

CHAPTER 1
GENERAL PROVISIONS

1.1 Title

This ordinance shall be known and may be cited and referenced to as the “Storm Drainage, Erosion, and Sediment Control Ordinance of the Town of Monrovia, Indiana” and shall hereafter be referred to as “this ordinance.”

1.2 Purpose

It is the purpose of this ordinance to reduce the hazard to public health and safety caused by excessive storm water runoff and erosion; to reduce the economic hardships caused by excessive storm water runoff and erosion; and to protect, conserve, and promote the orderly development of land and water resources within the regulated area.

1.3 Applicability

This ordinance shall apply to all development which requires the Town of Monrovia Improvement Location Permits and official review and approval of any Town of Monrovia agencies.

Projects that require only individual Improvement Location Permits for a single family dwelling, a two-family dwelling, or their accessory structures are not subject to these requirements.

Minor subdivisions that do not require off-site drainage easements and do not increase either the runoff or release rates, in the opinion of the Plan Commission Staff, are exempt from seeking Plan Commission approval. However, if in the watershed of an existing legal drain, the developer must petition the Morgan County Drainage Board to establish a maintenance fund assessment. In such cases, the Drainage, Erosion, and Sediment Control Plan will be reviewed by the Plan Commission Staff. All other requirements of this ordinance shall apply to the above referenced minor subdivisions.

It is further recognized that land disturbing activities may cause soil loss, siltation, and degradation of natural resources. The erosion control standards of this ordinance are applicable to all land disturbing activities that are necessary for any development regulated by this ordinance. Typical agricultural uses are exempt from this ordinance.

1.4 Conflicting Ordinances

The provisions of this ordinance shall be deemed as additional requirements to minimum standards required by other ordinances of the Town. In the case of conflicting requirements, the most restrictive shall apply.

1.5 Reservation and Appeal

Upon the adoption of these regulations prescribed by Indiana Code 36-7-4-701, the Storm Drainage, Erosion, and Sediment Control Ordinance of Monrovia, Indiana, adopted February 10, 1997, as amended, is hereby repealed.

1.6 Saving Provision

These regulations shall not be construed as abating any action now pending under, or by virtue of, prior existing regulations, or as discontinuing, abating, modifying, or altering any penalty accruing or about to accrue, or as affecting the liability of any person, firm, or corporation, or as waiving any right of the Town Council of the Town of Monrovia under any section or provision existing at the time of adoption of these regulations, or as vacating or annulling any right obtained by any person, firm or corporation, by lawful action of the Town except as shall be expressly provided for in these regulations.

1.7 Policy

It is recognized that streams and drainage channels serving the Town of Monrovia may not have sufficient capacity to receive and convey storm water runoff resulting when land use changed from underdeveloped or agricultural use to a more urbanized use. It is further recognized that deposits of sediment from developments during and after construction can reduce capacities of storm sewers and drainage systems and result in damages to receiving lakes and streams.

Therefore, it shall be the policy of the Town of Monrovia Plan Commission that the storage and controlled release of storm water runoff shall be required of all new development except as exempted in Section 1.3, and redevelopment, certain other new construction in the Town of Monrovia. The storm water release rate of a one hundred (100) year storm event from development, redevelopment, and certain new construction shall not exceed the storm water runoff from a ten (10) year storm event from the land area prior to the new development, redevelopment, or certain new construction or the capacity of its drainage outlet, whichever is more restrictive. There are certain circumstances where detention is not justified or may be detrimental to the overall drainage basin. The Plan Commission may waive detention requirements in these cases. Open ditches with side slopes steeper than 3:1 are not allowed. No open ditch shall be greater than three (3) feet deep.

1.8 Permits For Construction In A Floodway

The 1945 Flood Control Act (Indiana Code 14-28-1) of the State of Indiana prohibits the construction of abodes or residences in or on a floodway. Prior approval of Department of Natural Resources is required for any type of construction, excavation, or filling in or on a floodway. All projects must also comply with the requirements of the Town of Monrovia flood ordinances, when adopted.

All applications made to and granted approval by the Department of Natural Resources or US Army Corps of Engineers do not in any way relieve the owner of the necessity of securing easements or other property rights, permits or approvals from affected property owners and local, state, and federal agencies.

1.9 Wetlands

It shall be the responsibility of landowners or developers to notify and make application to all appropriate state and federal agencies with authority for wetland protection. In cases where federal or state jurisdictional wetlands have been determined to exist, such wetland areas and boundaries shall be indicated on preliminary and final drainage plans.

The Commission will not make determinations of the accuracy of delineation nor extent of jurisdictional wetlands. Approvals required by this ordinance may be deferred until wetland-related approvals have been obtained.

1.10 Establishment Of A Legal Drain

When the Commission determines it is necessary to establish a Legal Drain, each developer must provide the necessary information and meet the requirements of the 1965 Indiana Drainage Code, as amended, for the establishment of a Legal Drain. The Commission shall determine the necessary easements for adequate maintenance of any Legal Drain. This will generally be seventy-five (75) feet on either side of the centerline of the Legal Drain.

1.11 Adequate Drainage Outlets

1. All projects subject to this ordinance must provide drainage outlets whose adequacy is based upon the following standards:
 - A. Use of the outlet will not increase the velocity or rate of outflow above that allowed by this ordinance;

- B. The outlet shall be approved by all involved regulatory agencies including the Commission; and
 - C. Use of the outlet will not cause hardship or compound existing problems.
2. The following outlets will generally not be deemed to be adequate:
- A. An outlet that is not legally and physically accessible and maintainable;
 - B. Overland flow which is not a watercourse as defined by this ordinance;
 - C. Existing or future Town gutters or roadside ditches;
 - D. Agricultural field tiles for surface water; and
 - E. Railroad side ditches without adequate improvements.

1.12 Compliance with 327 IAC 15-5

All land disturbing activities that disturb one half (0.5) acres or more in total must comply with 327 IAC 15-5 (Rule 5) “Storm Water Runoff Associated With Construction Activity.” It shall be the responsibility of the landowners or developers to determine if this rule applies to their project. The Commission will make no determination of the applicability of this rule to individual projects. Copies of Notice of Intent (NOI) Letters shall also be filed with the Town of Monrovia Engineer’s Office prior to the land disturbing activity.

1.13 Compliance

In addition to the requirements of this ordinance, compliance with the requirements set forth in other applicable ordinances with respect to submission and approval of primary and secondary subdivisions, site plan review, improvement plans, building and zoning permits, construction inspections, appeals, and similar matters and compliance with applicable State of Indiana statutes and regulations shall be required.

CHAPTER 2 DEFINITIONS

2.1 Interpretation of Terms or Words

For the purpose of this ordinance, certain terms or words are defined. The words and terms used shall be interpreted as follows:

1. The word “person” includes a firm, association, organization, partnership, trust, company, corporation, or other legal entity, as well as an individual;
2. The present tense includes the future tense, the singular number includes the plural, and the plural number includes the singular;
3. The word “shall” is a mandatory requirement; the word “may” is a permissive requirement; the word “should” is a preferred requirement;
4. The words “used” or “occupied” include the words “intended, designed, constructed, converted, altered, or arranged to be used or occupied”;
5. The word “lot” includes the word “tract, plot or parcel”; and
6. Any word or term not defined herein shall be given a meaning found in a standard English dictionary.

2.2 Definitions

For the purpose of this ordinance, the following definitions shall apply:

1. ADMINISTERING AUTHORITY: The Plan Commission of the Town of Monrovia, Indiana.
2. AGRICULTURAL LAND USE: Use of land for the production of animal or plant life including forestry, pasturing or yarding livestock and planting, growing, cultivating, and harvesting crops for human or livestock consumption.
3. CAPACITY OF A STORM DRAINAGE FACILITY: The maximum flow that can be conveyed or stored by a storm drainage facility without causing damage to public or private property.

4. CHANNEL: A natural or artificial watercourse which periodically or continuously contains moving water or which forms a connecting link between two (2) bodies of water. It has a defined bed and banks which serve to confine the water.
5. COMMERCIAL LAND USE: Use of land for the manufacturing, wholesale or retail sale of goods or services.
6. COMMISSION: The Plan Commission of the Town of Monrovia, Indiana.
7. COMPENSATORY STORAGE: An artificial volume of storage within a floodplain used to balance the loss of natural flood storage capacity when artificial fill or structures are placed within the floodplain.
8. CONTIGUOUS: Adjoining or in actual contact with.
9. TOWN STAFF OR TOWN PLAN COMMISSION STAFF: Staff as appointed by the Plan Commission.
10. CULVERT: A closed conduit used for the passage of surface drainage water under a roadway, railroad, canal or other impediment.
11. DETENTION BASIN: A facility constructed or modified to restrict the runoff of storm water to a prescribed maximum rate, and to detain for a specified period of time the excess waters that accumulate upstream from the outlet.
12. DETENTION STORAGE: The temporary detaining or storage of storm water in storage basins, under predetermined and controlled condition.
13. DRAINAGE AREA: The area from which water drains to a point of consideration.
14. DROP MANHOLE: A manhole having a vertical drop pipe connecting the inlet pipe to the elevation of the outlet pipe. The vertical drop pipe shall normally be located immediately outside the manhole.
15. DRY BOTTOM DETENTION BASIN: A basin designed to be completely dewatered after having provided its planned detention of runoff during a storm event.
16. EROSION: The detachment and movement of soil, sediment or rock fragments by water, wind, ice or gravity.

17. EROSION AND SEDIMENT CONTROL MEASURE: A practice or a combination of practices to control erosion and resulting off-site sedimentation.
18. EROSION AND SEDIMENT CONTROL PLAN: A written description and drawings of pertinent information concerning erosion and sediment control measures designed to meet the requirements of this ordinance.
19. FLOOD ELEVATION: The maximum level of high waters for a flood of given return period and rainfall duration.
20. FLOOD OR FLOODWATER: Water which overflows the banks of a lake or watercourse.
21. FLOOD HAZARD AREA: Any floodplain, floodway, floodway fringe, or any combination which is subject to inundation by the regulatory flood or any floodplain as delineated by Zone A on the current Flood Hazard Boundary Map of the Federal Emergency Management Agency.
22. FLOODPLAIN: The area adjoining the river or stream which has been or may be covered by floodwaters. It consists of both the floodway and floodway fringe.
23. FLOOD PROTECTION GRADE: An elevation which is a specific distance above the regulatory flood elevation as established by agencies having jurisdiction.
24. FLOODWAY: See Regulatory Floodway.
25. FLOODWAY FRINGE: That portion of the floodplain lying outside the floodway which is inundated by the regulatory flood.
26. FOOTING DRAIN: A drain pipe installed around the exterior of a basement wall or foundation or located in a crawl space to prevent water from entering a basement or crawl space.
27. GRADIENT: The inclination or slope of a channel, conduit or natural ground surface expressed as a ratio of the vertical rise or fall to the corresponding horizontal distance.
28. IMPACT AREAS: Areas defined by the Commission which are unlikely to be easily drained because of one or more factors including, but not limited to, any of the following: Soil type; topography; land where there is not an adequate outlet; a floodway or floodplain; land within seventy-five (75) feet of each bank of legal drain or within seventy-five (75) feet from the centerline of any legal tile drain; or within recorded drainage easements of a legal drain.

29. IMPERVIOUS: A material through which water cannot pass or through which water passes with difficulty.
30. IMPROVEMENT LOCATION PERMIT: A permit stating that the proposed erection, construction, enlargement or moving of a building or structure complies with the provisions of the Town of Monrovia Zoning Ordinance.
31. INLET: An opening into a storm sewer system for the entrance of surface storm water runoff, more completely described as a storm sewer inlet.
32. JUNCTION CHAMBER: Structure used to facilitate the flow from one or more conduits into a main conduit.
33. LAND DISTURBING ACTIVITY OR NONAGRICULTURAL LAND DISTURBING ACTIVITY: Any manmade change of the land surface including removing vegetative cover, excavating, filling, transporting, and grading. It includes any activity requiring the Town of Monrovia Improvement Location Permit, but does not include agricultural land uses.
34. LEGAL DRAIN: Any drain that has been accepted and is maintained by the Plan Commission in accordance with the 1965 Drainage Act and its amendments.
35. MANHOLE: Storm sewer structure through which a person may enter to gain access to a storm sewer or enclosed structure. A manhole may also be an inlet for the storm sewer system.
36. OUTFALL: The point or location where storm runoff discharges from a sewer, channel or detention facility.
37. PEAK FLOW: The maximum rate of flow of water at a given point in a channel or conduit resulting from a specified storm or flood of a given return period or duration.
38. PERIMETER DRAIN: A tile drain located around an absorption field in compliance with appropriate governmental regulations.
39. RAINFALL INTENSITY: The rate of rainfall expressed as the amount of rain occurring within a given duration, normally expressed in inches per hour.
40. REACH: A specified length of a river, channel, or conduit.

41. REGULATED AREA: All of the land under the jurisdiction of the Town of Monrovia Plan Commission.
42. REGULATORY FLOOD: A flood with a peak having a probability of occurrence of one (1) percent in any given year, which is commonly referred to as a one hundred (100) year flood as calculated by a method and procedure which is acceptable to the Commission. If a permit for construction in the floodway is required by the Indiana Department of Natural Resources, the regulatory peak discharge shall be calculated by the method and procedure acceptable to the Commission and the Indiana Department of Natural Resources.
43. REGULATORY FLOODWAY: The channel of a river or stream and those portions of the floodplain adjoining the channel which are reasonably required to carry and discharge the peak flow of the regulatory flood of any river or stream.
44. RELEASE RATE: The amount of water released from a storm water control facility per unit of time.
45. RETURN PERIOD: The average interval of time within which a given rainfall event will be equaled or exceeded once. A flood having a return period of one hundred (100) years has a one (1) percent probability of being equaled or exceeded in any one (1) year.
46. RUNOFF: The portion of precipitation from such sources as rainfall, snow melt, or irrigation water that flows over or under the ground surface and arrives at the point of consideration as surface water.
47. RUNOFF COEFFICIENT: A factor in the rational formula which relates the ratio of peak runoff to rainfall and considers such factors as ground cover, soil types, and watershed configuration.
48. SEDIMENT: Material of soil and rock origin transported, carried or deposited by water.
49. SIPHON: A closed conduit, a portion of which lies above the hydraulic grade line resulting in a pressure less than atmospheric and requiring a vacuum within the conduit to start flow. An inverted siphon is used to carry flow under an obstruction.
50. SITE: The entire area included in the legal description of the land on which the land disturbing activity is proposed in the permit application.

51. SPILLWAY: A waterway in or about a hydraulic structure for the escape of excess water.
52. STILLING BASIN: A structure used to dissipate the energy and/or velocity of flowing water.
53. STORAGE DURATION: The length of time that water may be stored in any storm water control facility.
54. STORM SEWER: A closed conduit for conveying collected storm water.
55. STORM WATER DRAINAGE SYSTEM: All means, natural or manmade, used for conducting storm water to, through or from a drainage area.
56. SUBSURFACE DRAIN: A tile drain installed for the purpose of lowering the ground water table.
57. URBANIZATION: The development, change or improvement of any parcel of land consisting of one or more lots for residential, commercial, industrial, instructional, recreational or public utility purposes.
58. WATERCOURSE: Any natural or manmade drainage way having a defined channel and banks and into which storm water runoff or floodwaters flow either regularly or intermittently.
59. WATERSHED: See Drainage Area.
60. WET BOTTOM DETENTION BASIN/RETENTION BASIN: A basin designed to retain a permanent pool of water plus capacity to detain and release excess runoff.
61. WETLANDS: Those areas which have hydric soils and that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and that, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

CHAPTER 3
DRAINAGE EROSION AND SEDIMENT CONTROL PLAN PROCEDURES

3.1 INFORMATION REQUIREMENTS

The applicant shall submit to the Commission, drainage calculations detailing runoff before and after the proposed project which demonstrate compliance with this ordinance. In addition, the applicant shall submit a set of plans of sufficient detail and clarity to allow the Commission to evaluate project compliance with this ordinance. The maximum sheet size shall be 24" x 36" and as much information as possible should be shown on as few sheets as possible. The plans must be prepared under the supervision of and certified by a registered land surveyor or a professional engineer licensed by the State of Indiana.

3.2 SITE PLAN REQUIREMENTS

The plans submitted shall include the following information:

1. Existing Conditions
 - A. Project name, developer, project engineer or surveyor, their address and telephone number, legal description, date of plans and any revisions, scale of plan, and north point;
 - B. Area Vicinity Map detailing project environs, current zoning, adjoining property owners, and street lines within one thousand (1,000) feet of the project boundaries;
 - C. Topography based on mean sea level elevation at a minimum one (1) foot interval for the project site and any adjoining areas whose topography may affect project drainage. If the drainage area is extensive, an additional map of sufficient clarity must be provided.
 - D. The location of existing streams, lakes, ponds, watercourses, and other flood water runoff channels, the extent of the floodplain at the established one hundred (100) year flood elevation (regulatory floodway), and the limits of the floodway, all properly identified;
 - E. The existing location of legal drains, surface and subsurface farm drains, inlets, and outfalls, easements that are visible or of record, existing seeps, springs, and wells that are visible or of record;

- F. Existing storm and sanitary sewers, inlets, or outfalls, existing septic tank systems, and treatment plant outlets and utilities;
- G. Existing structures;
- H. Identification of jurisdictional wetlands in conformance with Section 1.7;
- I. Boundary and acreage of project site indicated by a heavy solid line based on a traverse with angular and linear dimensions; and
- J. Other significant conditions of the area proposed to be improved.

2. Site Improvements

- A. Finished floor elevations for all improvements;
- B. Proposed changes in streams, lakes, swamps, detention basins, watercourses and flood water runoff channels, floodplains, and the limits of the floodway, all properly identified;
- C. Proposed location of legal drains, surface and subsurface drains, inlets, outfalls, and easements;
- D. Proposed location, materials, and gradients of storm and sanitary sewers, inlets and outfalls, on-site sanitary effluent disposal systems, and location of affected utilities;
- E. Structures to be removed or relocated on the project site;
- F. The location and design of proposed streets, roads, sidewalks, culverts, bridges, parking lots, hard surfaced areas, including depressed pavement used to convey or temporarily store overflow from heavier rainstorms, and outlets for such overflow;
- G. The cross section of existing streams and floodplains to be maintained or changed and new channels to be constructed where changes are proposed or discharge into receiving streams is altered; and
- H. The erosion and sediment control measures to be implemented including, but not limited to: design and installation details, location, vegetation and schedule.

3.3 SUBMITTAL AND CONSIDERATION OF PLANS

All applications must be submitted on the forms approved by the Plan Commission and provided by the Town of Monrovia Engineer's Office. Projects which require approval through the Plan Commission, such as subdivisions and site plan reviews, shall submit preliminary and final plans to the Plan Commission according to the Plan Commission Rules of Procedure.

The Plan Commission shall give proper notice of their decision and deliver the same to the applicant. The Commission shall approve or disapprove the plans within sixty (60) days of submission unless the applicant consents to a continuance or extension. All approvals and disapprovals with written reasons shall be incorporated into the Commission minutes.

3.4 DETERMINATION OF RUNOFF QUANTITIES

Runoff quantities shall be computed for the watersheds within the parcel under development. The quantity of runoff which is generated as the result of a given rainfall intensity may be calculated as follows:

1. For areas up to and including two hundred (200) acres, the Rational Method may be used: The peak rate of runoff (Q) in cubic feet per second is computed as $Q = CIA$;

Where:

C = runoff coefficient, representing the characteristics of the drainage area and defined as the ratio of runoff to rainfall;

I = average intensity of rainfall in inches per hour for a duration equal to the time of concentration (t_c) for a selected rainfall frequency; and

A = tributary drainage area in acres.

2. Guidance for selection of the runoff coefficients is to be found in appropriate design manuals. Rainfall intensity shall be determined from the rainfall frequency curves found in standard design manuals for this region or from data shown. The time of concentration (t_c) to be used shall be the sum of the inlet time and flow time in the drainage facility from the most remote part of the drainage area to the point under consideration. The flow time in the storm sewers may be estimated by the distance in feet divided by velocity of flow in feet per second. The velocity shall be determined by the Manning Formula.

3. Other methods of determining runoff may be used upon approval of the Town Staff. Computer programs may be used and computer printouts submitted for drainage calculations provided details of the program and the assumptions made by that program are submitted with the calculations and approved by the Town Staff.

3.5 AMOUNT OF RUNOFF TO BE ACCOMMODATED BY VARIOUS PARTS OF DRAINAGE FACILITY

Various parts of the drainage facility must accommodate runoff water as follows:

1. The drainage system, including inlets, catch basins, street gutters, component swales, storm sewers and small channels, which collect storm water must accommodate peak runoff from at least a ten (10) year return period storm. The allowable spread of water on collector streets is limited to maintaining two (2) clear ten (10) foot moving lanes of traffic. One (1) lane is to be maintained on local roads and subdivision streets.
2. For rainfall heavier than a ten (10) year storm, these minimum requirements must be satisfied:
 - (A) Open channels carrying peak flows greater than thirty (30) cubic feet per second shall be capable of accommodating peak runoff for a fifty (50) year return period storm within the drainage easement;
 - (B) New culverts shall be capable of accommodating peak runoff from a fifty (50) year return period storm when crossing under a road which is part of the Indiana Department of Transportation functional classification system and are classified as principal or minor arterial, major or minor collector roads; and
 - (C) Drainage systems shall have adequate capacity to convey the storm water runoff from all upstream tributary areas through the development under consideration for a storm of one hundred (100) year design return period calculated on the basis of the upstream land in its present state of development. An allowance, equivalent to the reduction in flow rate provided, shall be made for upstream detention when such upstream detention and release rates have previously been approved by the Commission and evidence of its construction can be shown. Developer shall be responsible for providing supporting documentation if the Town does not have it on file.

3.6 DRAINAGE EASEMENTS

Drainage easements must be provided to cover all elements of the drainage system and must be designed:

1. To be adequate to install and maintain the drainage facilities;
2. To minimize conflicts with utility easements; and
3. To maintain a sufficient buildable area on each lot or parcel.

CHAPTER 4
STORM SEWER DESIGN STANDARDS

All storm sewers, whether public or private and whether constructed on public or private property, shall conform to the design standards and other requirements contained in this ordinance.

4.1 HYDRAULIC CAPACITY

The hydraulic capacity of a storm sewer shall be determined using Manning's Equation.

4.2 MINIMUM SIZE

The minimum diameter of a storm sewer shall be twelve (12) inches. Rate of release for detention storage shall be controlled by an orifice plate or other devices, subject to approval of the Commission where the twelve (12) inch pipe will not limit the rate of release as required.

4.3 GRADE

The minimum and maximum allowable sewer gradients shall be those capable of producing velocities of two and one half (2.5) and twelve (12) feet per second, respectively, when the sewer is flowing full. A minimum of two (2) feet of cover is to be maintained over the top of the pipe. Pipe cover less than the minimum may be used only upon approval of the Plan Commission. Uniform slopes shall be maintained between structures. A final grade shall be set with full consideration of the capacity required, sedimentation problems and other design parameters.

4.4 ALIGNMENT

A storm sewer shall be straight between structures.

4.5 MANHOLES

A. Structures shall be installed to provide access to continuous underground storm sewers for the purpose of inspection and maintenance. Manholes shall be provided at the following locations:

1. Where two (2) or more storm sewers converge;
2. Where pipe size changes;
3. Where a change in alignment occurs;

4. Where a change in grade occurs;
5. At suitable intervals in straight sections of sewer; and
6. Wherever pipe materials change.

B. The maximum distance between storm sewer manholes shall be as follows:

<u>Size of Pipe (inches)</u>	<u>Maximum Distance (feet)</u>
12" thru 18"	400
24" thru 42"	500
48" and larger	600

4.6 INLETS

Inlets or drainage structures shall be utilized to collect surface water through grated openings and convey it to storm sewers, channels or culverts. The inlet grate opening provided must be adequate to pass the design ten (10) year flow with fifty (50) percent of sag inlet grate open areas clogged while providing a ten foot minimum lane free of ponding. An overload channel with suitable easement(s) from sag inlets to a suitable outlet or basin shall be provided. (See Section 3.5.1).

4.7 WORKMANSHIP

The specifications for the construction of storm sewers shall not be less stringent than those set forth in the latest revision of the Indiana Department of Transportation's "Standard Specifications."

4.8 MATERIALS

Storm sewer manholes and inlets shall be cast in place concrete or precast reinforced concrete. Material and construction shall conform to Indiana Department of Transportation's "Standard Specifications," Section 720. Pipe and fittings used in storm sewer construction shall be galvanized or aluminum corrugated metal pipe, ductile iron pipe (AWWA C-151), or reinforced concrete pipe (ASTM C-76). PVC and HDPE may be used subject to the approval of the Plan Commission. Other types of inlets, end treatments, pipes and fittings may be used only when specifically authorized by the Commission. Pipe joints shall be flexible and soil tight and shall conform to the

requirements of Section 715.02 - Materials, of the latest edition of the Indiana Department of Transportation's "Standard Specifications." Pipe end treatments shall be metal end sections for metal or plastic pipes and concrete end sections for concrete pipes.

4.9 BACKFILL REQUIREMENT

Backfill around storm sewer pipes and structures shall meet the following standards:

1. Backfill under pavement and five (5) feet outside of pavement shall pass less than five percent (5%) through a #200 sieve and shall be haunched and compacted in the installation to support the pipe in compliance with all the manufacturer's specifications, or flowable backfill per INDOT Standard Specifications (where sewer crosses under streets);
2. Backfill of a storm sewer pipe trench, the near edge of which is within five (5) feet of the proposed or existing pavement area, shall be granular material or flowable backfill as specified in #1 above, to the base of pavement along the entire trench (sewer parallel to street); and
3. Backfill of a storm sewer pipe trench, the near edge of which is located more than five (5) feet outside of the pavement area, may be of selective native material which shall be haunched and compacted in compliance with all manufacturer's specifications.

4.10 SPECIAL HYDRAULIC STRUCTURES

Special hydraulic structure such as siphons, stilling basins, or other special structures required to control the flow of water in storm drainage systems, shall be limited to those locations justified by prudent planning and designed with careful and thorough hydraulic engineering analysis subject to approval of the Plan Commission.

CHAPTER 5 OPEN CHANNEL DESIGN STANDARDS

All open channels, whether constructed on public or private property, shall conform to the design standards and other requirements contained in this ordinance.

5.1 CHANNEL CROSS SECTION AND GRADE

The required channel cross section and grade are determined by the design capacity based on Manning's Equation, the material of which the channel is to be constructed, and the requirements for maintenance. A minimum depth may be required to provide adequate outlets for subsurface drains, storm sewer pipes, tributary ditches or streams. The channel grade shall be such that the velocity in the channel is high enough to prevent siltation but low enough to prevent erosion. Channel lining materials must be justified by the project engineer in the final drainage design.

5.2 SIDE SLOPES

Side slopes of earthen channels shall be no steeper than three to one (3:1), justified by local materials and approved by the Commission. Flatter slopes may be required to prevent erosion and for ease of maintenance. Where channels will be lined, as per Section 5.7, side slopes shall be no steeper than one and half to one (1 ½: 1) with adequate provisions made for weep holes. Side slopes steeper than one and a half to one (1 ½: 1) may be used for lined channels provided that the side lining and structural retaining wall are designed and constructed with provisions for live and dead load surcharges. Side slopes of ditches located along roadways must be traversable and comply with Appendix B guidelines.

5.3 CHANNEL STABILITY

- A. A stable channel does not vary design gradient and cross section from acceptable limits;
- B. Channel stability shall be determined for an aged condition. The velocity shall be based on the design flow or the bank full flow, whichever is greater, using "n" values for various channel linings; and
- C. Channel stability must be checked using conditions immediately after construction for justification of erosion control measures. See Chapter Seven, "Soil Erosion and Sedimentation Control," for erosion control standards.

5.4 DRAINAGE OF OPEN CHANNELS

Vegetated channels with a gradient of less than one percent (1.0%) or that are subject to low flows of long duration or where wet conditions prevail shall be drained with a tile system or by other means such as paved gutters. Tile lines may be drained through a drop structure at the end of the channels or through a standard tile outlet. Tiles shall be bedded in granular materials that will not pass through tile wall openings. Tiles shall be installed with a minimum of twenty four (24) inches of cover over the top of the tile and shall be offset from the centerline of the channel. Any cover less than twenty four inches (24") is subject to Plan Commission approval.

5.5 BACKYARD SWALES

Grass swales shall have a minimum gradient one percent (1.0%). Underdrains may be drained through a drop structure at the end of the channels or through a standard tile outlet. Tiles shall be bedded in granular materials that will not pass through tile wall openings. Tiles shall be installed with a minimum of twelve (12) inches of cover over the top of the tile and shall be offset from the centerline of the channel. Any cover less than twelve inches (12") is subject to Plan Commission approval.

Underdrains or storm sewers shall be provided in plan design for each lot to connect house storm sewer drains and sump pumps. No connection to street underdrains shall be allowed. No drainage of sump pumps or house storm sewer drains to street gutters shall be allowed.

5.6 APPURTENANT STRUCTURES

The channel design will include the design of all structures required for the proper functioning of the channel, the laterals, and the maintenance ways.

5.7 DISPOSITION OF SPOIL MATERIAL

Spoil material resulting from clearing, grubbing, and channel excavation shall be disposed of in a manner which will minimize erosion and other adverse effects to easements, surface drainage, and rights-of-way. Disposal shall be done in a manner that will also improve the aesthetic appearance of the site.

5.8 MATERIALS

Materials acceptable for use as channel lining are revetment rip-rap, concrete, hand laid rip-rap, precast cement concrete rip-rap and grouted rip-rap, gabions, pegged rod erosion control blankets, and netting.

Other lining materials shall require specific approval of the Commission. All channel materials shall comply with the latest edition of the Indiana Department of Transportation's "Standard Specifications." Interconnected tires are not acceptable material.

CHAPTER 6 STORM WATER DETENTION

The following shall govern the design of any improvement with respect to the detention of storm water runoff.

6.1 ACCEPTABLE DETENTION METHODS

The increased storm water runoff from a proposed development shall be detained on-site by appropriate wet or dry bottom reservoirs, by storage on flat roofs, parking lots, streets, lawns or other acceptable techniques. Measures which retard the rate of overland flow and the velocity in runoff channels may also be used to control the runoff rate.

6.2 DETENTION FACILITY DESIGN

Storm water facilities shall be designed to store the excess flows from a post-development one-hundred (100) year return interval storm of 24 hour duration. The release rate shall be that of a ten (10) year return interval storm of 24 hour duration on the site in its predeveloped state or the capacity of the receiving stream, whichever is less. Under certain conditions it may be desirable to allow storm water runoff from a site without detention. This would be particularly germane for developments located immediately upstream from a channel obstruction that cannot be realistically removed.

6.3 ALLOCATION OF DETENTION

In the case of an existing limiting restriction that cannot be realistically removed, the allowable release rate from any one detention basin shall be in direct proportion to the ratio of its drainage area to the drainage area of the entire watershed upstream of the limiting restriction. The total runoff shall not exceed the capacity of the restriction and each development shall be responsible for its proportionate share of the storage requirement.

6.4 DETERMINATION OF STORAGE VOLUME - RATIONAL METHOD

For areas of two hundred (200) acres or less, the Rational Method may be used to determine the required volume of storm water storage, as outlined in the Storm Drainage Control Model Ordinance of the Highway Extension and Research Project for Indiana Counties and Cities (HERPICC).

6.5 DETERMINATION OF STORAGE VOLUME - OTHER METHODS

Methods for determining runoff and routing of storm water other than the Rational Method may be used to determine the storage volume required to control storm water runoff. The procedures or methods used must receive the prior written approval of the Town Engineer. The TR-20 and TR-55 models are approved for appropriate use in analysis of the runoff and routing of storm water.

6.6 GENERAL DETENTION BASIN DESIGN REQUIREMENTS

Basins shall be constructed to temporarily detain the storm water runoff which exceeds the peak flow rate authorized by this ordinance.

The following minimum standards shall be observed:

1. The maximum volume of water stored and subsequently released at the design release rate shall not result in a storage duration in excess of forty-eight (48) hours unless additional storms occur within the period;
2. All storm water detention facilities shall be separated by not less than twenty-five (25) feet from any building or structure to be occupied and the lowest floor of any building or structure must be at least one (1) foot above the one-hundred (100) year storm water elevation of detention facilities;
3. Safety screens shall be installed on all outlet control structures. Screens shall retain a sphere greater than six (6) inches in diameter and shall have a screen area at least six (6) times the end area of the outlet control structure;
4. Danger signs shall be mounted at appropriate locations to warn of deep water, possible flooding conditions during storm periods and other dangers that exist. Fencing shall be provided if deemed necessary by the Commission. Design and locations must be approved by the Commission.
5. Outlet control structures shall be designed to operate as simply as possible and shall be designed so as to require little or no maintenance and attention for proper operation;
6. Emergency overflow facilities such as a weir or spillway shall be provided for the release of exceptional storm runoffs or in emergency conditions such as the normal discharge devices becoming totally or partially inoperative. The overflow facility shall be of such design that its operation is automatic and does not require manual implementation; and

7. Side slopes shall be in compliance with Section 5.2.

6.7 DRY BOTTOM BASIN DESIGN REQUIREMENTS

Detention basins which will not contain a permanent pool of water shall comply with the following additional requirements:

1. Provisions shall be incorporated to facilitate complete interior drainage of dry bottom basins. Acceptable methods include natural grades to outlet structures, longitudinal or transverse grades to perimeter drainage facilities, paved gutters, or subsurface drains. Detention basins with less than one percent (1%) gradient must be provided with subsurface drainage or paved gutters;
2. Recreational facilities, aesthetic qualities, open space or other secondary use shall be considered in planning the detention facility; and
3. The maximum planned depth of storm water stored without a permanent pool shall not exceed four (4) feet.

6.8 WET BOTTOM BASIN DESIGN REQUIREMENTS

Where part of a detention basin, excluding wetlands, will contain a permanent pool of water, the following additional requirements shall apply

1. If fish are to be maintained, a pond shall have a water area of at least one-half (1/2) acre and a minimum depth of approximately ten (10) feet and a maximum of twenty (20) feet shall be maintained over at least twenty-five (25) percent of the pond area. The remaining pond area shall have no extensive shallow areas, except as required by subsection (3) below;
2. Where fish are not to be maintained, the minimum depth shall be eight (8) feet and a maximum of twenty (20) feet over at least twenty-five (25) percent of the pond at permanent water level, or where a limiting layer prevents excavation to that depth, a minimum of six (6) feet over at least fifty (50) percent of the area shall be required;
3. In excavated ponds, the underwater side slopes in the pond shall be stable. In the case of valley storage, natural slopes may be considered to be stable;
4. A safety ledge measuring a minimum of six (6) feet in width and a 10:1 slope is required and must be installed in all ponds approximately thirty (30) inches below the permanent water level;

5. Erosion control measures must be installed to prevent erosion from wave action and wet-dry cycles;
6. Pond design shall facilitate periodic maintenance to control weed and larval growth; and
7. Facilities to enhance and maintain pond water quality shall be provided if required to meet applicable water quality standards. Design calculations to substantiate the effectiveness of these facilities shall be submitted with final engineering plans. Agreements for the perpetual operation and maintenance of these facilities shall be prepared to the satisfaction of the Commission.

6.9 ROOFTOP STORAGE

If rooftop detention is proposed, details of such design are to be included in the Improvement Location Permit application and shall include the depth and volume of storage, details of outlet devices and down drains, and elevations of emergency overflow provisions. Rooftop detention is not recommended.

6.10 PARKING LOT STORAGE

Paved parking lots may be designed to provide temporary detention storage of storm water. Ponding should, in general, be confined to those positions of the parking lots farthest from the area served. Ponding areas shall not conflict with handicapped parking and access routes. Such ponding areas should be exposed to sunlight in winter months to minimize icing. Storage depth shall be limited to 7 inches so as not to conflict with parking lot use. Any detention facility utilizing a parking lot must take resurfacing and other parking lot maintenance activities into consideration during design.

6.11 FACILITY MAINTENANCE RESPONSIBILITY

Maintenance of detention facilities during construction shall be the responsibility of the land developer or owner. Maintenance responsibilities shall be documented by appropriate covenants to property deeds prior to final drainage plan approval. Routine maintenance shall be the owner's or homeowner's responsibility. The permanent pool of a wet bottom basin shall be the responsibility of the owner or homeowner's association. Routine maintenance shall, at a minimum, assure that the drainage facility performs the functions for which it was designed and constructed. Unless accepted by the Town, all facilities shall be privately owned and funded.

6.12 JOINT DEVELOPMENT OF CONTROL SYSTEMS

Storm water control systems may be planned and constructed jointly by two (2) or more developers as long as compliance with this ordinance is maintained.

6.13 ALLOWANCE FOR SEDIMENTATION

Detention basins shall be designed with an additional six percent (6%) of available capacity to allow for sediment accumulation resulting from development and to permit the pond to function for reasonable periods between cleanings. Basins should be designed to collect sediment and debris in specific locations so that removal costs are kept to a minimum.

6.14 DETENTION FACILITIES IN A FLOODPLAIN

If detention storage is provided within a floodplain, only the net increase in storage volume above that which naturally existed in the floodplain shall be credited to the development. No credit will be granted for volumes below the elevation of the regulatory flood at the location unless compensatory storage is also provided.

CHAPTER 7
SOIL EROSION AND SEDIMENT CONTROL

7.1 GENERAL PROVISIONS

Measures taken to control erosion and sedimentation shall assure that sediment is not transported from a site by storm events. The following general provision should be used in the preparation of submissions required under this ordinance:

1. To minimize potential for soil erosion, development should fit the topography and soils of the site. Steep slopes, deep cuts, and fills in erodible soils should be avoided wherever possible and natural contours should be followed as closely as possible;
2. Natural vegetation shall be retained and protected wherever possible. Areas immediately adjacent to natural watercourses and protected wetlands shall also be left undisturbed wherever possible. Vegetation to be preserved shall be protected prior to construction;
3. All activities on a site must be conducted in a logical sequence so that the smallest practical area of land will be exposed for the shortest practical period of time during development;
4. Practices such as, but not limited to sediment basins, silt traps or filters shall be installed prior to land disturbing activities and maintained to remove sediment from runoff leaving the site as long as unstabilized soil conditions exist;
5. The selection of soil erosion and sediment control measures shall include the assessment of the probable frequency of climatic events. The aesthetics of the project improvements and the requirements of continuing maintenance shall be considered; and
6. Provisions shall be made to accommodate the increased runoff caused by changed soil and surface conditions during and after development. Drainage ways shall be designed so that their final gradients and resultant velocities will not create erosion.

7.2 Design Criteria, Standards, and Specifications for Erosion Control Measures

All erosion control measures shall meet the design criteria, standards, and specification as outlined in the “ Field Office Technical Guide” of the Soil Conservation Service (SCS of the United State Department of Agricultural (USDA)) and the “ Urban Development Planning Guide” of the Hoosier Heartland Resource Conservation and Development Council and the “ Indiana Handbook for Erosion Control in Developing Areas” of the IDNR - Division of Soil Conservation. These publications are available through the Morgan County Soil and Water Conservation District, the Soil Conservation Service (SCS) offices, the US Government Printing Office, and the IDNR Division of the Soil Conservation. Erosion Control measures shall be identified on the plans using standard symbols (See Appendix A).

7.3 Maintenance of Erosion Control Measures

All sediment basins and other erosion control measures necessary to meet the requirements of this ordinance shall be maintained by the applicant or subsequent landowner. After land disturbing activities cease, and the silt is stabilized, temporary sediment basins and other temporary erosion control measures may be eliminated if their purpose has been fulfilled. Any disturbed soil resulting from removal of such practices shall be stabilized by approved methods.

7.4 Control of Erosion and Sediment During Land Disturbing Activities

The following requirements shall be met on all sites:

1. Sediment Trapping: Sediment laden water flowing from the site shall be detained by temporary sediment basins or other suitable control measures. Water may not be discharged in a manner that causes erosion of the site or receiving channels or an accumulation of sediment within the receiving channel or its outlets;
2. Waste and Materials Disposal: All waste and unused building materials including, but not limited to, garbage, debris, cleaning wastes, wastewater, toxic materials, and hazardous substances shall be properly disposed of and not allowed to be carried by runoff into a receiving channel or storm sewer system;
3. Tracking: Prior to the land disturbing activity each site shall have graveled access drives or other approved systems of sufficient width and length to eliminate sediment being tracked onto public or private roadways. Gravel access drives shall be maintained by acceptable methods. Flushing is not an acceptable method;

4. Temporary Stream Crossings: A stream crossing during land disturbing activities shall be non-erosive, structurally stable, and shall not contribute to flooding or safety hazards. Streams should be crossed at right angles to the stream flow. Erosion control measures shall be employed and shall be appropriate to the expected life of the crossing. Temporary crossings must convey full flow or a two (2) year peak discharge, whichever is less. Overflow areas must be protected from erosion for a ten (10) year peak flow;
5. Sediment Removal: Public or private roadways shall be cleaned daily and after major storms using acceptable methods to remove any accumulated sediment. The developer's contractors are responsible for supervision of the construction activity within the development and shall take all necessary actions to remove sediment from the streets. Appreciable sediment should be placed and stabilized properly and protected from returning onto the road or into the storm water system.
6. Drain Inlet Protection: All storm drain inlets shall be protected with straw bales, filter fabric, or equivalent barriers meeting accepted design criteria, standards and specifications. Curb inlet protection measures that trap sediment within pavement areas are prohibited;
7. Site Erosion and Sediment Control: The following items apply only to the time period when land disturbing activities are taking place which may cause water and sediment to leave the site.
 - (a) Runoff passing through the site from adjacent areas shall be minimized by protecting the existing channel or, if necessary, diverting it around disturbed areas if legal, feasible, and practical; and
 - (b) On the site, runoff from the entire disturbed area shall be controlled by meeting the following:
 - (1) All disturbed ground left inactive for seven (7) or more days shall be stabilized by seeding, sodding, mulching, or by other equivalent erosion control measures;
 - (2) For sites having less than ten (10) acres disturbed at one time, silt fences, straw bale dams, or equivalent erosion control measures shall be placed along all sloping perimeters where erosion and sedimentation could occur. If a channel or an area of concentrated runoff passes through the site, silt fences shall be placed along the channel edges to reduce the amount of sediment reaching the

channel; and

- (3) Where drainage areas are too large or runoff volumes are too great for sediment trapping practices, one or more sediment basins should be constructed. Each sediment basin should have a sufficient depth and a sufficient surface area to trap the sediment. The discharge rate or velocity from a basin should be sufficiently low so as to not cause erosion or the receiving channel shall be adequately protected.
8. Top Soil Stockpiling: During cut and fill operations top soil shall be stockpiled and respread on final grades where vegetation is to be established.
9. Soil Stockpiling: Excess soil that is stored to be used at a later date must be stockpiled and protected from erosion.

CHAPTER 8 ACCESSORY DRAINS

8.1 SUMP PUMPS

Sump pumps installed to receive and discharge ground waters or other storm water shall be connected to a storm sewer, a subsurface drain or a designated storm discharge channel. They shall not outlet to street gutters or street underdrains. Floor drain flow or other sanitary sewage shall be connected to the sanitary sewers or septic systems and shall not discharge to storm sewers or surface outlets.

8.2 DOWN SPOUTS

All down spouts or roof drains shall discharge onto the ground or be connected directly to the storm sewer pipe. Downspouts or roof drains shall not be connected to the sanitary sewers or subsurface drains.

8.3 FOOTING DRAINS

Footing drains shall be connected to a storm sewer, subsurface drain or designated storm drainage channel. Footing drains or drainage tiles shall not be connected to the sanitary sewer or septic system.

8.4 BASEMENT FLOOR DRAINS

Basement floor drains shall be connected to the sanitary sewers or septic system. Basement drains shall not be connected to sump pumps which discharge to storm sewers.

8.5 OTHER INFORMATION

No accessory drain shall be connected to underdrains under the street or curb.

CHAPTER 9
ADMINISTRATIVE REQUIREMENTS

9.1 CERTIFICATION REQUIRED

After completion of the project and before final acceptance will be made, five (5) “As Built” sets of plans, stamped and signed by a registered land surveyor, shall be submitted to the Plan Commission Staff for review. These plans shall include all pertinent data relevant to the completed storm drainage and erosion control systems and shall include:

1. All pipe sizes and pipe materials;
2. All invert elevations;
3. All top rim elevations;
4. All structure locations and pipe lengths;
5. All permanent sediment basins and their maintenance provisions;
6. Data and calculations showing detention basin storage volume; and
7. A certified statement on the plans stating the completed storm drainage system substantially complies with construction plans as approved by the Plan Commission. If during preparation of these “As Builts” plans it is found that the storm drainage system does not substantially comply with the construction plans as approved by the Plan Commission, reapproval must be obtained.

All “As Built” plans submitted shall be reviewed for compliance within thirty (30) days after submission to the Plan Commission Staff. If notice of noncompliance is not given within thirty (30) days of submission of the plans, the plans shall be construed as approved.

9.2 CHANGES IN PLANS

Any revision, significant change or deviation in the detailed plans and specifications after formal approval by the Commission shall be filed with and approved by the Commission prior to implementation of the revision or change. Copies of the revisions or changes, if approved, shall be attached to the original plans and specifications.

9.3 DETERMINATION OF IMPACT DRAINAGE AREAS

The Commission is authorized, but is not required, to classify certain geographical areas as Impact Drainage Areas and to enact and promulgate regulations which are generally applied. In determining Impact Drainage Areas, the Commission shall consider such factors as topography, soil type, the capacity of any existing legal drains, and the distance from an adequate drainage facility. The following areas shall be designated as Impact Drainage Areas unless good reason for not including them is presented to and approved by the Plan Commission:

1. A floodway or floodplain as designated by the Indiana Department of Natural Resources or the Federal Emergency Management Agency;
2. Land within seventy-five (75) feet of each bank of any legal drain; and
3. Land within seventy-five (75) feet of the center line of any legal drain tile.

Land where there is not an adequate outlet, taking into consideration the capacity and depth of the outlet, may be designated as an Impact Drainage Area by resolution of the Commission. Special requirements for development within any Impact Drainage Area shall be included in the resolution.

9.4 DISCLAIMER OF LIABILITY

The degree of protection required by this ordinance is considered reasonable for regulatory purposes and is based on historical records, reasonable engineering criteria, and scientific methods of study. Larger storms may occur or storm water runoff depths may be increased by manmade or natural causes. This ordinance does not imply that land uses permitted will be free from storm water damage. This ordinance shall not create liability on the part of the Town of Monrovia or any officer or employee for any damage which may result from reliance on this ordinance or on any administrative decision(s) lawfully made.

9.5 CORRECTIVE ACTION

Nothing contained in this ordinance shall prevent the Town of Monrovia from taking such other lawful action as may be necessary to prevent or remedy any violation. All costs connected with any legal action shall accrue to the person or persons responsible.

9.6 REPEALER

All previous ordinances or parts thereof in conflict with the provisions of this ordinance are repealed.

9.7 EXEMPT PROJECTS

Any residential, commercial or industrial major or minor subdivision or construction project which has had its drainage plan approved by the Commission prior to the effective date of this ordinance may be exempt from all the requirements of this ordinance, however, compliance is encouraged.

9.8 ENFORCEMENT

This section establishes the means of enforcing and the penalty for violation of these regulations.

1. It shall be the duty of the Commission to enforce these regulations and to bring any violation or lack of compliance to the attention of the Town Attorney.
2. No Improvement Location Permit, Building Permit or Certificate of Occupancy required under the Building Code, the Zoning Ordinance or these regulations shall be issued on any property subject to these regulations until such property is in full compliance with the provisions of these regulations.
3. Any person who violates a provision of these regulations shall be guilty of an infraction and, upon conviction, shall be fined not less than ten dollars (\$10.00) and not more than three hundred dollars (\$300.00) for each day's violation. The time period of violation shall be determined by the Court.
4. The Commission may institute any injunction suit requesting a person or a governmental unit to be directed to repair streets, storm sewer facilities, streams and to remove a structure erected in violation of these regulations or to make the same comply with its terms. If the Commission is successful in its suit, the respondent shall bear the costs of the action including, but not limited to, attorney fees, court costs, legal advertising, and professional services.
5. The Commission may institute a suit for mandatory injunction requesting a person or a governmental unit to be directed, where such person or governmental unit has violated any provisions of these regulations, to comply with the provisions of the regulations.

9.9 EFFECTIVE DATE OF ORDINANCE

This ordinance shall be in full force and effective from and after its passage, approval, and publication according to law.

Approved by the Town Council of the Town of Monrovia, Indiana this _____ day of _____, 19__.

ATTEST:

Symbols for Use on Erosion Control Plan Site Maps
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3.0 Site Preparation

- 3.01 Temporary Gravel Entrance/Exit
- 3.02 Topsoil (Salvage and Utilization)
- 3.03 Surface Roughening*

3.1 Surface Stabilization

- 3.11 Temporary Seeding*
- 3.12 Permanent Seeding*
- 3.13 Dormant Seeding and Frost Seeding

Permanent*

Temporary*

- 3.14 Sodding*
- 3.15 Mulching*
- 3.16 Riprap
- 3.17 Erosion Control Blanket (Surface Applied)
- 3.18 Turf Reinforcement Mat

3.5 Temporary Drop Inlet Protections

- 3.51 Excavated Drop Inlet Protection

(Buried)

3.2 Runoff Control

- 3.21 Temporary Diversion
- 3.22 Permanent Diversion
- 3.23 Diversion Dike (Tem. Perimeter Protection)
- 3.24 Water Bar (Right-of-Way Diversion)
- 3.25 Rock Check Dam
- 3.26 Temporary Slope Drain

3.3 Runoff Conveyances

- 3.31 Grass-Lined Channel
- 3.32 Riprap-Lined Channel

3.4 Outlet Protections

- 3.41 Rock Chute
- 3.42 Concrete Block Chute
- 3.43 Reinforced Vegetated Chute
- 3.52 Fabric Drop Inlet Protection
- 3.53 Block and Gravel Drop Inlet Protection

- 3.54 Straw Bale Drop Inlet Protection
- 3.55 Slotted Barrel Drop Inlet Protection
- 3.56 Gravel Donut Drop Inlet Protection

3.6 Temporary Curb Inlet Protections

(?) NOT PERMITTED IN
The Town of Monrovia

3.7 Sediment Traps and Barriers

- 3.71 Temporary Sediment Trap

- 3.72 Temporary Sediment Basin
- 3.73 Vegetative Filter Strip*
- 3.74 Silt Fence (Sediment Fence)
- 3.75 Straw Bale Dam (Straw Bale Filter)
- 3.76 Rock Dam

3.8 Related Practices

- 3.81 Dust Control NO SYMBOL
- 3.82 Temporary Stream Crossing
- 3.83 Tree Conservation

Other Symbols

Subsurface Drains
Grade Limits

* Use an appropriate shading/matrix pattern to denote the area to be treated.

APPENDIX B TRAVERSABLE DITCHES

1) GENERAL GUIDELINES

Traversable ditch cross sections are defined in Figures I, II, and III. Two (2) curves are shown on each figure. The area below the lower curve represents ditch cross sections which can be traversed by a vehicle containing unrestrained occupants and, thus, have a Severity Index of 1.0.

The upper curve is for ditch cross sections that have a Severity Index of 1.6, and thus, vehicle occupants must be restrained in order to safely traverse the ditch. Minor encroachments into the area above the curve where the Severity Index = 1.6 may be necessary because of R/W restrictions or to avoid nominal changes to existing ditches. In addition, the following items shall be considered:

- a) Slopes of 3:1 shall be used only where site conditions do not permit the use of flatter slopes;
- b) Embankment surfaces must be uniform to permit traversability of a 3:1 slope. Vehicle rollover can be expected if the embankment is soft or rutted; and
- c) Foreslopes steeper than 4:1 are not desirable because their use severely limits the range of backslopes producing a safe ditch configuration.

2) DITCHES IN FILL SECTION ON RECONSTRUCTION PROJECTS

- a) If any part of the backslope of the ditch section falls within the Clear Zone then the slopes shall be evaluated in accordance with Figures I, II, and III. Existing ditch combinations which fall on or below the 1.6 Severity Index curve shall remain. Areas with ditch slope combinations which fall above the 1.6 Severity Index curve shall be evaluated for cost and accident history before deciding to make an improvement. If improvement is warranted, the slope combination should preferably fall below the SI = 1.0 curve, but at least below the SI = 1.6 curve.
- b) If the ditch falls outside the Clear Zone, traversability shall not be considered.

3) DITCHES IN FILL SECTIONS ON NEW FACILITIES

If the ditch falls within the Clear Zone, the Designer shall select a front slope, backslope, and ditch width that will fall within the 1.0 Severity Index curve on Figures I, II, or III.

4) DITCHES IN CUT SECTIONS ON RECONSTRUCTION PROJECTS

Additional R/W shall be obtained, if practical, when the ditch cross section can be made traversable by flattening the slopes or by moving the ditch farther from the road. Other means of making the ditch traversable which shall be evaluated are as follows:

- a) Use of a pipe in the ditch;
- b) Raising the grade of the ditch; and
- c) 4" rip rap placed in the ditch to change ditch contour, and such that the projection of any one piece of rip rap does not exceed 2" above surrounding area.

5) DITCHES IN CUT SECTIONS ON NEW FACILITIES

The desirable section is shown in Figures I, II, and III. For minimum ditch sections, provide a section which falls on or below the 1.0 Severity Index curves on Figures I, II, and III.

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