APPROXIMATELY 300' INTERVALS OR AS DIRECTED BY THE ENGINEER. UNDERDRAINS MAY BE CONNECTED TO CROSS DRAINS.

POSSIBLE ADDITIONAL LOCATIONS OF PERFORATED PIPE AS DETERMINED BY THE ENGINEER

BACKFILL MATERIAL (NO. 76, 8, 9M COARSE AGGREGATE OR NATURAL SAND)



DETAIL 2

DETAIL FOR LONGITUDINAL UNDERDRAINS

SHEET NOTES: 0

1. LIMITS OF FIRST BENCH.
2. BACKFILL MATERIAL

NOTE:

1. ALL PERFORATED AND NON-PERFORATED PIPE SHALL COMPLY WITH ASTM & KDOT SPECIFICATIONS.

APPENDIX B

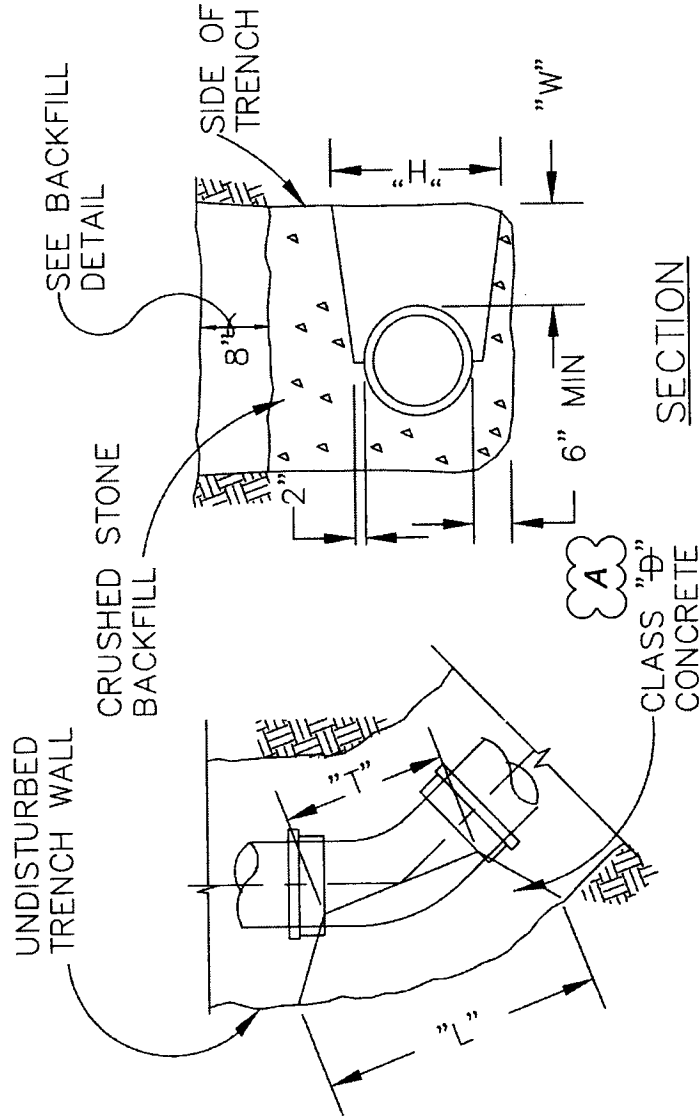
LFUCG SANITARY SEWER & PUMPING STATION STANDARD
DRAWINGS 2009

Excerpt from:
LFUCG Sanitary Sewer and Pump Station Manual,
Appendix B - Drawings

* ALL PIPE AND FITTINGS TO BE BLOCKED SHALL BE WRAPPED TO PREVENT PERMANENT ENCASEMENT OF JOINTS.

| 45° BEND | | | | | | |
|----------|---|-----|-----|-----|-----|-----|
| SIZE | D | 4" | 6" | 8" | 10" | 12" |
| W | | 8" | 8" | 10" | 12" | 12" |
| L | | 14" | 18" | 20" | 22" | 27" |
| H | | 14" | 16" | 18" | 20" | 24" |
| T | | 13" | 15" | 16" | 18" | 18" |

| 90° BEND | | | | | | |
|----------|---|-----|-----|-----|-----|-----|
| SIZE | D | 4" | 6" | 8" | 10" | 12" |
| W | | 8" | 8" | 10" | 12" | 12" |
| L | | 14" | 24" | 30" | 35" | 40" |
| H | | 14" | 16" | 18" | 24" | 30" |
| T | | 13" | 16" | 18" | 20" | 22" |



PLAN

SECTION

HORIZ. & VERT. BENDS &
CONCRETE BACKING

1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS406-0

2" DIA. PVC VENT
CRUSHED STONE (NO. 57)
HALFWAY AROUND
MANHOLE

MANHOLE SHOULD BE LINED
WITH VULCAN COATING, OR
APPROVED EQUAL AS
SPECIFIED IN SECTION 02608.

STANDARD MANHOLE
CROSS-SECTION

TOP OF PIPE TO BE
SAME ELEVATION AS
INVERT OF GRAVITY
SEWER

FORCE MAIN

GRAVITY SEWER

TYPICAL MANHOLE FOR
TRANSITION FROM FORCE MAIN
TO GRAVITY SEWER

1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS407-0

CAUTION
 PRESSURE
 PIPE BELOW
 SEWAGE
 LEXINGTON-FAYETTE
 URBAN COUNTY GOV'T.

RED BACKGROUND

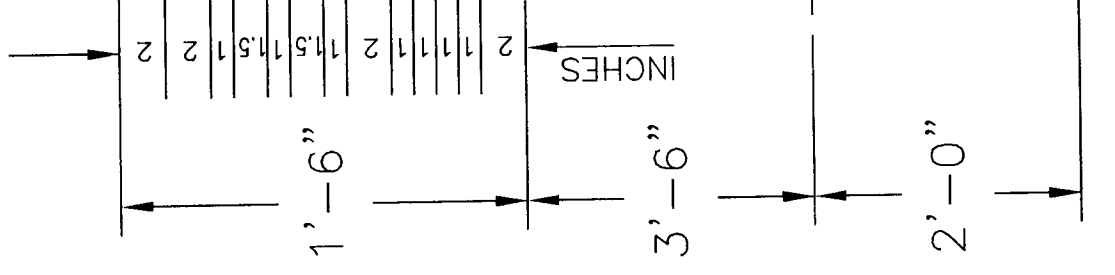
WHITE LETTERS

SIGN TO BE MADE OF
 18 GAUGE, ZINC-COATED
 BONDERIZED STEEL WITH
 BAKED ENAMEL FINISH
 OF AT LEAST TWO COATS.
 SIGNS SHALL BE THE
 EQUIVALENT OF W.S. DARLEY
 & CO. "QUALITY LINE"

7'-0" LONG
 STEEL POST

GROUND LINE

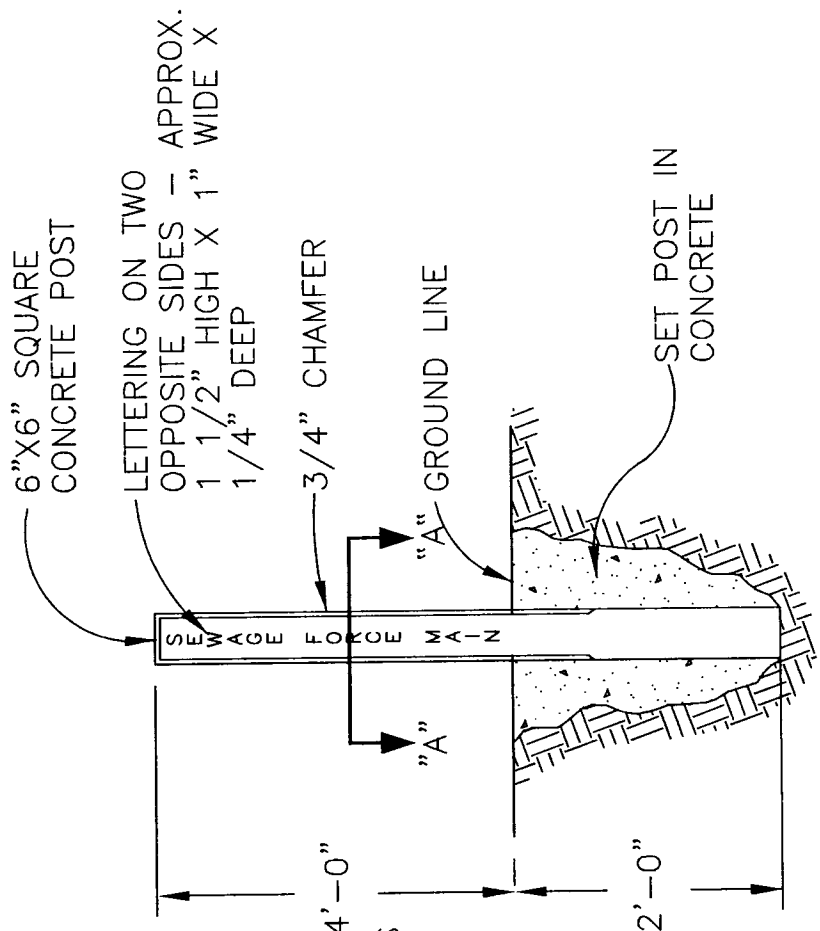
SET POST IN
 CONCRETE



STEEL POST AND
 LINE MARKER

1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS406-O



6"X6" SQUARE
CONCRETE POST

LETTERING ON TWO
OPPOSITE SIDES - APPROX.
1 1/2" HIGH X 1" WIDE X
1/4" DEEP

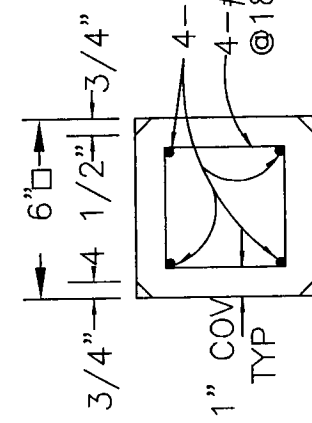
3/4" CHAMFER

"A" GROUND LINE

SET POST IN
CONCRETE

4'-0"

2'-0"

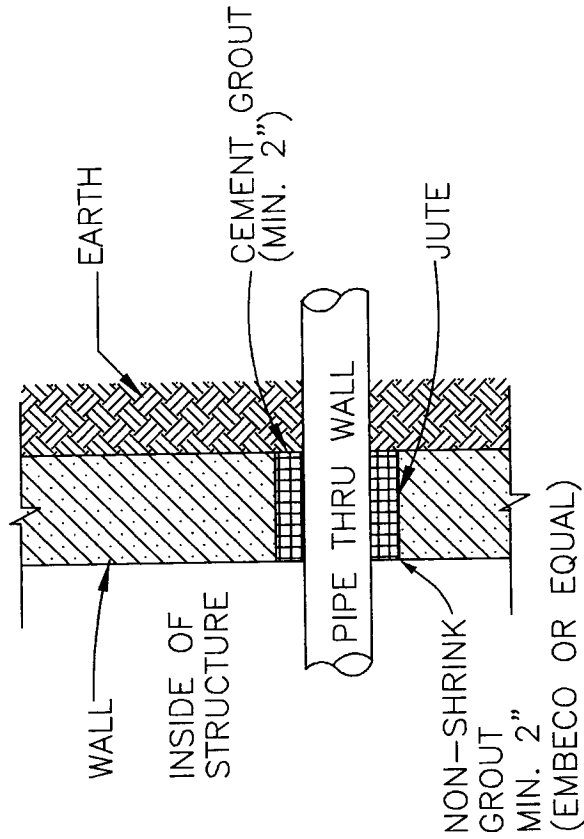
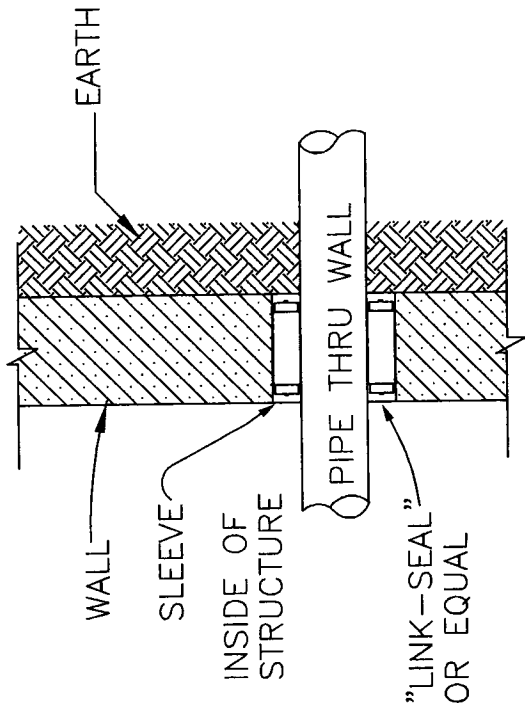


SECTION "A"

CONCRETE LINE MARKER

1/1/09

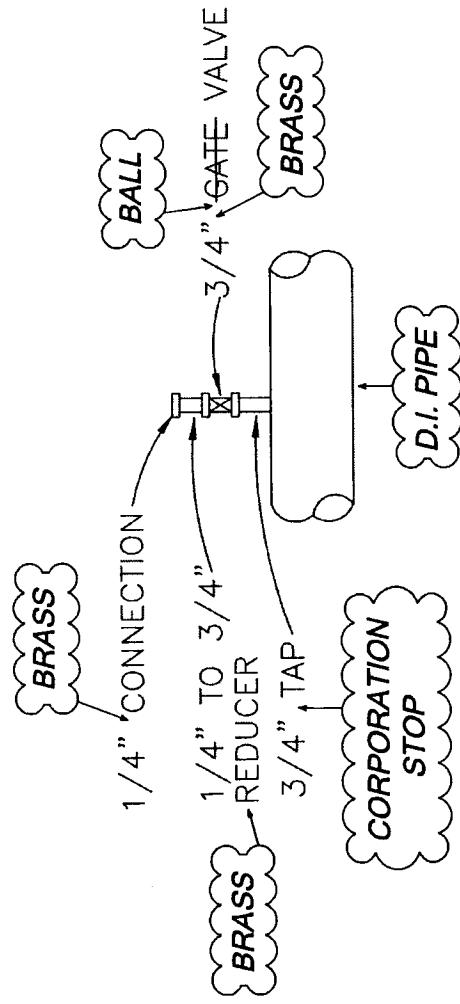
STANDARD SANITARY SEWER DRAWING NO. PS-409-0



WALL PENETRATION DETAIL

1/1/09

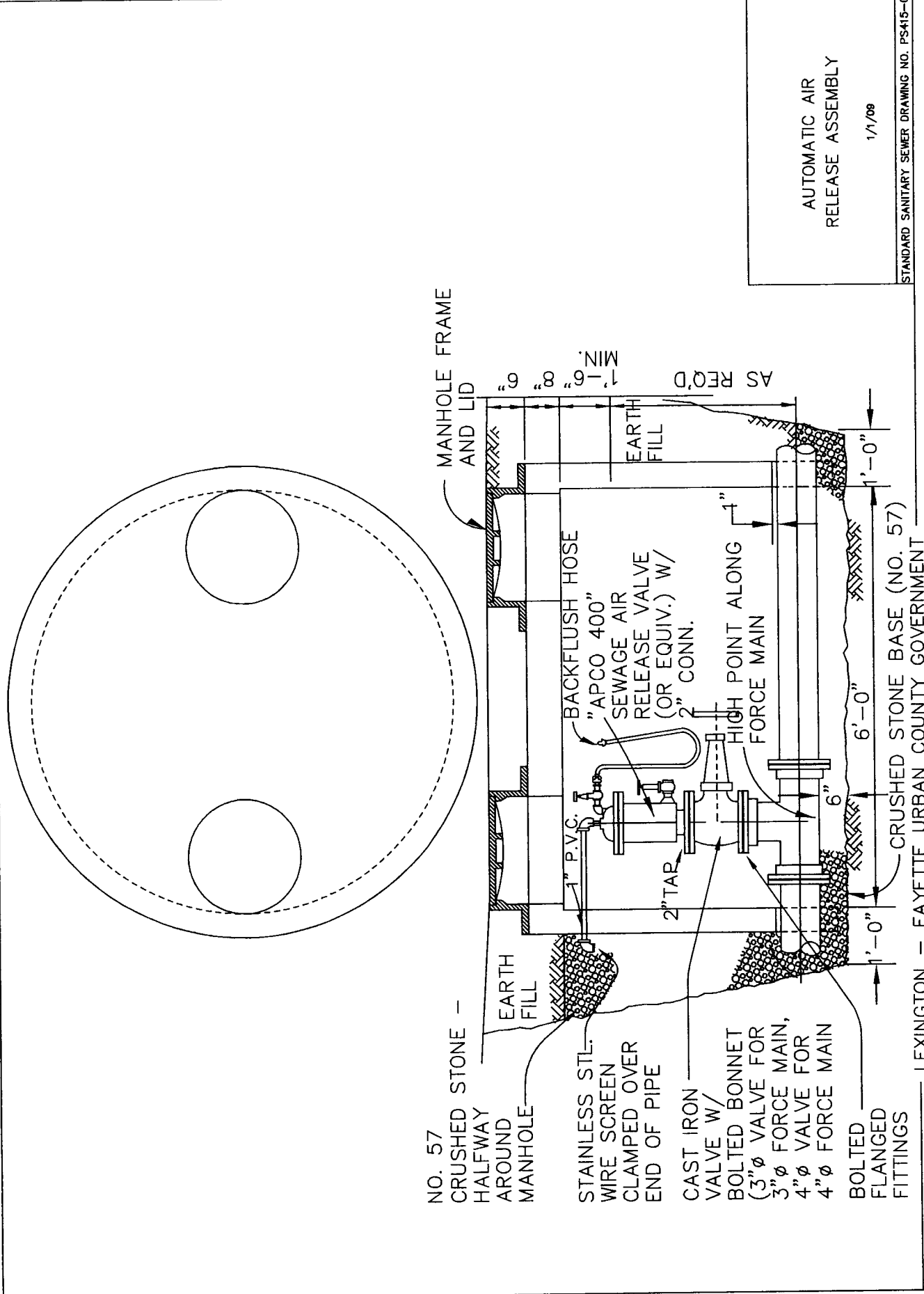
STANDARD SANITARY SEWER DRAWING NO. PS410-0



GAUGE TAP DETAIL

1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS411-0



NO. 57
 CRUSHED STONE -
 HALFWAY
 AROUND
 MANHOLE

MANHOLE FRAME
 AND LID

AS REQ'D
 MIN.
 1'-6" 8" 6"

EARTH
 FILL

BACKFLUSH HOSE

"APCO 400"
 SEWAGE AIR
 RELEASE VALVE
 (OR EQUIV.) W/
 2" CONN.

HIGH POINT ALONG
 FORCE MAIN

1" P.V.C.

2" TAR

6"

6'-0"

1'-0"

1'-0"

CRUSHED STONE BASE (NO. 57)

LEXINGTON - FAYETTE URBAN COUNTY GOVERNMENT

AUTOMATIC AIR
 RELEASE ASSEMBLY

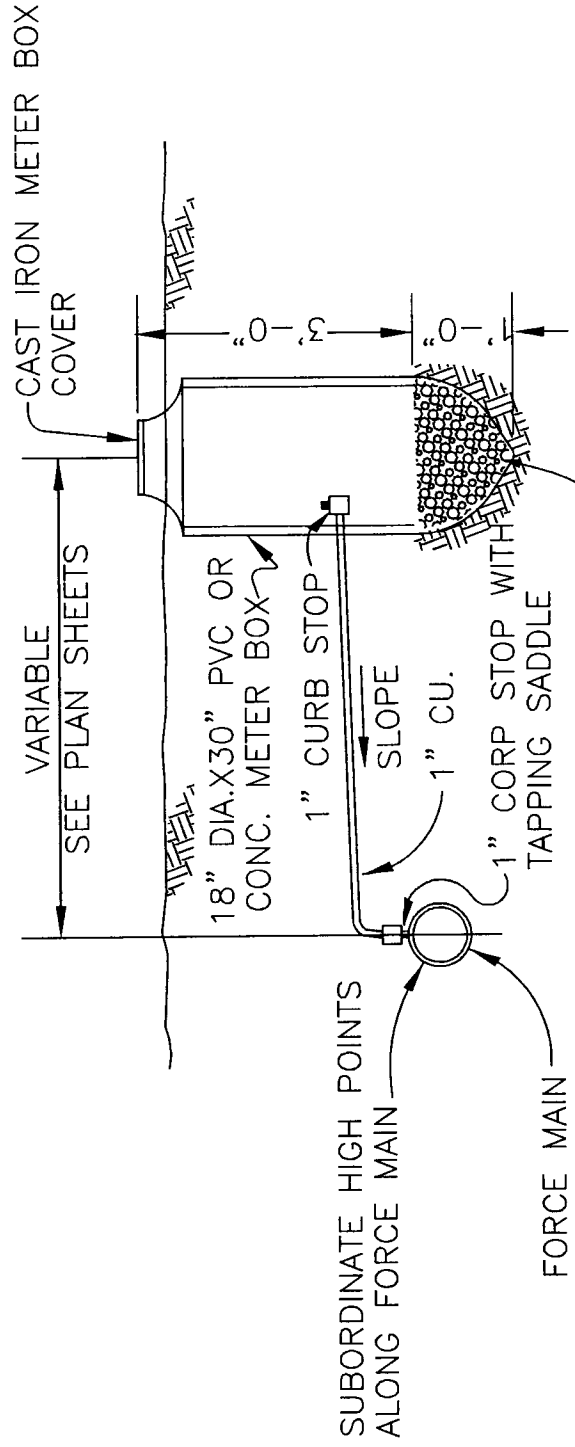
1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS415-0

STAINLESS STL.
 WIRE SCREEN
 CLAMPED OVER
 END OF PIPE

CAST IRON
 VALVE W/
 BOLTED BONNET
 (3" ϕ VALVE FOR
 FORCE MAIN,
 4" ϕ VALVE FOR
 FORCE MAIN

BOLTED
 FLANGED
 FITTINGS

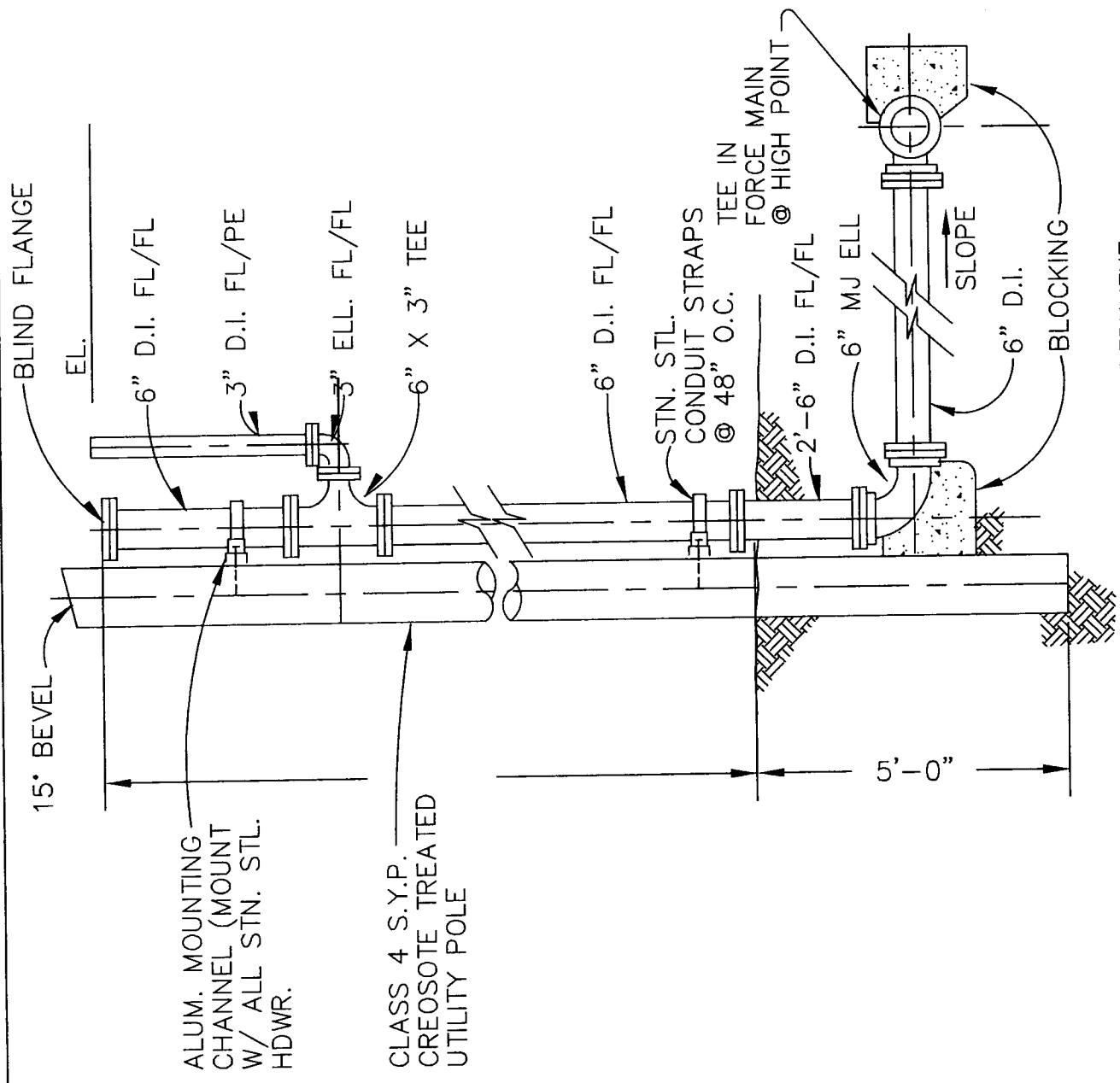


NO. 57 CRUSHED STONE FILL

MANUAL AIR RELEASE
ASSEMBLY

1/1/09

STANDARD SANITARY SEWER DRAWING NO. PS416-0



ALUM. MOUNTING CHANNEL (MOUNT W/ ALL STN. STL. HDWR.)

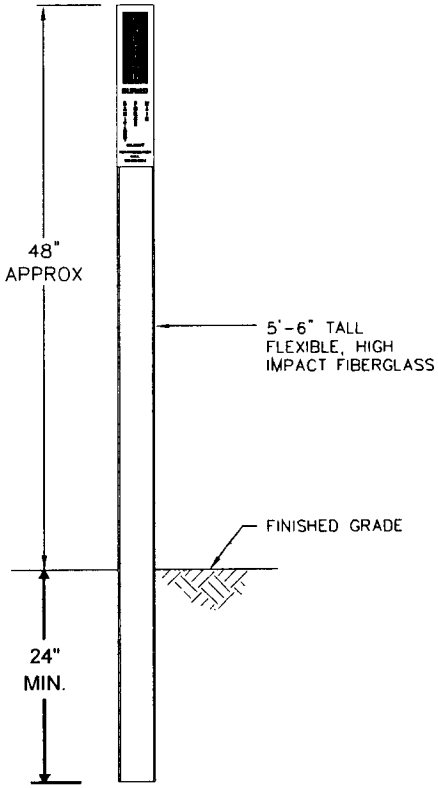
CLASS 4 S.Y.P. CREOSOTE TREATED UTILITY POLE

NON-MECHANICAL AIR RELEASE

1/1/08

STANDARD SANITARY SEWER DRAWING NO. PS417-0

LEXINGTON - FAYETTE URBAN COUNTY GOVERNMENT



BROWN

CAUTION

REFLECTIVE WHITE

BURIED

SANITARY FORCE MAIN

**NEARBY
FOR INFORMATION
CALL
859-425-2255**

17 1/4"

3.5"-4"

FIBERGLASS FORCE MAIN
LINE MARKER



CERTIFICATE OF LIABILITY INSURANCE

8/1/2015

DATE (MM/DD/YYYY)

7/29/2014

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| | | |
|---|--|--|
| PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000 | CONTACT NAME: _____ PHONE (A/C, No. Ext): _____ FAX (A/C, No): _____ E-MAIL ADDRESS: _____ | |
| | INSURER(S) AFFORDING COVERAGE | |
| INSURED 5036 LAYNE INLINER, LLC 4520 N. STATE ROAD 37 ORLEANS IN 47452 | INSURER A: Catlin Specialty Insurance Company NAIC # 15989 | |
| | INSURER B: _____ | |
| | INSURER C: _____ | |
| | INSURER D: _____ | |
| | INSURER E: _____ | |
| | INSURER F: _____ | |

COVERAGES LAYIN01 **CERTIFICATE NUMBER:** 13049414

REVISION NUMBER: XXXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSD | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|----------|--|-----------|----------|-----------------|-------------------------|-------------------------|--|
| | COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER: _____ | | | NOT APPLICABLE | | | EACH OCCURRENCE \$ XXXXXXXX DAMAGE TO RENTED PREMISES (Ea occurrence) \$ XXXXXXXX MED EXP (Any one person) \$ XXXXXXXX PERSONAL & ADV INJURY \$ XXXXXXXX GENERAL AGGREGATE \$ XXXXXXXX PRODUCTS - COMP/OP AGG \$ XXXXXXXX |
| | AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> NON-OWNED AUTOS | | | NOT APPLICABLE | | | COMBINED SINGLE LIMIT (Ea accident) \$ XXXXXXXX BODILY INJURY (Per person) \$ XXXXXXXX BODILY INJURY (Per accident) \$ XXXXXXXX PROPERTY DAMAGE (Per accident) \$ XXXXXXXX |
| | UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED _____ RETENTION \$ _____ | | | NOT APPLICABLE | | | EACH OCCURRENCE \$ XXXXXXXX AGGREGATE \$ XXXXXXXX |
| | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below | | | NOT APPLICABLE | | | PER STATUTE <input type="checkbox"/> OTH-ER <input type="checkbox"/> E.L. EACH ACCIDENT \$ XXXXXXXX E.L. DISEASE - EA EMPLOYEE \$ XXXXXXXX E.L. DISEASE - POLICY LIMIT \$ XXXXXXXX |
| A | CONTRACTOR'S POLLUTION LIABILITY | N | N | CPL-689473-0815 | 8/1/2014 | 8/1/2015 | \$2,000,000. PER LOSS/ \$2,000,000. TOTAL |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
 RE: WOLF RUN TRUNK A REHABILITATION, BID NO. 117-2014.

CERTIFICATE HOLDER
 13049414
 LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT
CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE



CERTIFICATE OF LIABILITY INSURANCE

8/1/2015

DATE (MM/DD/YYYY)
7/28/2014

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).


| | | |
|---|-----------------------|----------------|
| PRODUCER Lockton Companies 444 W. 47th Street, Suite 900 Kansas City MO 64112-1906 (816) 960-9000 | CONTACT NAME: | |
| | PHONE (A/C, No, Ext): | FAX (A/C, No): |
| E-MAIL ADDRESS: | | |
| INSURER(S) AFFORDING COVERAGE | | NAIC # |
| INSURER A: Zurich American Insurance Company | | 16535 |
| INSURER B: American Zurich Insurance Company | | 40142 |
| INSURER C: | | |
| INSURER D: | | |
| INSURER E: | | |
| INSURER F: | | |

COVERAGES LAYIN01 CERTIFICATE NUMBER: 13048117 REVISION NUMBER: XXXXXXXX

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSD | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|-------------|--|-----------|----------|---|----------------------------------|----------------------------------|--|
| A | <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> CONTRACTUAL <input checked="" type="checkbox"/> X.C.U. COVERAGE GENL AGGREGATE LIMIT APPLIES PER: <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC <input type="checkbox"/> OTHER | Y | N | GLO 5817438-01 | 8/1/2014 | 8/1/2015 | EACH OCCURRENCE \$ 2,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 500,000 MED EXP (Any one person) \$ 10,000 PERSONAL & ADV INJURY \$ 2,000,000 GENERAL AGGREGATE \$ 5,000,000 PRODUCTS - COM/OP AGG \$ 5,000,000 \$ |
| A | AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS | Y | N | BAP 5817437-01 | 8/1/2014 | 8/1/2015 | COMBINED SINGLE LIMIT (Ea accident) \$ 5,000,000 BODILY INJURY (Per person) \$ XXXXXXXX BODILY INJURY (Per accident) \$ XXXXXXXX PROPERTY DAMAGE (Per accident) \$ XXXXXXXX \$ XXXXXXXX |
| | UMBRELLA LIAB <input type="checkbox"/> OCCUR EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE DED RETENTION \$ | | | NOT APPLICABLE | | | EACH OCCURRENCE \$ XXXXXXXX AGGREGATE \$ XXXXXXXX \$ |
| B A A | WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below | Y/N N | N/A | WC 5817439-02 (AOS) WC 5817440-02 (WI) STOPGAP(ND,OH,WA,WY) | 8/1/2014 8/1/2014 8/1/2014 | 8/1/2015 8/1/2015 8/1/2015 | <input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ 5,000,000 E.L. DISEASE - EA EMPLOYEE \$ 5,000,000 E.L. DISEASE - POLICY LIMIT \$ 5,000,000 |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, may be attached if more space is required)
RE: WOLF RUN TRUNK A REHABILITATION, BID NO. 117-2014; OWNER IS INCLUDED AS AN ADDITIONAL INSURED AS RESPECTS GENERAL LIABILITY AND AUTOMOBILE LIABILITY ON A PRIMARY BASIS IF REQUIRED BY SIGNED, WRITTEN CONTRACT. 30 DAYS NOTICE OF CANCELLATION APPLIES.

| | |
|--|---|
| CERTIFICATE HOLDER 13048117 LEXINGTON FAYETTE URBAN COUNTY GOVERNMENT | CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. |
| | AUTHORIZED REPRESENTATIVE  |