

**City of Semmes, Alabama**

**DESIGN AND  
CONSTRUCTION  
STANDARDS**

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Prepared by  
The Semmes Planning Commission

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# 1 GENERAL PROVISIONS

## 1.1 Title

This manual shall hereafter be known, cited, and referred to as the Manual for Design and Construction Standards for the City of Semmes, Alabama.

## 1.2 Scope of Manual

This manual covers design and construction requirements, guidelines, details, and standards for design, development, and construction relating to residential, commercial, or industrial development within the jurisdiction of this manual, including public or private subdivision of property.

## 1.3 Jurisdiction

On and after, insert date of adoption here this manual for design and construction standards shall apply to the design and development of all improvements located within the Corporate Limits of the City of Semmes.

## 1.4 Applicable References

The following references should be considered as a minimum standards manual. Whenever the provisions of this manual impose more restrictive standards than are required in or under any other ordinance, regulation, or applicable construction manual, the provisions herein contained prevail. Whenever the provisions of any other ordinance, regulation, or applicable construction manual are more restrictive standards than are required herein, the requirements of such prevail.

## 1.5 City of Semmes, Alabama Subdivision Regulations

The Subdivision Regulations shall be used to govern public and private developments, to include the application and approval procedure, the minimum construction standards, and the guarantee for completion and associated bonds. The Manual for Design and Construction Standards shall function in conjunction with the Subdivision Regulations, and any other ordinances adopted by the City of Semmes.

## **1.6 Compliance with Applicable Regulations**

The owner/developer shall be solely responsible to ensure compliance with all Local, State, and Federal rules, requirements, regulations, and guidelines for all design and construction related to developments. The absence of a reference to any applicable regulations in this manual does not relieve the owner/developer of his responsibility to conform to all applicable rules and regulations related to the type of development intended.

## **1.7 Statement of Severability**

The sections, paragraphs, sentences, clauses and phrases of this Code are severable, and if any phrase, clause, sentence, paragraph or section of this Code shall be declared unconstitutional by a court of competent jurisdiction, then such ruling shall not affect any other paragraphs and sections, since the same would have been enacted by the city council without the incorporation of any such unconstitutional phrase, clause, sentence, paragraph or section.

# 2

## DEFINITIONS

### 2.1 Usage

For the purpose of these regulations, certain numbers, abbreviations, terms, words and phrases herein shall be used, interpreted and defined as set forth by the City of Semmes. Unless the context clearly indicates to the contrary, words used in the present tense include the future tense; the plural number includes the singular number; the word "herein" means "in these regulations"; the word "regulations" means this "Manual for Design and Construction Standards for the City of Semmes, Alabama", the City of Semmes Subdivision Regulations, the City of Semmes Zoning Ordinance, and any future regulations or ordinances adopted by the City of Semmes."

A "person" includes a corporation, a partnership or an incorporated association of persons such as a club or limited liability company (LLC); "shall" and "must" are always mandatory; "should" and "may" are suggestive; a "building" includes a "structure" and includes any part thereof; "used" or "occupied" as applied to any land or building shall be construed to include the words "intended, arranged, or designed to be used or occupied".



# 3 STORMWATER DRAINAGE DESIGN AND CONSTRUCTION STANDARDS

## 3.1 Drainage and Grading Plan

A drainage and grading plan, prepared and certified by a Professional Engineer licensed in the State of Alabama, shall be submitted to the City of Semmes in conjunction with commercial site plan reviews, a subdivision review as required by the subdivision regulations, or other permit requests as deemed appropriate. The plan shall include the following information as a minimum:

- Map Information
  - o Existing and proposed surveyed contours in 1 foot increments;
  - o Locations of roads, parking areas and building footprints along with their proposed finished floor elevations;
  - o Flood Zone Designation(s), determined by elevation, if published flood elevations are available;
  - o Elevation of the regulatory lowest floor level, including basement, of all proposed structures;
  - o Elevation to which any structures will be flood proofed;
  - o Drainage basin boundaries, showing direction of flow and including total tributary drainage areas entering the improved area and taking into account off site runoff being routed through or around the project;
  - o Size, location, slopes, inverts, materials, types and general configuration of all primary drainage facilities required to route, collect, treat and dispose of stormwater runoff, generated by or passing through the development;
  - o Location of onsite water bodies and wetlands with details of size and vegetative cover to include normal water elevation, side slopes, and depths of water bodies and for wetlands, the general surface elevation and the wet season water elevation.
  
- Narrative
  - o Proposed project description including its size, percent pervious versus impervious land usage, total wetlands within site boundaries, and a breakdown of wetland acreage preserved, by type, and acreage removed, by type.
  - o All areas solely for water management purposes shall be noted and the legal method to ensure areas remain devoted shall be provided.
  - o Times of concentration, intensity, runoff coefficients used for determining runoff for all tributary areas and areas within the development at pre and post construction rates.



- o Discharge volume in cubic feet per second (cfs), discharge velocity, and any additional hydraulic data needed to establish that the drainage system will convey the flow to an adequate outlet
- o Proposed start up and completion date for the project
- o Description of the extent to which any watercourse will be altered or relocated as a result of the proposed development, if applicable
- o Design storms used including depth, duration, and distribution
- o Stage storage calculations for the project and stage discharge computations for the outfall structure(s)
- o Runoff routing calculations showing discharges, elevations and volumes retained/detained during applicable storm events
- o Draw down calculations for detention areas
- o Provisions to restore stormwater flow to the nature of the pre-development condition (i.e., use of level spreaders or other means to prevent concentrated flow from leaving the site during storm events)
- o Base flood elevation data for all proposed developments if not established refer to the Flood Damage Prevention Ordinance for requirements (see Appendix B)
- o Calculations required for determination of minimum building floor and road elevations
- o Calculations for flood plain encroachment, if applicable
- o Acreages in the following format:

	Existing (acres/%)	Proposed (acres/%)
Total Area:	_____	_____
Impervious:	_____	_____
Building:	_____	_____
Pavement:	_____	_____
Pervious:	_____	_____
Wetlands:	_____	_____

- o Plans shall be signed and sealed by a professional civil engineer with a current license to practice in the State of Alabama

The City Engineer may require additional engineering information as deemed necessary to protect the public.

Offsite drainage easements or improvements may be required to handle run off from new developments into a natural drainage channel. Any off site drainage or utility requirements must be clearly shown on the plans submitted to the City of Semmes. When a proposed new drainage system will divert water into an unnatural water system or on private land adjacent to the development, appropriate drainage rights shall be secured by the applicant/owner and indicated on the plat or recorded by a separate instrument in Mobile County Probate Court. Restoring drainage to a sheet flow condition that is less than or equal to pre-development conditions may, at the Planning Commission’s discretion; based upon the City engineer’s recommendation, remove the requirement to obtain drainage rights from adjacent land owners.

The Planning Commission may require enhancement of a drainage feature proportional to volume and velocity of discharge water if said discharge water will have an adverse impact on the drainage feature.

Upon development completion, As-Built plans shall be submitted to the City of Semmes from the Design Engineer of record certifying all drainage facilities have been installed in accordance with approved plans. As-built plans shall be provided to the City in CAD format, in state plane coordinates, on NAVD88 vertical datum, with final surveyed elevations on all stormwater facilities. A final inspection shall be scheduled as required by the subdivision regulations or prior to the issuance of a Certificate of Occupancy.

**3.2 Design and Construction of Stormwater Management Systems**

Need to Marry 4.19 of Sub Regulations and this...there is overlap.

**3.2.1 General Design Criteria**

The method of determining storm water runoff shall be based on an acceptable engineering practice and/or standard. Design of stormwater drainage facilities shall include calculation of a runoff coefficient by measuring the total area of each drainage basin and the areas of each land use which will occur in the basin after construction is complete. These areas shall include off site drainage onto the site as well as the development area. Grady pond wetlands shall not be designed as stormwater management facilities unless the existing and proposed runoff volume is accounted for in the storage calculations.

The following rainfall intensities are to be used for hydrologic analyses:

Rainfall intensity (in/hr): City of Semmes, Alabama							
Storm Duration		Return Period					
Hours	Minutes	2	5	10	25	50	100
0	5	6.05	7.45	8.75	9.10	10.10	11.00
0	10	5.10	6.40	7.38	8.00	9.00	9.80
0	15	4.40	5.60	6.40	7.10	7.90	8.50
0	30	3.20	4.00	4.75	5.10	5.75	6.30
1	0	2.10	2.60	3.25	3.40	3.90	4.30
2	0	1.30	1.65	1.85	2.20	2.40	2.70
3	0	0.65	0.85	1.00	1.20	1.30	1.40
6	0	0.57	0.75	0.90	1.10	1.15	1.30
12	0	0.35	0.47	0.55	0.65	0.74	0.80
24	0	0.23	0.29	0.35	0.40	0.45	0.50

The following 24-hour rainfall precipitation amounts shall be used for hydrologic analyses:

Design Storm:

1-yr: 4.50 in

2-yr: 5.52 in

5-yr: 6.96 in

10-yr: 8.40 in

25-yr: 9.60 in

50-yr: 10.80 in

100-yr: 12.00 in

### 3.2.2 Functional Design of Stormwater Drainage Systems

The storm water drainage system shall be separate and independent from any sanitary sewer system. The drainage systems along roadways shall accommodate peak flows from at least a 25 year frequency design storm. A copy of basic design computations shall be submitted along with detailed plans for review by the City Engineer. Grading and Drainage design shall provide for surface water removal from the street, such that surface water is not carried across any intersection, nor carried for a distance of more than 500 feet in the gutter. Very long flat vertical curves shall be avoided as these can cause standing water on the concrete gutter and in the travel way.

A complete drainage plan and contour map showing pipe sizes, their locations, and the areas to be drained to each structure shall be submitted along with the profile grades and typical roadway section for approval.

All existing drainage facilities and structures shall be shown on the engineering plans, along with a surveyed 1' interval contour map, and proposed drainage features.

All roadways cross drain and side drain pipes shall be the equivalent of the minimum size of fifteen (15) inches in diameter. All stormwater piping in the public (State, County, or City) Right-of-Way shall be reinforced concrete. Corrugated smooth flow HDPE pipe shall be allowed in addition to concrete pipe within common areas that are not to be publicly maintained, provided that installation is in accordance with the manufacturer's recommendations. The minimum cover for drainage pipes under pavement shall be according to the pipe manufacturer specifications and the anticipated loading in the area where the pipe will be installed. All pipe joints shall be gasketed and wrapped and pick holes sealed and wrapped or not present.

Roadway cross-drains for all local and collector streets shall be designed for a 25-year frequency storm, providing that the roadway is not overtopped by the 100-year frequency storm and that no structures are flooded by the 100-year frequency storm.

Roadway cross-drains for arterial streets or higher street classification shall be designed for a 25-year frequency storm, providing that the roadway is not overtopped by the

100-year frequency storm and that no structures are flooded by the 100-year frequency storm.

All bridges, structures or embankments in floodways shall be designed to pass a 100-year frequency storm without raising the existing 100-year flood profile or increasing velocity and erosive capacity of the stream. If the contributing drainage area is 200 acres and greater, the 100-year design storm shall also be computed using Alabama Urban Regression equations and developed area percentages must be used in accordance with the Semmes Comprehensive Plan. The 100-year design storm must be contained within a drainage common area or public right-of-way for drainage areas that are 200 acres or greater.

Minimum design velocities for storm drainage systems shall be at least 2 feet per second to ensure that the system has some capability for self-cleaning.

The minimum internal diameter of manholes or junction boxes shall be 48 inches or 12 inches larger than the largest connecting pipe structure, whichever is greatest. All junction boxes greater than 3 feet deep shall have steps that are placed within easy reach of the access point. No closed, inaccessible junction boxes without manhole access points will be allowed in public right of ways. No pipe runs longer than 400' will be allowed without a manhole or inlet access point breaking up the length of pipe.

**3.2.3 Design of Open Channels**

Closed storm drain systems shall be used wherever practicable. Where a closed storm drain system is not feasible, open ditches or swales may be used as long as they are concrete paved or permanently vegetated and stable based on site conditions. Flow velocities and tractive force shall be considered when choosing surface treatments for open channels. Calculations demonstrating that the chosen surface materials meet calculated tractive forces along sides and bottom of channels will be submitted with detailed construction plans.

A maximum slope of 3 (horizontal) to 1 (vertical) side slopes and 2' minimum width flat bottom ditch is required, unless the approval is received from the Planning Commission for a waiver. Calculations shall show the volume and velocity for each separate ditch section. Where two open channels converge, some form of energy dissipater, such as riprap, shall be provided. When an open channel makes a turn, banking calculations shall be provided to demonstrate that the channel has been designed to an adequate depth to prevent overtopping on the outside of the turn.

Where proposed lots gain access across an existing or a proposed ditch, calculations shall be submitted that shows the required size of driveway culverts. These culvert sizes shall be shown on the I Plat or on the plans for the project, as appropriate.

Headwalls shall be installed on all street culverts with the use of flared headwalls or slope paved headwalls (4:1 slope or flatter) used within any public right-of-way. Flared headwalls will only be allowed outside of the roadway clear zone.

The applicant/owner shall be required to carry away by pipe or open ditch any spring or surface water that may exist either previously to, or as a result of, the development. Such drainage facilities shall be located in the road right-of-way where feasible, or in common areas of appropriate width, 15 foot minimum.

### 3.2.4 Design of Curb and Gutter and Inlets

When calculations indicate that a 25 year frequency stormwater spread will extend more than 6 feet into a travel lane, drainage design will be modified by additional inlets or revised grading design to reduce the spread to no more than allowable by these regulations.

Curb inlets shall be designed so that surface water shall not be carried across any roadways nor for a distance of more than five hundred (500) feet in the gutter or valley. Inlets shall be placed located at uphill comers of each street intersection to prevent sheet flow of stormwater. In addition, double-wing weir inlets shall be placed at all vertical sags in the roadway.

Cul-de-sacs and street intersections shall be graded in detail by the designer. A 1"=20' max scale detail will be provided in the construction plans depicting existing topography and proposed contours with spot grades.

### 3.2.5 Analysis of Downstream System

Stormwater discharges from a developed site must be routed to an existing natural or manmade stormwater channel with adequate capacity. Calculations must be submitted that show the capacity of the receiving stormwater channel to handle the design storm appropriate for that channel's classification.

A downstream hydrologic analysis shall be performed to determine if there are any additional impacts in terms of peak flow increase, downstream flooding or flow velocity increase. This analysis should be performed at the outlet(s) of the site and concentrate on impacts of the development for a minimum of 1000 feet off-site, and downstream at each tributary junction, including roadway culverts, to the point(s) in the conveyance system where the area of the portion of the site draining into the system is less than or equal to 10% of the total drainage area above that point.

The downstream analysis shall be performed to ensure known flooding problems are not exacerbated, and that the immediate downstream receiving channel, if it currently has adequate capacity, will continue to be adequate.

The analysis will also be used to determine any backwater effects on the proposed development and upstream properties. The design engineer shall utilize the downstream analysis to determine if the developments stormwater facilities operate under inlet control or outlet control.

Analysis of the downstream system must include flow capacity and velocity for existing and proposed flow conditions, using Manning's equation at a minimum.

All outfall drains shall be designed and shown on plan and profile sheets with cross sections provided in the detailed construction plans for the development.

### 3.2.6 Stormwater Management Systems Design and Construction

A combination of storage and controlled release of stormwater runoff shall be required for all development and construction that creates the peak rate of runoff after development to increase by more than one (1) cubic foot per second for a ten-year frequency storm.

When the peak rate for a 10-year storm event surpasses the above criteria; the City of Semmes requires that post-developed runoff rates for the 2-yr, 5-yr, 10-yr, 25-yr, 50-yr and 100-yr design storm events are equal to or below the pre-development runoff rates for each respective design storm event. Specific means and methods of achieving this goal are the responsibility of the engineer of record but shall reflect acceptable engineering practice.

The stormwater management facility shall provide an emergency spillway designed to accommodate the estimated runoff from a rainfall event with a 100-year frequency without catastrophic damage to the facility or downstream areas.

Temporary sediment storage shall be provided during construction to allow for the accumulation of 1/2" of sediment from the developed area. Detention facilities may be utilized for this temporary sediment storage provided the detention facility is cleaned of sediment prior to final approval.

The design engineer shall provide a maintenance plan for any stormwater management facility.

#### DETENTION FACILITIES

Detention Facilities shall be designed by routing a hydrograph through the facility. No "shortcut" or storage estimation methods shall be used as a final design. Methods based on Natural Resource Conservation Service's (formerly SCS) unit hydrograph are preferred and recommended for developing hydrographs. However, any regionally acceptable engineering method will be considered.

Detention facilities shall be classified as normally dry ponds or normally wet ponds. All detention facilities shall meet the following standards:

- (1) Provide 15-foot wide maintenance right-of-way must to the detention facility from a public or private road. It is preferred and shall be normal practice to locate stormwater ponds adjacent to the ROW. Location of the stormwater ponds that are not adjacent to the ROW must be

substantiated by an approved engineering rationale. Maintenance access should have a maximum slope of no more than 15% and be appropriately stabilized to withstand maintenance equipment and vehicles. The maintenance access must extend to the fore bay, safety bench, riser, and outlet and, to the extent feasible, be designed to allow maintenance vehicles to turn around.

- (2) Provide 10-foot maintenance easement around the outside of the facility as measured from the 100-year high water elevation.
- (3) Provide 10-foot landscape strip for screening purposes measured outside the 10-foot maintenance easement. Plantings shall be specified to provide a complete visual screen.
- (4) Discharge / Outfall point shall be no closer than 25-feet from any property line and shall include permanent velocity dissipation to prevent erosion.
- (5) Dam embankments shall not exceed 3:1 slopes nor be greater than 10-feet in height or shall provide geotechnical slope stability analysis
- (6) All other embankments shall have side slopes not exceeding 4:1 to provide for maintenance.

Detention ponds and structures shall be designed to attenuate the post development peak flow rates from the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year 24 hour design storm events at a graduated discharge at or below pre-development peak flow rates.

Proposed stormwater ponds, detention basins, etc., shall be presented in proposed construction plans at 1"=20' max. scale details including existing 1' interval contours and proposed 1' interval contours with proposed spot grades and all outfall details shown thereon.

Normally Dry detention facilities provide for the temporary storage of storm water runoff to reduce downstream water quantity impacts. These facilities temporarily detain stormwater runoff, releasing the flow over a period of time. They are designed to completely drain following a storm event and are normally dry between rain events.

Normally dry detention basins provide limited pollutant removal benefits and are not intended for water quality treatment. Detention-only facilities must be used in a treatment process with other structural controls that provide water quality treatment of the stormwater.

The maximum allowable contributing drainage area to be served by a single dry detention basin is 40 acres. Routing calculations must be used to demonstrate that the storage volume is adequate.

Areas above the normal high water elevations of the detention facility should be sloped toward the basin to allow drainage and to prevent standing water. A low flow or pilot channel across the facility bottom from the inlet to the outlet is recommended to convey low flows and prevent standing water.



Inflow channels are to be stabilized with flared riprap aprons, or the equivalent.

A sediment forebay shall be provided to facilitate major cleanout activities. The forebay volumes have a capacity of 10% of the water quality volume. The forebay volume may be included in the water quality volume requirements. The forebay shall be distinguished from the permanent pool or water quality volume. Options which may be used include: two ponds in series, differential pool depth; rock-filled gabions, retaining walls; or a rock filter dam separating the forebay.

The outlet structure shall be sized based on hydrologic routing calculations and can consist of a weir, orifice, outlet pipe, combination outlet, or other acceptable control structure that achieves the required graduated discharge.

Riprap, plunge pools or pads, level spreaders, or other energy dissipaters are to be placed at the end of the outlet to prevent scouring and erosion.

Stormwater ponds (also known as normally wet detention facilities) are constructed stormwater basins that have a permanent pool of water throughout the year. Runoff from each rain event is detained and treated in the pool through gravitational settling and biological uptake until it is displaced by runoff from the next storm. The permanent pool also serves to protect deposited sediments from resuspension. Above the permanent pool level, additional temporary storage is provided for runoff quantity control and stormwater detention.

Normally wet ponds are among the most cost effective and widely used stormwater management practices. A well designed and landscaped pond can be an aesthetic feature on a development site when planned and located properly.

Normally wet ponds treat incoming runoff by physical, biological, and chemical processes. The primary removal mechanism is gravitational settling of particulates, organic matter, metals, bacteria and organics. Another mechanism for pollutant removal is uptake (particularly nutrients) by algae and wetland plants in the permanent pool. Volatilization and chemical activity also work to break down and eliminate stormwater contaminants such as hydrocarbons.

Normally wet ponds shall provide the required storage above the permanent pool and meet the specified graduated allowable release. In situations where it is required, stormwater retention ponds shall also be used to provide detention to control the 100 year storm event. Where this is not required, the pond structure shall be designed to safely pass extreme storm flows.

Underlying soils of hydrologic group "C" or "D" should be adequate to maintain a permanent pool. Most group "A" soils and some group "B" soils will require a pond liner. Evaluation of soils should be based upon an actual subsurface analysis and permeability tests.



Minimum setback requirements for stormwater pond or stormwater detention facilities:

- 25 feet from property line to outward toe of berm
- 10 feet from right of way line to outward toe of berm
- 100 feet from private wells
- 50 feet from a septic system tank or leach field

The well designed normally wet pond consists of a permanent pool of water, overlying zone in which runoff control volumes are stored, and a shallow littoral zone along the edge of the permanent pool that acts as a biological filter. All stormwater pond designs shall include a sediment forebay at the inflow to the basin to allow heavier sediments to drop out of suspension before the runoff enters the permanent pool. Additional pond design features include an emergency spillway, maintenance access, safety bench, pond buffer and appropriate native landscaping.

Proper geometric design is essential to prevent hydraulic short circuiting which results in failure of the pond to achieve adequate levels of pollutant removal. The minimum length-to-width ratio for the permanent pool shape is 1.5:1, and should ideally be greater than 3:1 to avoid short-circuiting. In addition ponds should be wedge-shaped when possible so that flow enters the pond and gradually spreads out, improving the sedimentation process. Baffles, pond shaping or islands are encouraged and can be added within the permanent pool to increase the flow path.

Maximum depth of the permanent pool should generally not exceed 8 feet to avoid stratification and anoxic conditions. Minimum depth for the pond bottom should be 4 feet. Deeper depths near the outlet will yield cooler bottom water discharges that may mitigate downstream thermal effects.

Side slopes approaching the pond shall not exceed 4:1 without safety precautions or if mowing is anticipated and should terminate on a safety bench. The safety bench requirement may be waived if slopes are gentler than 4:1.

The perimeter of all deep pool areas should be surrounded by two benches: safety and aquatic. For larger ponds, a safety bench extends approximately 15 feet outward from the normal water edge to the toe of the pond side slope. The maximum slope of the safety bench should be 6%. An aquatic bench extends inward from the normal pool edge (15 feet on average) and has a maximum depth of 18 inches below the normal pool water surface elevation.

As an additional measure of safety, perimeter fencing may be required at the Planning Commission's discretion. Steep slopes and depths will be used to determine if a perimeter fence is necessary. It is preferred that the proposed pond(s) be located adjacent to a public ROW if at all possible.

The sediment forebay should consist of a separate cell, formed by an acceptable barrier. A fixed vertical sediment depth marker shall be installed in the forebay to measure sediment deposition over time. The bottom of the forebay maybe hardened

to make sediment removal easier. Inflow channels are to be stabilized with flared riprap aprons, or the equivalent. Inlet pipes to the pond can be partially submerged. Exit velocities from the forebay must be non-erosive.

Flow control from a normally wet pond is typically accomplished with the use of a concrete or corrugated metal riser and barrel. The riser is a vertical pipe or inlet structure that is attached to the base of the pond with a watertight connection. The outlet barrel is a horizontal pipe attached to the riser that conveys flow under the embankment. The riser should be located within the maintenance access, safety and aesthetics. Higher flows pass through openings or slots protected by trash racks further up on the riser. After entering the riser, flow is conveyed through the barrel and is discharged downstream. Anti-seep collars should be installed on the outlet barrel to reduce the potential for pipe failure.

Riprap, plunge pools or pads, level spreaders, or other energy dissipaters are to be placed at the outlet of the barrel to prevent scouring and erosion. If a pond daylights to a channel with dry weather flow, care should be taken to minimize tree clearing along the downstream channel, and to reestablish a forested riparian zone in the shortest possible distance.

The principal spillway opening should not permit access by small children, and end walls above pipe outfalls greater than 48 inches in diameter should be fenced to prevent access. Warning signs should be posted near the pond to prohibit swimming and fishing in the facility.

Vector control shall be included in the maintenance plan for any normally wet pond. As an example; fish such as *Gambusia* can be stocked in a normally wet pond to aid in mosquito prevention. A fountain or solar-powered aerator should be used for oxygenation of water in the permanent pool.

#### ALTERNATIVE STORMWATER MANAGEMENT:

The City of Semmes seeks to promote Low Impact Development (LID) methods as an alternative means to manage stormwater. Low Impact development methods may be utilized to off-set detention requirements.

Bioretention Systems include raingardens, bioswales, constructed wetlands, stormwater planters or other vegetated areas using conditioned planting soil beds, planting materials and a filter medium to promote filtering of the stormwater runoff within a shallow depression area. The bioretention system should promote infiltration, provide storage of the design storm event, provide an underdrain to prevent stagnant water and provide for emergency overflow outlet. Bioretention system volumes may be designed by NRCS curve number methodology or the rational method based on post-development flows and allowable pre-developed flows for the 25-year design storm event. Areas directly contributing to these facilities may be fully excluded from detention requirements.

Rainwater collection systems include cisterns, rain barrels and other devices that provide permanent retention in storage tanks that allow the re-use of rainwater for irrigation of site landscaping. Rainwater collection system design requires the design to provide for the collection of the required storm event and provide the demand from irrigation or use to empty the storage device. Rainwater collection systems may be designed by NRCS curve number methodology or the rational method based on post-development flows and allowable pre-developed flows for the 25-year design storm event. Areas directly contributing to these facilities may be fully excluded from detention requirements.

Infiltration trenches are excavated trenches with stone or gravel backfill to form a subsurface basin allowing for infiltration. The Engineer should take care when designing infiltration trenches to insure the surrounding soils will allow infiltration. The system design should provide for the prevention of clogging and allow routine maintenance. Infiltration trenches may be designed by NRCS curve number methodology or the rational method based on post-development flows and allowable pre-developed flows for the 25-year design storm event. Areas directly contributing to these facilities may be fully excluded from detention requirements.

Porous or permeable paving systems contain pores or separation joints allowing water to flow through the paving surface into the base material and promoting infiltration. Areas appropriate for permeable paving should have a maximum slope of 2% slope, and should not be in a seasonally wet area. Permeable paving areas should not be adjacent to building foundations unless measures are taken to prevent infiltration under the structure. Use of porous or permeable paving systems shall allow a reduction in the curve number for these areas covered by these surfaces. The allowable NRCS Curve Number (CN) for permeable paving shall be 80. The allowable "c" factor for use with the rational method for permeable paving shall be a 0.80.

Grass swales and greenspace areas may be utilized to allow a reduction in the post-developed time of concentration.

Alternative designs using low impact development techniques shall determine the required storage and treatment utilizing a 25-year design storm event based on either the NRCS curve number methodology or the Rational Method computation (also known as FAA method for Pond volume determination).

The Engineer shall determine the ability of site soil conditions to provide infiltration and shall provide underdrains and emergency overflow devices for each LID method employed on the project site to prevent on-site and off-site flooding.

### **3.2.7 Water Quality Treatment**

New development and construction resulting in the addition or redevelopment of 5000 square feet or more of impervious area shall provide for water quality treatment of all developed areas

WATER QUALITY TREATMENT shall be provided by detaining the first 1 inch of runoff and provide for its release over a minimum time period of 24 hours and maximum time period of 72 hours. The modified discrete SCS Curve Number method shall be used to calculate the required water quality volume based on the following equation:

$$WQV = 3630 * [(0.9*IA)+(0.2*PA)+(0.01*VA0)]$$

WQV = Water quality volume, cubic feet

IA = Impervious areas, acres

PA = Permeable areas, acres

VA = Vegetated areas, acres

Impervious areas shall be considered any hard surface such as roads, parking, asphalt, concrete, roofs, etc. Retention or detention pond surface areas for the 25-year design storm event shall be considered impervious areas.

Permeable areas shall be considered any pervious paving system including pervious concrete, permeable pavers, gravel, confined grass systems for parking, etc.

### 3.2.8 Stormwater Concept Plan

The subdivider or agent shall provide a Stormwater Concept Plan during the project proposal conference (Subdivision Regulations 2.2). The Concept Plan shall be a statement or drawing describing the manner in which stormwater from the proposed development will be controlled to minimize stormwater impacts to downstream areas and provide for the prevention of pollutant discharge from the site.

### 3.2.9 Offsite Contributory Areas

The design of stormwater management systems shall include and analysis of all upstream contributory areas. Upstream areas draining through stormwater management facilities shall be accounted for in engineering calculations and design. Stormwater systems shall have the capacity to convey flows from the 25-year design storm event from upstream areas without surcharge.

## 3.3 Operation and Maintenance of Stormwater Facilities

The City of Semmes will accept for maintenance only the stormwater management facilities that are located in a public ROW accepted by the City. The City will NOT accept stormwater management facilities on private property or in an easement.

Any liability associated with the design, performance and operation of the facility remains with the owner and the owner's engineer.

Operation and maintenance of the detention facility is the responsibility of the property owner. The owner's engineer shall be responsible for instructing the owner in the proper operation and maintenance of the facility. Prior to Final Plat approval by the Planning

Commission a completed Stormwater Facility Maintenance Agreement (Appendix A) shall be submitted to the City for future maintenance responsibility.

Annual inspections shall be conducted by the City Engineer or his authorized designee of stormwater management areas and outfalls within the City of Semmes. These inspections shall note the condition of the detention/retention basin and outfall integrity, maintenance, erosion, or sedimentation. Entry to the stormwater facilities shall be granted by the owner, developer, or property owners association. Deficiencies of the stormwater facilities will be communicated to the owner, developer, or property owners association and those deficiencies shall be corrected within fourteen days or as practicable as conditions may allow.

**3.3.1 Final Acceptance of Stormwater Facilities**

Upon completion and stabilization of each stormwater facility, the developer shall provide a copy of the final ADEM inspection report to the City. Stormwater facilities shall not be deeded unto the Homeowners Association or similar entity until the City of Semmes has reviewed said report and the final plat is recorded at Mobile County Probate.

**3.4 Drainage and Maintenance Common Areas**

Drainage and maintenance common areas shall be illustrated and annotated on the plats for all stormwater management facilities.

**3.4.1 Maintenance Common Areas**

All stormwater management areas with the exception of parking lots shall be included as part of the common area of the development. The limits of the common area shall extend ten (10) feet beyond the maximum anticipated ponding area for a base flood event.

**3.4.2 Drainage Common Areas**

Drainage common areas with a minimum width of fifteen (15) feet shall be provided within the stormwater management area connecting the tributary pipes and the discharge system along the most suitable routing for elimination of the stormwater. Also drainage common areas shall be required for areas traversed by an existing waterway and may be required for areas traversed by an existing watercourse. The drainage common area, if required by the Planning Commission, shall be on both sides of the existing waterway or water course to a distance that is adequate to discharge flood waters without cumulatively increasing the water surface elevation of more than one foot.

# 4 EROSION & SEDIMENT CONTROL

Developments shall adhere to the City of Semmes Design and Construction Standards for the design of the Erosion and Sediment Control Plan and the implementation, maintenance and inspection of adequate, effective Best Management Practices for the control of erosion and sedimentation.

## 4.1 Purpose

During the construction process, soil is most vulnerable to erosion by wind and water. This eroded soil endangers water resources by reducing water quality and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates repair of sewers and ditches, and the dredging of watercourses. In addition, clearing and grading during construction causes the loss of native vegetation necessary for terrestrial and aquatic habitat, and to provide a healthy living environment for the citizens of Semmes. As a result, the purpose of this section is to safeguard persons, protect property, prevent damage to the environment and promote the public welfare by guiding and regulating the design, construction, use, and maintenance of land disturbance in the City of Semmes.

## 4.2 BMP Permits

- A. Best Management Practices Permits shall be required for land disturbing activities that uncover more than 500 square feet of ground except land disturbances as noted below.
- B. BMP Permits shall not be required for the following activities, however, Best Management Practices must be used regardless:
  - 1. Any emergency activity that is immediately necessary for the protection of life, property, or natural resources.
  - 2. Existing nursery, silviculture and agricultural operations conducted as a permitted main or accessory use.

## 4.3 Erosion and Sediment Control Plan

- A. Applicable for developments classified as multi family, subdivisions, commercial, and industrial construction.
- B. Plan shall be designed by a qualified credential professional (QCP) such as a duly licensed professional engineer and shall meet or exceed the standards presented in the "Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas" (Alabama Handbook)

C. Plan shall at a minimum include the following:

1. Map identifying topography, natural features such as watercourses, waterways, and wetlands, and proposed construction areas.
2. Proposed contours and slopes.
3. Sequence of construction of the development, such as clearing and grading, drainage installation, utility installation, infrastructure and building construction, and landscaping.
4. Erosion and sediment controls used throughout all phases of construction and details of permanent soil stabilization methods to be used at completion.
5. Provisions for maintenance of erosion and sediment controls and periodic inspections for effectiveness of controls.
6. Erosion Controls and Sediment Controls shall both be addressed.
7. Silt fencing and hay bales alone will be considered an inadequate BMP plan.

D. Submittal, Review, and Approval Procedures:

1. Erosion and Sediment Control Plan shall be submitted as required by the Semmes Subdivision Regulations, the Semmes Planning Commission, or the City Engineer.
2. Review of each Erosion and Sediment Control Plan shall be within thirty (30) days of submittal to determine the plan's conformance with these provisions.
3. The City shall, in writing:
  - a. Approve the plan if it meets and/or exceeds the standards set forth in the Alabama Handbook.
  - b. Approve the plan with reasonable, justifiable conditions to accomplish objectives of the provisions.
  - c. Disapprove the plan, indicating deficiencies and procedure for submitting a revised plan.

E. Modifications to the Plan

1. Major amendments to the Erosion and Sediment Control Plan, such as the redesign of BMPs or removal of BMPs, shall be submitted to the City Engineer and shall be processed and approved, or disapproved, in the same manner as the original plan.
2. Minor modifications to the Erosion and Sediment Control Plan, such as the use of additional temporary BMPS, may be addressed on site as needed to ensure compliance with the provisions.

### 4.4 Erosion and Sediment Control Contract

- A. Applicable for all construction including single family residential construction.
- B. In lieu of an approved erosion and sediment control plan prepared by a QCP, single and double family residential construction may complete an erosion and



sediment control contract. This contract is a legally binding agreement between the property owner and the City wherein the property owner agrees to implement BMPs as needed for the subject project.

- C. The contract shall include the BMPs to be used during the construction process and the final soil stabilization measures to be implemented.
- D. The landowner and/or contractor shall comply with all requirements as described within this document.

### 4.5 Design Requirement

Erosion control practices, sediment control practices, and waterway crossings shall meet the design criteria set forth in the most recent version of the Alabama Handbook for Erosion Control, Sediment Control and Stormwater Management on Construction Sites and Urban Areas and shall be adequate to prevent transportation of sediment from the site to the satisfaction of the City of Semmes.

#### A. Clearing and Grading

1. Clearing and grading of natural resources, such as wetlands, waterways, and watercourses, shall not be permitted, except when in compliance with all other chapters of this Code and as permitted by the United States Army Corps of Engineers and the Alabama Department of Environmental Management, if applicable.
2. Clearing techniques that retain natural vegetation and natural drainage patterns are encouraged.
3. Phasing shall be required on all sites disturbing greater than five (5) acres, with the size of each phase to be established at plan review and as approved by the City of Semmes. The Planning Commission may allow exceptions on a case by case basis due to a justifiable discrepancy.
4. Clearing, except, as necessary to establish sediment control devices, shall not begin until all initial sediment control devices have been installed.
5. Cut and fill slopes shall be no greater than 3:1, except as approved by the City of Semmes to meet other community or environmental objectives.

#### B. Erosion Control

1. Soils must be stabilized by temporary or permanent erosion control within fourteen (14) days after clearing or inactivity in construction.
2. If vegetative erosion control methods, such as seeding, have not become established within four (4) weeks of planting or installation, the City of Semmes may require that the site be reseeded, solid sodded, or that a non-vegetative option be temporarily employed.
3. On steep slopes or in drainage ways, special techniques that meet design criteria outlined in the Alabama Handbook shall be used to ensure soil stabilization.



4. Soil stockpiles must be stabilized at the end of each work week or if significant rainfall is anticipated. The perimeter of stockpiles shall have a class A silt fence installed.
5. Techniques shall be employed to prevent the blowing of dust or sediment from the site onto adjacent properties.
6. Techniques shall be employed to divert upland runoff around disturbed slopes.
7. Adjacent properties shall be protected by the use of level spreaders in combination with and downstream of concentrated outfalls from any stormwater management structures.

### C. Sediment Controls

1. Sediment controls shall be provided in the form of sediment basins or sediment traps and perimeter sediment controls.
2. Where possible, sediment basins shall be designed in a manner that allows adaptation to provide long term stormwater management.
3. Adjacent properties shall be protected by the use of a vegetated buffer strip, in combination with perimeter sediment controls.
4. Ditches longer than 200 linear feet shall include intermediate check dams appropriate for the soil conditions and expected stormwater flows.

### D. Waterways and Watercourses

1. When a watercourse must be crossed regularly during construction, a temporary stream crossing shall be provided and an approval obtained from the United States Army Corps of Engineers.
2. When in-channel work is conducted, the channel shall be stabilized after the work is completed.
3. All on-site stormwater conveyance channels shall be designed according to the criteria outlined in the Alabama Handbook.
4. Outlets of all pipes and paved channels shall have adequate stabilization to prevent erosion. Riprap may be required for stabilization if vegetative measures prove to be ineffective at controlling erosion in waterways or watercourses.

### E. Construction Site Access

1. A stabilized construction access shall be required on all developments in order to ensure sediment is not tracked onto public streets from the construction site. Unpaved parking and equipment storage areas must have stabilized construction access as well, and if these areas are existing and permanently used areas, property owners will be expected to comply with these regulations even if no site or building construction is associated with the sediment tracking.
2. If sediment tracking occurs on public streets, the property owner or developer will be required to remove accumulated sediments from streets and ditches.

### F. Completion of Construction Activities

1. All open channels and ditches shall be permanently vegetated upon final inspection. Seed and mulch shall not be accepted. If sod is used on slopes, comers will need to be pinned per the Alabama Handbook, and the sod must have an established root system prior to acceptance.
2. Common areas, such as detention basins shall be permanently stabilized upon final inspection. Seed and mulch shall not be accepted.
3. All construction waste and debris, silt fences, hay bales, inlet protection, and other temporary BMPs shall be removed prior to final inspection. Only temporary BMPs installed for the next phase of construction, such as home building, will be allowed to remain for the final inspection.

## 4.6 Inspections

- A. The City of Semmes shall conduct random and scheduled inspections of the construction activity and shall determine compliance or non-compliance with the provisions of this document. The following inspections shall be performed at a minimum on multi family, subdivision, commercial and industrial developments:
  1. Immediately after erosion and sediment controls are in place.
  2. After clearing and grading has been completed.
  3. After drainage has been installed.
  4. After streets and curb and gutter have been completed.
  5. Before construction completion.
- B. The owner or contractor shall make regular inspections of all control measures throughout the construction process to ensure the overall effectiveness of the Erosion and Sediment Control Plan.



# 5

## ROAD DESIGN STANDARDS

### 5.1 General Requirements

The arrangement, character, extent, location and grade of all streets shall conform, when reasonable, to an acceptable plan and shall be integrated with all existing and planned streets.

The Planning Commission shall determine the classification of City streets. The City's subdivision regulations provide Planning Design Standards for new streets.

### 5.2 Minimum Design Requirements for Roadway Construction

All new roadways, public or private, shall be constructed by the subdivider/developer at his cost and centered on the centerline of the provided right-of-way. It shall be the responsibility of the design or geotechnical engineer to certify that the road buildup accommodates the site specific design loading conditions. All new public roadways shall be asphalt paved, at a minimum, to the guidelines of the City of Semmes, Alabama, which include, but are not limited to, the following requirements:

- a) Alabama Department of Transportation Standard Specifications for Highway Construction, current edition;
- b) 1.5" minimum compacted thickness of improved bituminous concrete (asphalt) wearing surface;
- c) 0.20 gallons per square yard prime coat;
- d) 8" minimum thickness sand-clay base or 6" minimum thickness crushed aggregate base;
- e) 6" minimum compacted sub-grade (existing if suitable and imported if required);
- f) removal and replacement of unsuitable sub-grade material;
- g) 2.2% sloped crown
- h) 2 ea. 16" wide (minimum) strips of solid sod along each side of the asphalt or along the curb with seed and mulch or solid sod extending the remainder of the right of way width or to the edge of the disturbed area, whichever is greater;
- i) 1' clearance between the bottom of the base and the estimated seasonal high groundwater elevation as provided in a geotechnical report, signed and sealed by a registered professional engineer;
- j) Streets to be constructed within an area subject to flood shall be constructed at a minimum of 2 feet above base flood elevation. Fill may be used for streets. Drainage openings shall be so designed as not to restrict the flow of flood waters or increase flood heights (See Section 3.2.2).
- k) Minimum grade shall be 0.5% along the centerline. Maximum grade shall be 10% along the centerline.

All private roads shall be constructed to the same standard as public roads enumerated above and within these standards.

### 5.3 Pervious Materials

Developers are encouraged to incorporate pervious materials into their designs. Pervious materials used may include brick pavers, pervious asphalt, pervious concrete, and other pervious materials as agreed to by the City Engineer.

The pervious material shall be maintained following industry standards at no less than once per calendar year or per manufacturer's instructions if the manufacturer's requirements are more stringent. Failure to perform the required maintenance activities could result in action by the City.

### 5.4 Curbs and Gutters

The purposes for requiring curbs and/or gutters are drainage control, and reduction of maintenance costs. The curbs and gutters shall be designed with a twenty-four (24) inch minimum curb and gutter or roll curb and shall be composed of concrete with a 3,000 psi minimum compressive strength required in 28 days, unless concrete of greater strength is required by the construction drawings. Minimum face of curb radius at all intersections shall be at least thirty-seven (37) feet. Curb radii at intersections with higher speed roadways may be increased per direction from the City Engineer.

### 5.5 Intersection, Tangents, and Horizontal Curves

Intersections shall be approximately at right angles, and shall not be less than 75° at any intersection. Intersections shall not include more than four (4) basic street legs or approaches which do not include merging lanes, deceleration lanes, "Y" intersections, and traffic circles.

Minimum radii of horizontal curves (centerline) shall not be less than 400 feet on arterial streets, 200 feet on collector streets, and 100 feet on local streets. There shall be a minimum tangent length of 100 feet provided between all reverse curves and from intersections. Alternative designs may be recommended by the City Engineer and approved by the Planning Commission with hardship justification provided.

Intersections shall be designed with a relatively flat grade wherever practical, but must always be designed to drain stormwater away from the driving surface to prevent ponding.

Traffic capacity improvements may be required. Traffic study may be required based on the number of lots proposed. The City subdivision regulations contain traffic study triggers.

## 5.6 Cul-de-Sac and Dead End Roadways

Fire apparatus access roads shall be provided in accordance with the *International Fire Code, Appendix D, and latest adopted edition*. Permanent dead end roadways with cul-de-sacs or fire-code compliant turn-a-round shall not exceed 600 feet in length without specific approval from the Planning Commission.

Temporary dead-end streets greater than 150 feet in length are required to have a temporary turnaround constructed of an all-weather surface at least 96 feet in diameter and have a right-of-way at least 120 feet in diameter. Said temporary turnaround shall be graded properly to drain, and be maintained by the developer until the roadway is continued. If adjacent property is not owned by the developer or no other preliminary plat is approved at the time of final inspections, a permanent cul-de-sac or fire code compliant turn-a-round shall be required.

## 5.7 Engineer's Certification

A "Certification of Professional Engineering Design" shall accompany each site plan submittal. Said certification shall have an original signature and seal of the design engineer. Please refer to Appendix B for additional information.



# 6 SITE DEVELOPMENT STANDARDS

## 6.1 Requirements

Items A through N below are required for the submittal of a commercial site plan. The site plan, if considered commercial or assembly occupancy by the building code, shall either require Planning Commission approval prior to issuance of a building permit or may be approved administratively.

Commercial Site Plan Trigger: A commercial site plan shall be reviewed and the approval process shall be determined in accordance with:

1. Planning Commission Approval is Required when:
  - a. A new project is proposed with new buildings(s) and associated improvements on a vacant site with no existing structures.
  - b. An addition to an existing building that totals more than 25% of the original permitted gross building footprint.
  - c. A renovation that increases the total combined impervious surfaces (building, parking lot, etc...) of the lot by more than 25%.
2. City Staff Approval of a Commercial Site Plan: Should a project not be required to earn Planning Commission approval as outlined in (1) above, a commercial site plan may be administratively approved by City Staff in conjunction with a building permit request.
3. Staff Determination: City staff is authorized to make a determination if a proposed project meets sections 1 or 2 above. Staff reserves the right to send any and all applications for engineering review for determination.
4. Staff Waivers: Staff is not authorized to grant a waiver of City requirements. If a waiver is requested, needed, or desired by the applicant the commercial site plan shall be considered in full by the Planning Commission.
5. Drainage and Erosion: All drainage and erosion control requirements apply to each and every project regardless of the approval process. Staff's decision may be appealed to the Semmes Planning Commission for final determination.
6. Interior Renovations/ Remodels: All interior remodels and renovations that do not result in site changes are specifically excluded from Planning Commission review and may be administratively approved by City Staff.



## Submittal Requirements

- A. The property being developed must be part of a legal lot of record prior to being considered for commercial site plan or land disturbance approval.
- B. Two(2) copies of the Site Plan package at the time of application. Site plan drawings shall bear the original seal of an Alabama Licensed Professional Engineer.
- C. A vicinity map shall be included on the Site Plan. Include a legal description of property. Provide a copy of the executed lease if site is a lease situation.
- D. The plan shall clearly indicate all accesses to City, County, or State roads. Maximum driveway width at the right-of-way is 48 feet. The minimum driveway width at the right-of-way is 20 feet. Driveways will slope away from roads a minimum of ½ inch per foot for a minimum of 8 feet. Stormwater runoff is not allowed to enter into the travel way. There shall be a adequate cover above any driveway pipe. Only reinforced rubber gasketed concrete pipe (15" min.) or reinforced ram-neck joint arch concrete pipe can be used in the City right-of-way. If driveways are existing then they shall be noted as existing with radii, pipe size, length, and headwalls detailed on the site plan. Existing drainage under existing driveways must be brought up to current standards along with the site plan approval. All accesses to City right-of-way shall be improved to match existing roadway surfacing at a minimum.
- E. The Contractor shall adhere to the *Alabama Handbook for Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas by the Alabama Soil and Water Conservation Committee, Volumes 1 and 2, 2003 Edition*, to prevent sediment laden storm water runoff or eroded materials from leaving the construction site.
- F. The Site Plan shall have existing and proposed surveyed contours at one (1) foot intervals. The Site Plan shall have all proposed site improvements detailed as to dimensions and construction materials. All surface materials shall be clearly identified and a weighted storm water runoff coefficient shall be determined. Existing facilities shall be noted as "Existing". The drainage of the property shall be kept in its natural drainage area. Only that portion of the property that presently drains to the right-of-way in its pre-development state can be drained to the right-of-way after the property is developed.
- G. Pre-development and post-development drainage calculations based on 2-year, 5-year, 10-year, 25-year, 50-year and 100-year storms, prepared and sealed by an Alabama Licensed Professional Engineer shall be submitted with the Site Plan. A stormwater detention or retention facility with first flush treatment will be required as described above. The engineer shall submit calculations insuring that the detention system will also safely pass the resulting flow of a 100-year post-

development storm with freeboard as required by these standards. A note should be placed on the site plan stating which entity other than the City of Semmes is responsible for the maintenance of the stormwater facility.

- H. The Site Plan shall also have all existing and proposed drainage detailed. Any required stormwater basin shall be detailed. The control structure and outfall shall be profiled, and an emergency relief provided. Calculations demonstrating the storage volume, sizing of the orifice, and discharge rate are required and shall bear the original seal of an Alabama Licensed Professional Engineer. Stormwater facilities shall not be located within any buffer zones or front building setbacks as described by the Semmes Subdivision Regulations.
- I. The flood zone designation, community panel number, map number & date as obtained from the most recent Federal Emergency Management Agency Flood Hazard Boundary Map, shall be shown on the Site Plan. Flood zones (and floodways, if established), shall be delineated on the site plan. If the commercial site contains a flood zone designated as A1 - A30 or "AE" zone, then the limits of the "A" flood zone shall be delineated by physical elevations corresponding to the established base flood elevation. If improvements which involve filling are proposed within an "A" zone without an established base flood elevation, or an "A" zone with a B.F.E. without a delineated floodway, the developer shall provide a flood study with the commercial site plan submittal insuring that the proposed fill will not raise the water surface elevation more than allowed by the City of Semmes Floodplain Management Ordinance. No improvements will be permitted within a designated floodway.
- J. The design engineer shall show the AASHTO stopping sight distances for each proposed intersection with an existing road. Sites that significantly impact the existing traffic patterns shall depict the adjacent accesses to the right-of-way.
- K. A note shall be added to the site plan requiring the contractor to contact the Semmes City Engineer or Mobile County Public Works Superintendent, as applicable, to discuss the conditions of the City or County maintained road leading to the construction site prior to performing any work on the site or in the public right-of-way.
- L. If the site is located adjacent to a State right-of-way, a copy of the permit from the Department of Transportation shall be supplied to the City of Semmes prior to approval by the City of Semmes.
- M. If the site is located adjacent to a Mobile County right-of-way, a copy of the permit from Mobile County shall be supplied to the City of Semmes prior to approval by the City of Semmes.
- N. All materials and workmanship proposed shall meet or exceed the requirements of the *Alabama Department of Transportation Standard Specifications for Highway Construction*, Latest Edition.

## 6.2 Engineer's Certification

A "Certification of Professional Engineering Design for Site Plan Approval of a Commercial Site Plan" shall accompany each site plan submittal. Said certification shall have an original signature and seal of the design engineer. Please refer to Appendix B for additional information.

# 7 INSPECTION AND TESTING REQUIREMENTS

## 7.1 General Inspection Requirements

### 7.1.1 Pre-Construction Conference

Commercial site plan project may require a pre-construction construction at the discretion of the building official. All subdivisions shall provide a pre-construction conference as required by the subdivision regulations.

### 7.1.2 Notification of Work

The City shall be notified at each phase of construction as specified below.

- a) It shall be the duty and responsibility of the developer and/or contractor to give written notice to the City Public Works Supervisor or his/her designee, a minimum of one working day prior to starting any major phase of construction. Major phases of construction include but are not limited to: Clearing, site grading or roadway grading and excavation, installation of drainage or utilities, placing base materials, foundation excavation for structures, placing prime and asphalt, any work within existing public right-of-ways, etc.
- b) The developer and/or contractor shall also notify the City Public Works Supervisor and his/her designee in writing the day work is resumed after a delay of more than five working days.
- c) After all BMPs have been installed and/or constructed, but before any other construction takes place, the contractor shall notify the City Public Works Supervisor to inspect the BMPs as indicated on the Erosion and Sediment Control Plan.

Failure to provide proper notification as specified shall be grounds for non-acceptance of roadways by the City of Semmes.

### 7.1.3 Embankment Sections

Roadway fill or embankment of earth material shall be placed in uniform layers, full width, and not exceeding eight inch thickness (loose lift measurement). Each layer shall be compacted so that a uniform specified density is obtained. Compaction tests shall be run at the frequency and location as directed by the geotechnical engineer retained to perform testing services and who will be providing final materials certifications to the City.

Said geotechnical engineer will be required to certify that all materials were placed in accordance with ALDOT Standard Specifications and Materials requirements. Additional layers of fill shall not be added until directed by said geotechnical engineer. For all density requirements refer to Section 210 and Section 306 of the "Alabama Department of Transportation Standard Specifications for Highway Construction."

**7.1.4 Subgrade**

The subgrade shall be compacted and properly shaped prior to the placing of base materials. At a minimum, the top six (6) inches of the roadbed subgrade shall be modified, with the work being performed as described in Section 230, Roadbed Processing, of the "Alabama Department of Transportation Standard Specifications for Highway Construction". The project geotechnical engineer may require additional subgrade preparation due to existing soil conditions. If the preliminary geotechnical report indicates a need for additional subgrade preparation, such recommendations must be followed in order for the City to accept the project at completion. Subgrade preparation shall be full width of the base section and extend twelve (12) inches on each side outside of the width of the lowest base material as described in Section 8.1.5 below. The embankment or subgrade shall be inspected by proof rolling, under the supervision of the project geotechnical engineer or his/her designee, with a fully loaded (minimum 20 CY) tandem axle dump truck to check for soft or yielding areas. Any unsuitable materials shall be removed and replaced with a suitable material compacted to a density as required by ALDOT Standard Specifications.

**7.1.5 Base**

Base course shall meet the requirements according to the "Alabama Department of Transportation Standard Specifications for Highway Construction." Base course shall have a minimum thickness as required by Section 5.2 of these regulations unless a thickness greater than specified is recommended by the project geotechnical engineer, and shall extend twelve (12) inches outside of curb sections or from the edge of asphalt, whichever is greater. The density requirements for compaction shall be in accordance with Section 306 of the "Alabama Department of Transportation Standard Specifications for Highway Construction." Developer/Engineer may submit an alternate base design method for recommendation by the City Engineer and approval by the Planning Commission. Design should be based on a proven and accepted engineering test or method for the site conditions that exist.

**7.1.6 Roadway Pavement**

All roads and/or streets shall be paved and comply with the following:

- a) All roads shall be improved according to the standard outlined in Section 5.2 and the City Subdivision regulations
- b) Crown slopes shall match required slopes within a tolerance of +/- 0.2%. Slopes found to be out of tolerance will be cause for non-acceptance or require milling and overlay in curb and gutter sections or overlay in non-curb sections.

- c) Profile grades shall meet finished profile requirements as detailed in Section 410 of the Alabama Department of Transportation Standard Specifications for Highway Construction. Non-conforming roadways will not be accepted by the City of Semmes.

### 7.1.7 Final Inspection

Subdivision shall require inspections and final inspections as stipulated in subdivision regulations. Commercial site plans shall be inspected for conformance to the plans and any Planning Commission contingencies prior to the issuance of CO.

## 7.2 Testing Requirements

All testing shall be conducted by an independent testing laboratory with oversight by a licensed professional geotechnical or materials engineer. The testing laboratory shall have the proper equipment and personnel necessary to perform the testing of materials used in the required improvements and shall be certified by the Alabama Department of Transportation. Proof of certification must be submitted to the City Engineer or his/her designee, prior to construction. The Geotechnical Engineer shall determine which tests shall be scheduled and performed, in accordance with the ALDOT Standard Specifications, Construction Manual, and Testing Manual. A schedule of proposed testing must be submitted to the City Engineer or his/her designee for review and approval at the time of the Pre-Construction Conference. The tests normally consist of, but are not limited to:

- 1) Soil Gradation
- 2) Moisture Content
- 3) Soil Compaction
- 4) Base Compaction
- 5) Approved Asphalt mix design(s)
- 6) Approved Concrete mix design(s)
- 7) Approved Materials Submittals
- 8) Concrete Test reports
- 9) Asphalt Test reports

The developer shall notify the Geotechnical Engineer, or his/her designee, twenty-four hours prior to any required tests. Copies of all test reports along with a letter stating that all materials were placed in accordance with ALDOT Specifications must be provided to the City Engineer upon request for final inspection.



# 8

# UTILITY REQUIREMENTS

## 8.1 Utilities

All utilities shall be underground.

## 8.2 Utility Easements

The City of Semmes prefers that all utilities be placed within the public right-of-way. When it is not feasible or is cost prohibitive to install a utility service within the public right-of-way, utility easements may be provided. Utility easements shall be parallel with existing and/or proposed property lines and shall be centered along said property lines (i.e., half of the utility easement shall lie on each adjacent lot). All utility easements shall be a minimum width of 15 feet. The utility easements shall contain all necessary utilities, to include sewer, water, gas, power, phone and cable.

## 8.3 Design Standards

All utility design shall be in accordance with the latest design standards of the utility owner providing service to the development (i.e., the Mobile Area Water and Sewer System or South Alabama Utilities). Coordination with the utility shall be the responsibility of the Developer. The City of Semmes will not be responsible for the cost of installation, upgrades, or repairs to any utility system. All new utilities that require road crossings shall be bored. No open cuts will be allowed. Sufficient right-of-way should be dedicated to the City or to the Utility to support the extra space required for boring operations.

## 8.4 Fire Protection

All proposed developments shall meet the fire flow requirements of Appendix B of the *International Fire Code, latest adopted edition*.

Fire hydrants shall be placed as required by Appendix C of the *International Fire Code, latest adopted edition* and should be similar in type to what is currently found throughout the City. This shall be coordinated with and approved by the Fire Chief of the City of Semmes.

Any reference to fire protection is subject to approval by the Fire Chief and/or recommendation by City Engineer and approval by the Planning Commission.





# A STORMWATER FACILITY MAINTENANCE AGREEMENT

## City of Semmes Stormwater Facility Maintenance Agreement

THIS AGREEMENT, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_ by and between (Insert Full Name of Owner) \_\_\_\_\_ hereinafter called the "Landowner", and the City of Semmes, hereinafter called the "City." WITNESSETH, that

WHEREAS, the Landowner is the owner of certain real property described as (Tax Map/Parcel Identification Number) \_\_\_\_\_ as recorded by deed in the land records of Mobile County, Alabama, Deed Book \_\_\_\_\_ Page \_\_\_\_\_, hereinafter called the "Property".

WHEREAS, the Landowner is proceeding to build on and develop the property; and WHEREAS, the Site Plan/Subdivision Plan known as \_\_\_\_\_, (Name of Plan/Development) hereinafter called the "Plan", which is expressly made a part hereof, as approved or to be approved by the City, provides for detention of storm water within the confines of the property; and

WHEREAS, the City and the Landowner, its successors and assigns, including any homeowners association, agree that the health, safety, and welfare of the residents of Semmes, Alabama, require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the City requires that on-site stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Landowner, its successors and assigns, including any homeowners association.

NOW, THEREFORE, in consideration of the foregoing premises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The on-site stormwater management facilities shall be constructed by the Landowner, its successors and assigns, in accordance with the plans and specifications identified in the Plan.
2. The Landowner, its successors and assigns, including any homeowners association, shall adequately maintain the stormwater management facilities. This includes all pipes, channels or other conveyances built to convey stormwater to the facility, as well as all structures, improvements, and vegetation provided to control the quantity and quality of the stormwater. Adequate maintenance is herein defined as good working condition so that these facilities are performing their design functions.
3. The Landowner, its successors and assigns, shall inspect the stormwater management facility and submit an inspection report annually. The purpose of the inspection is to assure safe and proper functioning of the facilities, The

inspection shall cover the entire facilities, berms, outlet structure, pond areas, access roads, etc. Deficiencies shall be noted in the inspection report.

4. The Landowner, its successors and assigns, hereby grant permission to the City, its authorized agents and employees, to enter upon the Property and to inspect the stormwater management facilities whenever the City deems necessary. The purpose of inspection is to follow-up on reported deficiencies and/or to respond to citizen complaints. The City shall provide the Landowner, its successors and assigns, copies of the inspection findings and a directive to commence with the repairs if necessary.
5. In the event the Landowner, its successors and assigns, fails to maintain the storm water management facilities in good working condition acceptable to the City, the City may enter upon the Property and take whatever steps necessary to correct deficiencies identified in the inspection report and to charge the costs of such repairs to the Landowner, its successors and assigns. This provision shall not be construed to allow the City to erect any structure of permanent nature on the land of the Landowner outside of the easement for the stormwater management facilities. It is expressly understood and agreed that the City is under no obligation to routinely maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the City.
6. The Landowner, its successors and assigns, will perform the work necessary to keep these facilities in good working order as appropriate. In the event a maintenance schedule for the stormwater management facilities (including sediment removal) is outlined on the approved plans, the schedule will be followed.
7. In the event the City pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, City attorney fees, costs and expenses of collection and the like, the Landowner, its successors and assigns, shall reimburse the City upon demand, within thirty (30) days of receipt thereof for all actual costs incurred by the City hereunder.
8. This Agreement imposes no liability of any kind whatsoever on the City and the Landowner agrees to hold the City harmless from any liability in the event the stormwater management facilities fail to operate properly. The Landowner also agrees to indemnify the City for any alleged liability under this agreement or in regard to the facilities.
9. This Agreement shall be recorded among the land records of Mobile County, Alabama, and shall constitute a covenant running with the land, and shall be binding on the Landowner, its administrators, executors, assigns, heirs and any other successors in interests, including any homeowners association.

# B

# ENGINEER'S CERTIFICATION

## CERTIFICATION OF PROFESSIONAL ENGINEERING DESIGN & CONSTRUCTION FOR SITE PLAN APPROVAL OF A COMMERCIAL SITE PLAN

I, \_\_\_\_\_, a Professional Engineer registered in the State of Alabama, Registration Number \_\_\_\_\_, do hereby certify that the commercial site plan for \_\_\_\_\_ that is hereby submitted to the City of Semmes has been designed under my supervision.

I further certify that the drainage system for this commercial site has been designed to meet the design storms criteria and first flush requirements as specified in the City of Semmes Subdivision Regulations and determined by the Rational Method and SCS TR55 method, as applicable, which is the established and accepted state of the art for drainage design in the City of Semmes. This design will ensure that all drainage waters occurring during design storms of 2-yr, 5-yr, 10 yr, 25-yr, 50-yr, and 100 yr magnitude will be released at a rate that is less than or equal to the rate being released in each storm prior to construction of this commercial site as shown on the accompanying drainage calculations submitted with this certification. This design will also ensure that the minimum first flush treatment required by the City of Semmes has been provided.

I further certify that I will watch over and assure to the City that all site work will be performed in accordance with the site plans submitted to the City of Semmes.

I acknowledge that in the event that Certification given herein shall be determined by the City Engineer to be grossly incorrect, the City may thereafter refuse to accept the certification of the undersigned.

NAME \_\_\_\_\_ Signature \_\_\_\_\_

P.E.# \_\_\_\_\_

TITLE \_\_\_\_\_

SEAL

FIRM \_\_\_\_\_

DATE \_\_\_\_\_



# C CHECKLIST FOR COMMERCIAL SITE PLANS

Project: \_\_\_\_\_

Date: \_\_\_\_\_

Engineer: \_\_\_\_\_

Reviewed by: \_\_\_\_\_

*Please provide or address the following topics*

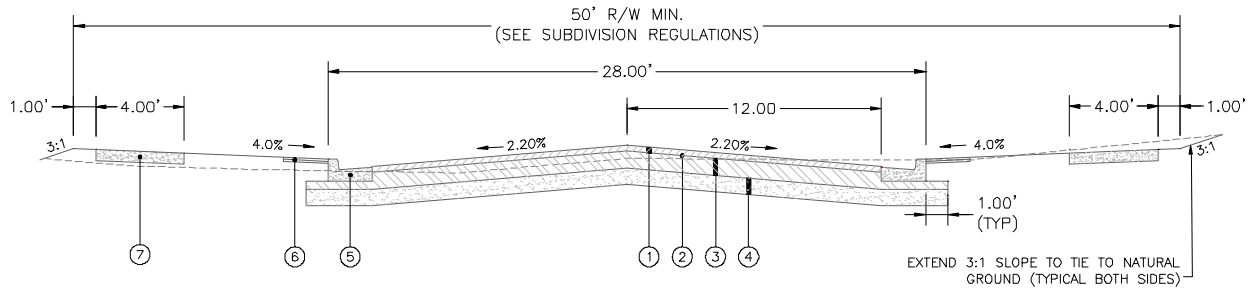
- \_\_\_\_\_ Application/Review fees
- \_\_\_\_\_ Vicinity Map
- \_\_\_\_\_ Scale or note stating "Not to Scale"
- \_\_\_\_\_ North arrow and legend
- \_\_\_\_\_ Legal Description
- \_\_\_\_\_ ADEM Notice of Intent (if over 1 acre soil disturbance)
- \_\_\_\_\_ Plan view showing existing site including all drainage structures and utilities
- \_\_\_\_\_ Plan view showing proposed site plan (may be superimposed on existing site)
- \_\_\_\_\_ Drainage plan showing proposed stormwater routing and site elevations (may be superimposed)
- \_\_\_\_\_ Plans stamped and signed by an Alabama licensed P.E.
- \_\_\_\_\_ Provide a letter by an Alabama licensed Professional Engineer that he/she had been retained for a sufficient amount of time for inspection to certify that the project was built according to the approved plans and that if there are significant changes in the final construction of the project from what was shown on the previously approved plans, new drawings and calculations will be submitted for approval.
- \_\_\_\_\_ Narrative describing existing site conditions and major elements of the project
- \_\_\_\_\_ Topographical details, before and after development (using 1' contours)
- \_\_\_\_\_ Proposed build-up details for standard and heavy duty areas, if used.
- \_\_\_\_\_ Design and width of turnout(s) including radii and profile
- \_\_\_\_\_ Headwall, inlet, and curb & gutter details as per ALDOT specs (if applicable)
- \_\_\_\_\_ Show all applicable sign and striping details as per ALDOT specs

- \_\_\_\_\_ Location and size of proposed and existing drainage pipes
- \_\_\_\_\_ Location of all existing utilities, appurtenances, and drainage structures (it should be determined prior to construction if minimum coverage of utilities will be maintained upon completion of work)
- \_\_\_\_\_ Drainage calculations signed and stamped by an Alabama licensed PE
- \_\_\_\_\_ Stormwater detention is designed and shown
  - \_\_\_\_\_ Provide orifice details and storage depth elevation
  - \_\_\_\_\_ Provide overflow weir and minimum freeboard details
- \_\_\_\_\_ Detention pond maintenance responsibility must be clearly stated on the plans. Where a property owners association is responsible, such an agreement must be recorded prior to final acceptance of the plans.
- \_\_\_\_\_ Engineers evaluation that the receiving stream or storm drainage system can handle the additional flow
- \_\_\_\_\_ Tie to the City's stormwater system underground or explain why this cannot be done.
- \_\_\_\_\_ Sedimentation and erosion control plan (must be detailed and site specific)
  - \_\_\_\_\_ Location of silt fence and hay bales
  - \_\_\_\_\_ Protection of existing and proposed catch basins
  - \_\_\_\_\_ Construction entrance required
- \_\_\_\_\_ Sidewalks are required unless a variance is obtained
- \_\_\_\_\_ Specify curb cuts and sidewalks to City of Semmes and ADA standards
- \_\_\_\_\_ Drainage Narrative meeting requirements of Section 4.1
- \_\_\_\_\_ Drainage map meeting requirements of Section 4.1
- \_\_\_\_\_ Drainage Easements are shown

# D SUPPLEMENTAL DRAWINGS

## E.1 Pavement Details

### E.1.1 Typical Curb & Gutter Section 60 ROW min pavement 22-34

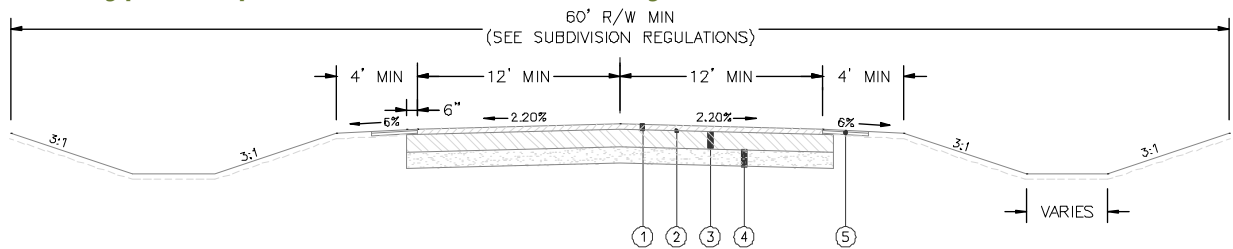


TYPICAL CURB & GUTTER SECTION  
N.T.S.

LEGEND

1. BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1.5" MINIMUM THICKNESS
2. PRIME COAT, 0.20 GALLONS PER SQUARE YARD
3. SAND-CLAY BASE COURSE, 8" MINIMUM THICKNESS OR CRUSHED AGGREGATE BASE COURSE, 6" MINIMUM THICKNESS
4. COMPACTED SUB-GRADE, 6" MINIMUM COMPACTED THICKNESS
5. 24" CURB & GUTTER
6. SOLID SODDING, 32" MINIMUM WIDTH EACH SIDE
7. CONCRETE SIDEWALK, 48" MINIMUM WIDTH, 4" MINIMUM THICKNESS

### E.1.2 Typical Open Ditch Section road way width varies 22-24



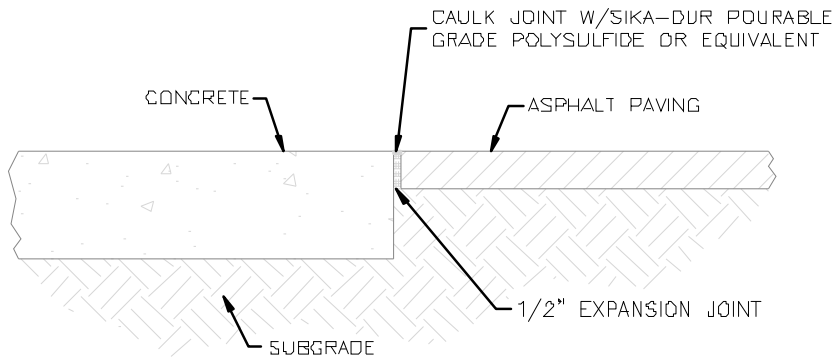
TYPICAL OPEN DITCH SECTION  
N.T.S.

LEGEND

1. BITUMINOUS CONCRETE WEARING SURFACE LAYER, 1.5" MINIMUM THICKNESS
2. PRIME COAT, 0.20 GALLONS PER SQUARE YARD
3. SAND-CLAY BASE COURSE, 8" MINIMUM THICKNESS OR CRUSHED AGGREGATE BASE COURSE, 6" MINIMUM THICKNESS
4. COMPACTED SUB-GRADE, 6" MINIMUM COMPACTED THICKNESS
5. SOLID SODDING, 32" MINIMUM WIDTH EACH SIDE



### E.1.3 Design of Junction Between Rigid and Flexible Pavements

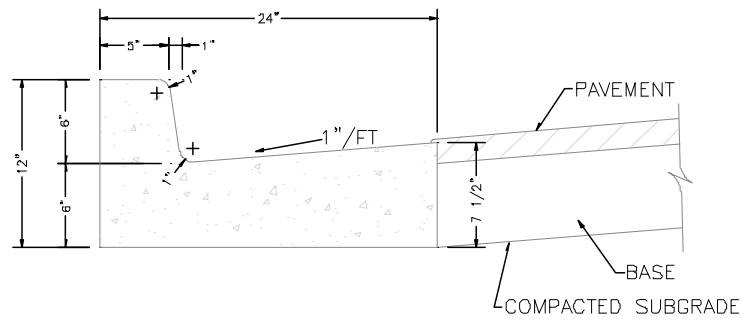


TYPICAL CONCRETE TO ASPHALT CONNECTION

NDT TO SCALE

## E.2 Curb & Gutter Details

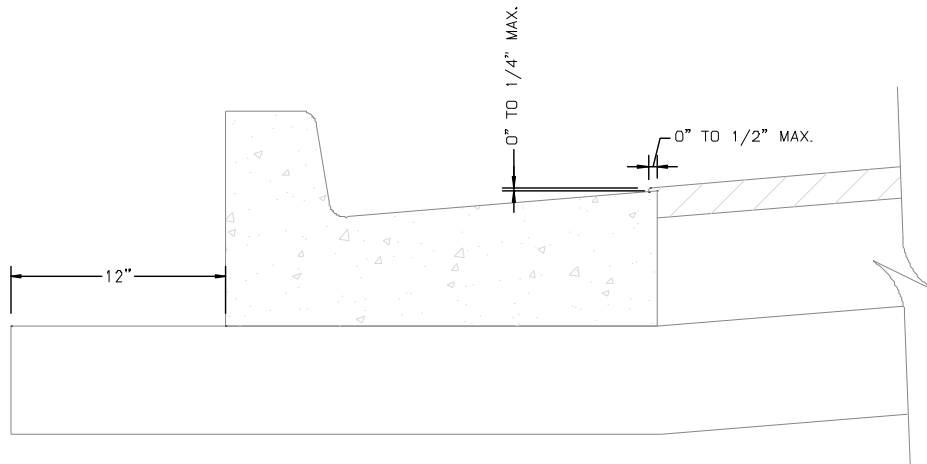
### E.2.1 24" Curb & Gutter (Type "C" Modified)



24" CURB & GUTTER DETAIL  
(TYPE "C" MODIFIED)

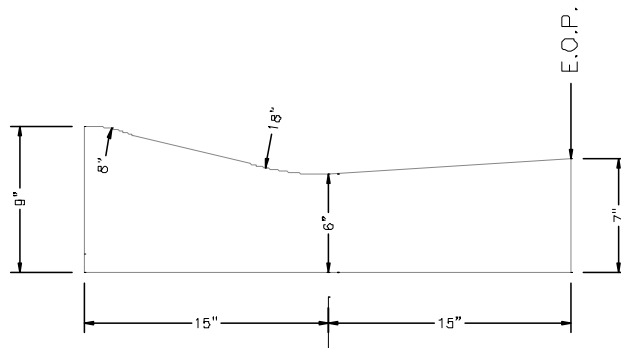
N.T.S.

### E.2.2 Asphalt Overlap Detail



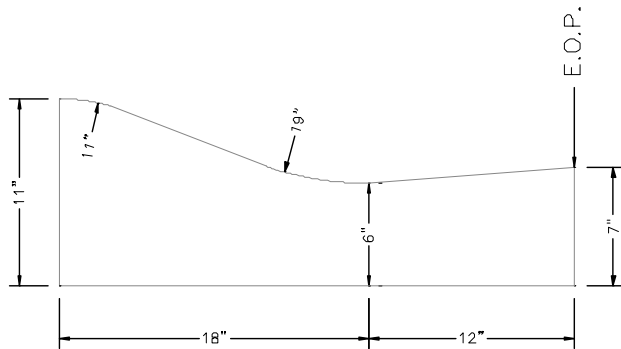
ASPHALT OVERLAP DETAIL  
N.T.S.

### E.2.3 R-3 Roll Type Curb Detail



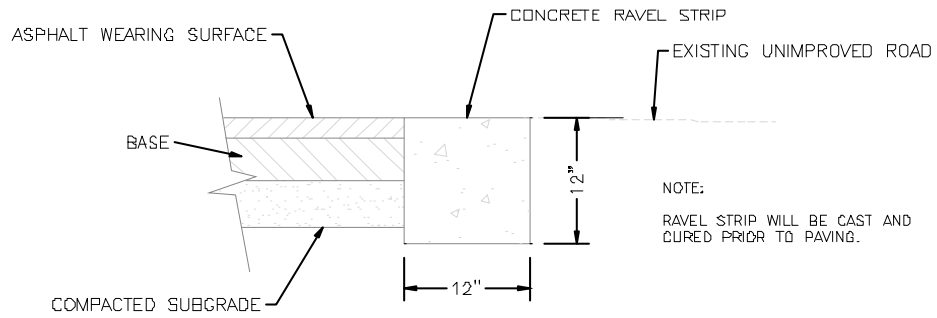
R-3 ROLL TYPE CURB DETAIL  
N.T.S.

### E.2.4 R-5 Roll Type Curb Detail



R-5 ROLL TYPE CURB DETAIL  
N.T.S.

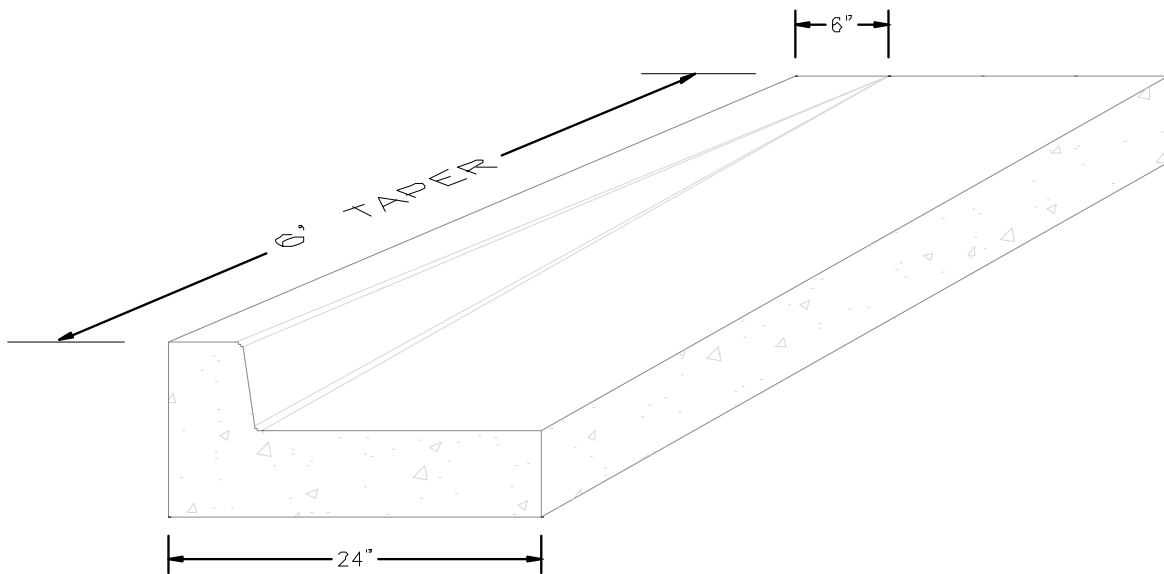
E.2.5 12" Ravel Curb Detail



12" RAVEL CURB  
N.T.S.

E.2.6 Curb and Gutter Taper Detail

TAPER CURB FROM 0" HEIGHT TO 6" HEIGHT OVER 6'

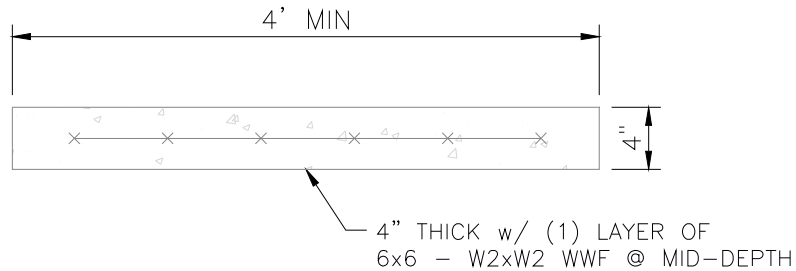


CURB & GUTTER TAPER DETAIL  
N.T.S.

### E.3 Sidewalk Details

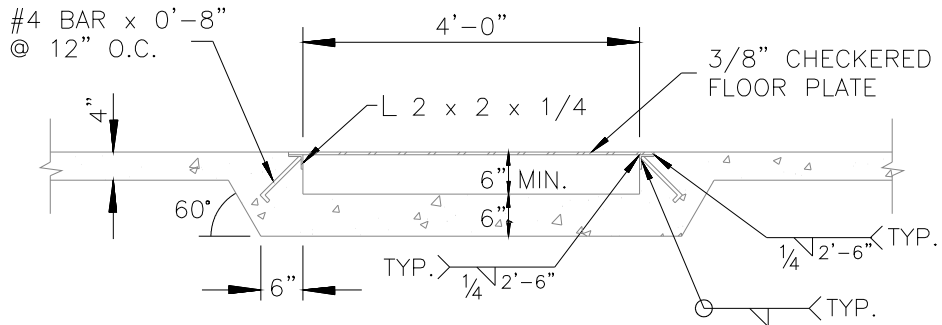
#### E.3.1 Typical Sidewalk Detail 5' min

\*REQ'D CONTROL JOINTS EVERY 4 L.F. & EXPANSION JOINTS EVERY 24 L.F.



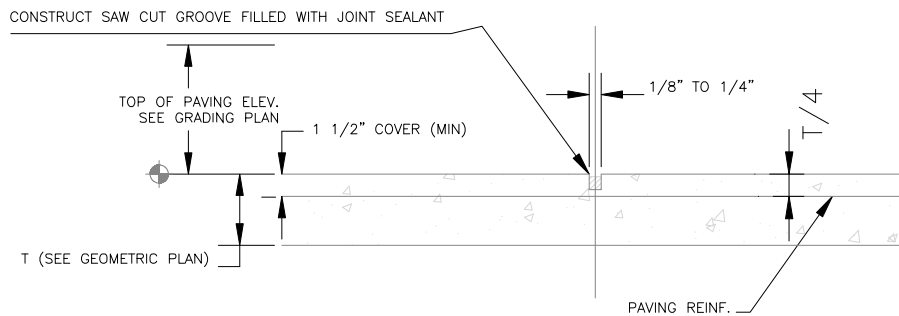
TYPICAL SIDEWALK DETAIL  
N.T.S.

#### E.3.2 Sidewalk Drain Detail

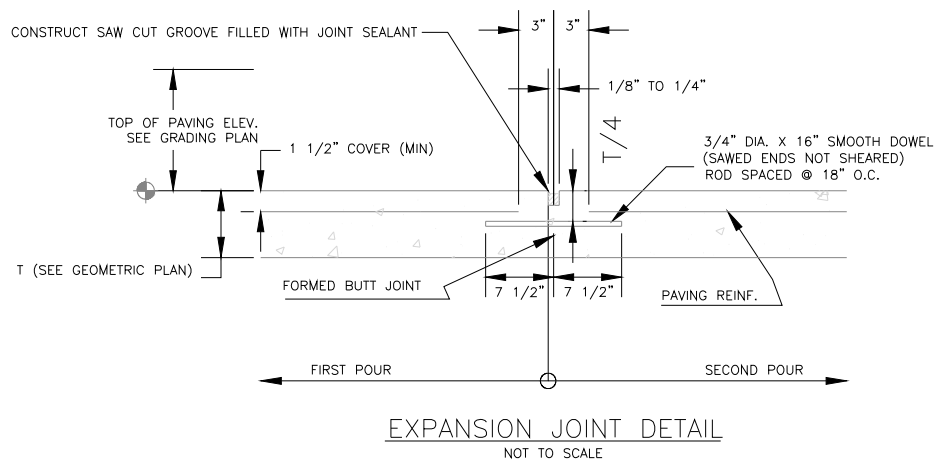


SIDEWALK DRAIN  
N.T.S.

#### E.3.3 Joint Details



SAW CUT JOINT DETAIL  
NOT TO SCALE

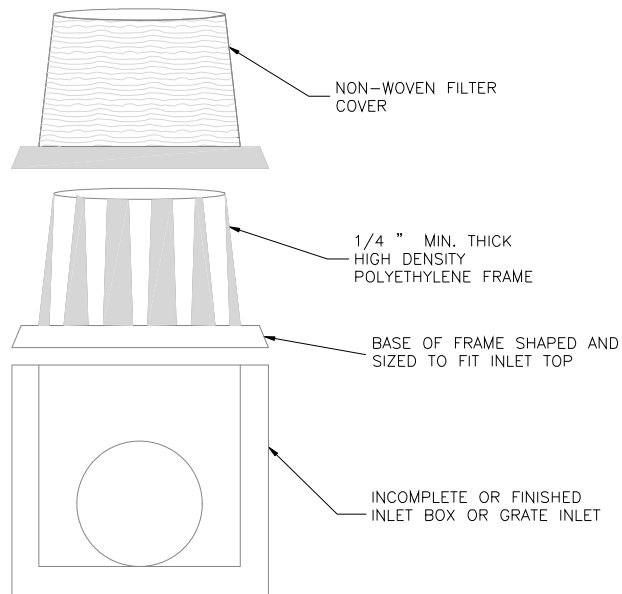


## E.4 Erosion & Sediment Control Details

### E.4.1 Typical Inlet Sediment Barrier Detail

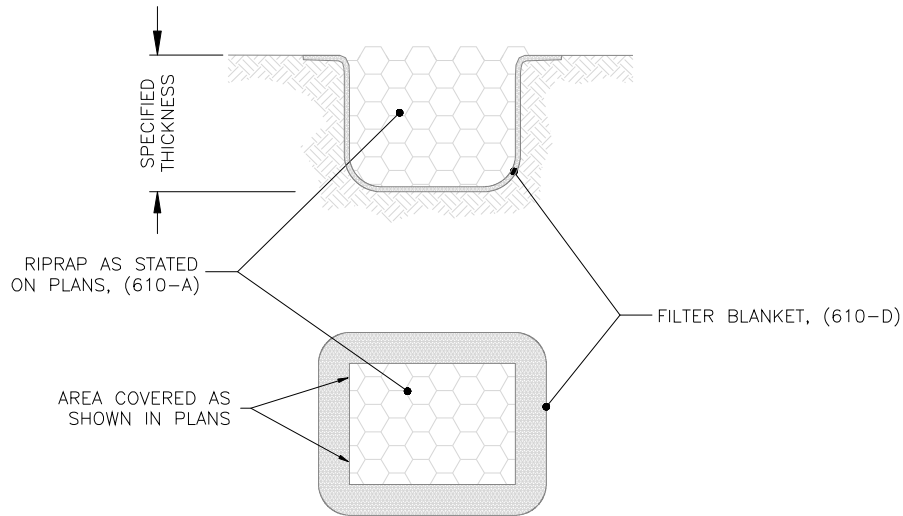
**TYPICAL CONSTRUCTION SEQUENCE FOR SILT-SAVER FRAME & FILTER**

1. EXCAVATE APPROXIMATELY 4" TO 6" BELOW THE TOP OF THE INLET STRUCTURE.
2. PLACE THE FRAME ONTO THE INLET STRUCTURE, ENSURING PROPER SEATING OF FRAME TO STRUCTURE.
3. SLIDE THE FILTER OVER THE FRAME.
4. FILL THE FILTER POCKETS WITH SOIL, #57 GRAVEL OR EQUIVALENT. THE FILTER POCKETS SHOULD BE COMPLETELY FILLED TO ENSURE A GOOD SEAL BETWEEN THE GROUND AND INLET STRUCTURE.
5. BACK FILL AROUND THE FRAME AND FILTER ASSEMBLY IS NOT REQUIRED TO COMPLETE INSTALLATION; HOWEVER, BACK FILLING MAY BE NECESSARY TO COMPLETE EXCAVATION REQUIREMENTS FOR THE SITE.



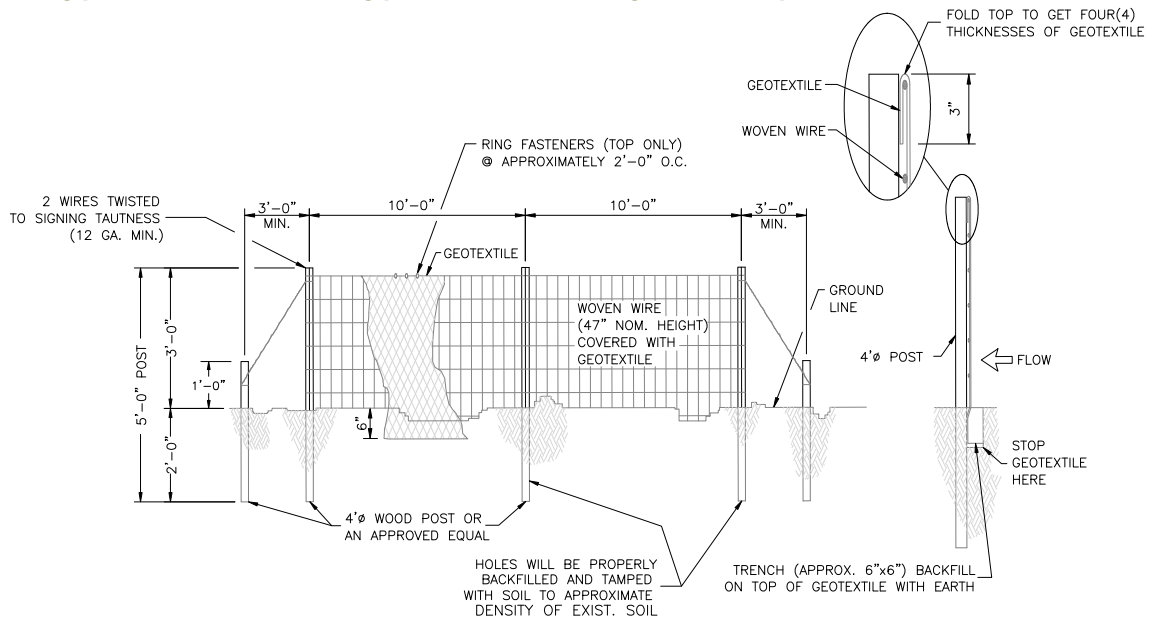
INLET SEDIMENT BARRIER DETAIL  
N.T.S.

E.4.2 Typical Riprap Placement Detail



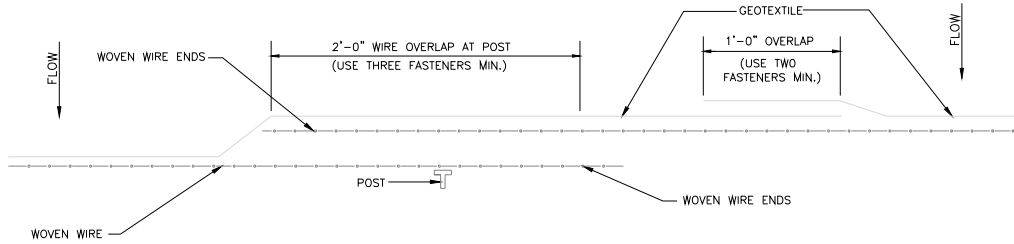
TYPICAL RIPRAP PLACEMENT DETAIL  
N.T.S.

E.4.3 Type "A" Silt Fence Typical Detail Only metal T posts



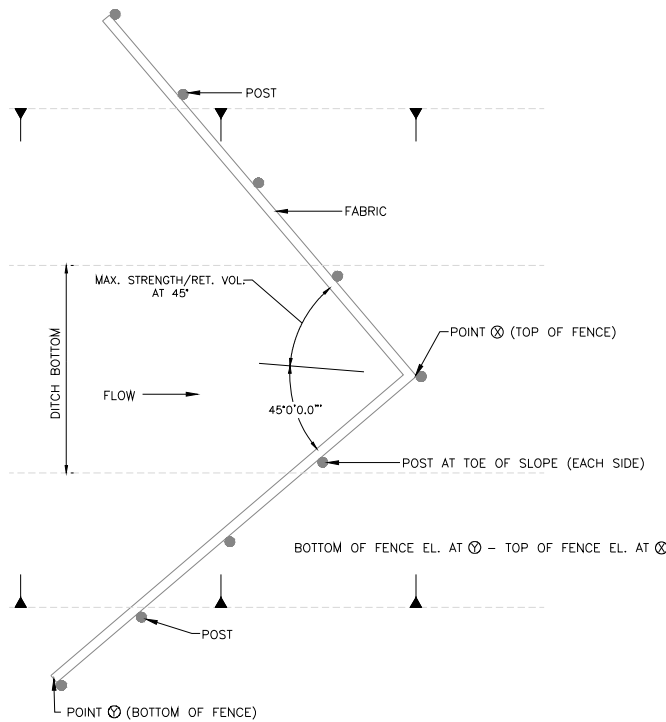
TYPICAL SILT FENCE INSTALLATION SECTION  
(TYPE A)  
N.T.S.

### E.4.4 Required Lapping of Silt Fence



REQUIRED LAPPING OF SILT FENCE (PLAN VIEW)  
NOT TO SCALE

### E.4.5 Silt Fence Ditch Check Detail

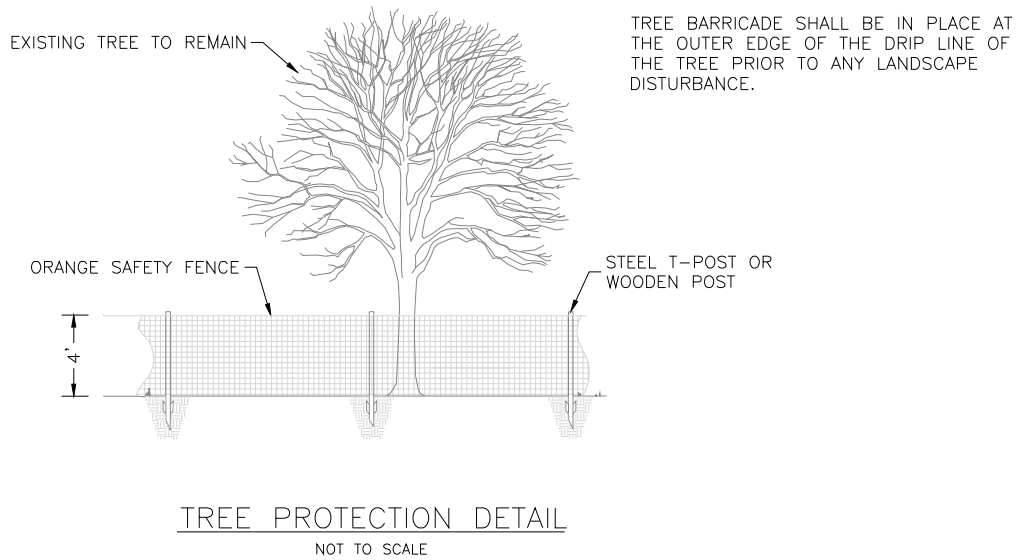


NOTES:

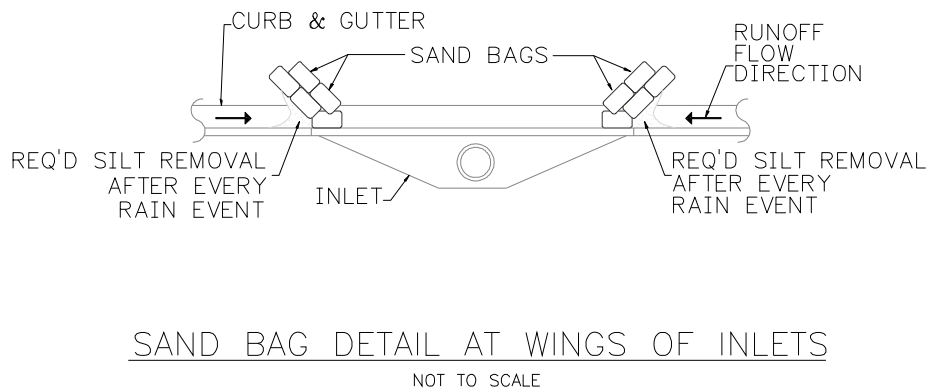
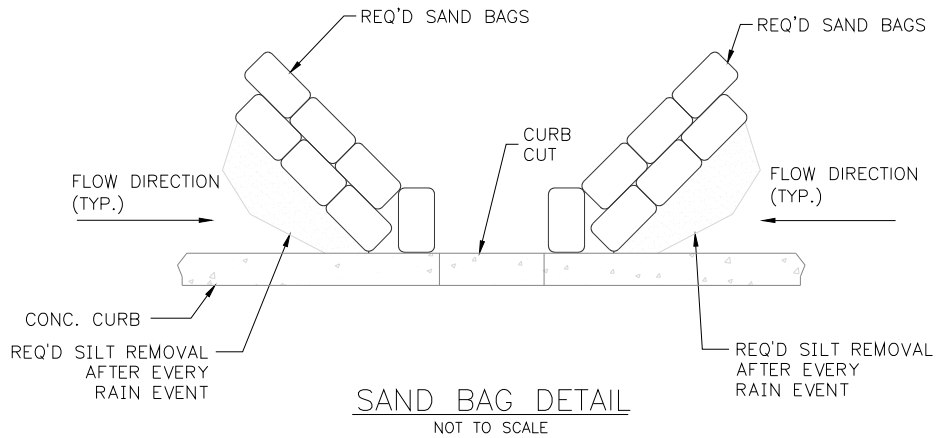
1. ANCHOR AND INSTALL SILT FENCE DITCH CHECK PER DETAILS SHOWN ON SPECIAL DRAWING ESC-200. THE LOCATIONS AND SPACING OF SILT FENCE DITCH CHECKS ALONG A DITCH SHOULD BE 100 FEET UNLESS OTHERWISE SHOWN ON PLANS OR APPROVED BY THE ENGINEER.
2. A "W" SHAPE MAY BE USED FOR WIDER DITCHES.

PLAN VIEW  
SILT FENCE DITCH CHECK  
NOT TO SCALE

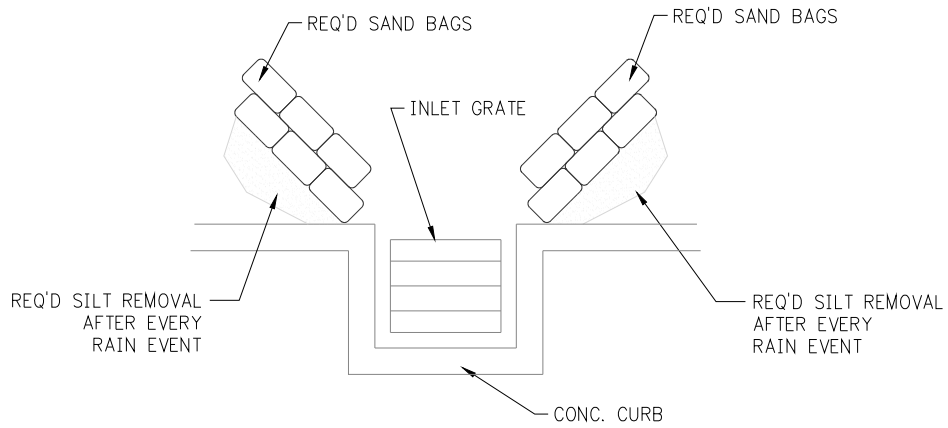
**E.4.6 Typical Tree Protection Detail**



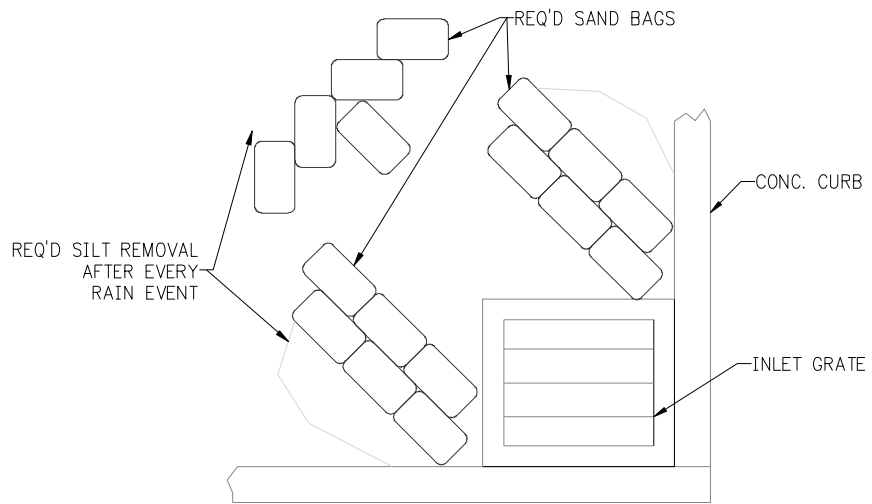
**E.4.7 Sand Bag Placement Details**





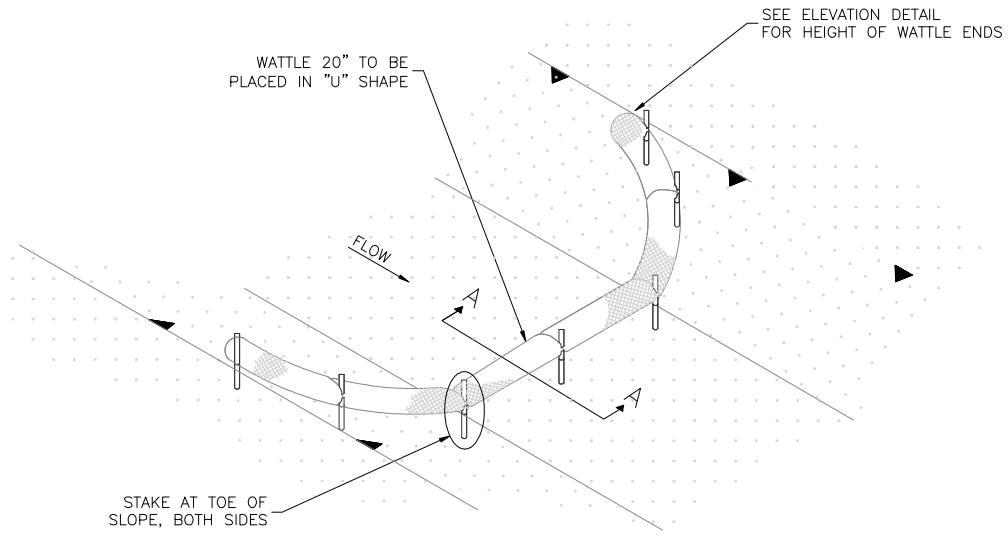


SAND BAG DETAIL AT GRATE INLETS  
NOT TO SCALE

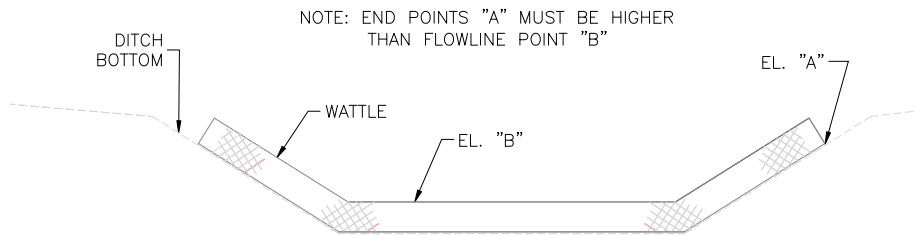


SAND BAG DETAIL AT GRATE INLETS  
NOT TO SCALE

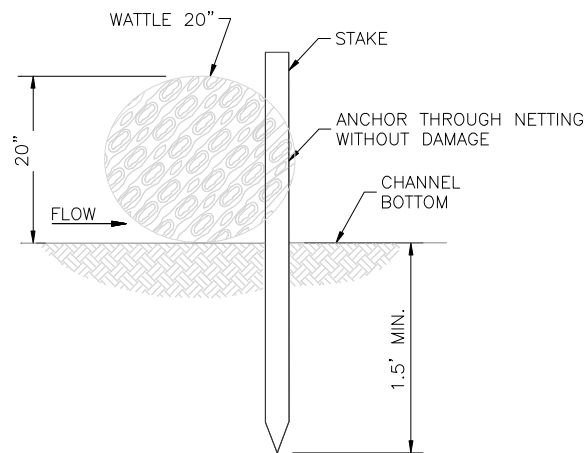
E.4.8 Wattle Details



WATTLE DETAIL (DITCH CHECK)  
N.T.S.



WATTLE ELEVATION DETAIL  
N.T.S.



WATTLE SECTION A-A  
N.T.S.

NOTES:

1. MINIMUM RECOMMENDED PLACEMENT INTERVAL BETWEEN WATTLE DITCH CHECK IS 100' UNLESS SHOWN OTHERWISE ON THE PLANS OR APPROVED BY THE ENGINEER.
2. ANCHORING STAKES SHALL BE SIZED, SPACED, DRIVEN, AND BE OF A MATERIAL THAT EFFECTIVELY SECURES THE CHECK. STAKE SPACING SHALL BE A MAXIMUM OF THREE FEET. ALL NON-DEGRADABLE MATERIALS SHALL BE REMOVED WHEN NO LONGER NEEDED.
3. TRENCHING OF WATTLES MAY BE NECESSARY IF PIPING BECOMES EVIDENT.
4. WATTLES SHOULD BE NOT BE USED IN HARD BOTTOM CHANNELS.