

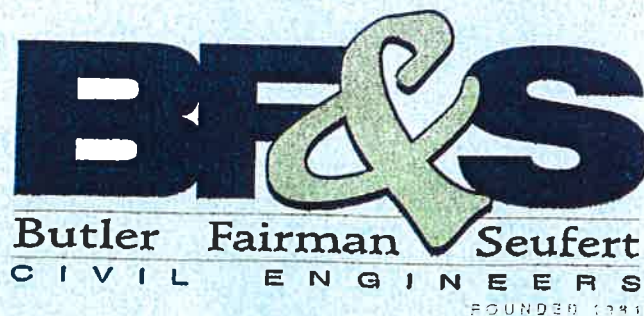
STORM DRAINAGE **CONTROL ORDINANCE**

Ordinance No. 2025

Effective Date: January 1, 2001

Revised 2011

**Randolph County Board
of County Commissioners**



**RANDOLPH COUNTY DRAINAGE BOARD
GUIDELINES FOR APPLICATION OF
ITEM VII AS AMENDED**

See Drainage Board Minutes of May 15, 2006.

Any tract of land that has 20,000 square feet or more *impervious surface added* whether in one building or multiple buildings, *parking lots, or other areas* shall conform to the requirements of this ordinance. *The City of Winchester will enforce a threshold of 10,000 square feet of impervious area (approximately ¼ acre) for commercial, industrial, or general business projects in urbanized areas. The lower threshold applies only to the Winchester (021) parcel number district.*

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(For use on projects over 20,000 sq. ft.(10000 sq ft in Winchester(021))

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I. TITLE

This ordinance will be known and may be cited and referred to as the "**Storm Drainage Control Ordinance of Randolph County, Indiana**" and will hereafter be referred to as "this ordinance."

II. PURPOSE

It is recognized that smaller streams and drainage channels serving Randolph County may not have sufficient capacity to receive and convey storm water runoff, resulting when land use changes from open 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 Drainage Board that the storage and controlled release of storm water runoff shall be required of all new major subdivision residential development, commercial, industrial, and institutional development, and any commercial, industrial or institutional redevelopment in Randolph County. The release rate of storm water from developed lands ~~shall not exceed~~ *shall be lower than* the release rate from the land area in its present land use.

If it is determined that the standard release rate of storm water has contributed to or caused flooding in the existing state, the allowable release rate may be reduced to a lower limit. Conversely, there are some circumstances where detention is not justified and may be waived by the Board.

Because topography and the availability and adequacy of outlets for storm runoff vary with almost every site, the requirements for storm drainage tend to be an individual matter for any project. It is recommended that each proposed project be discussed with the county surveyor's office at the earliest practical time in the planning stage

III. APPLICABILITY

This ordinance shall become effective after its final passage, approval and publication as required by law. The affected land shall be the applicable land area within Randolph County not located within an incorporated city or town, unless that City or Town has also adopted this ordinance as its own.

Any residential major subdivision, or commercial, industrial or institutional development or construction project thereon, which has had its drainage plan approved by the Board and has initiated construction activities consistent with the approved plan prior to the effective date of this ordinance shall be exempt from all of the requirements of this ordinance

IV. CONFLICTING ORDINANCES

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

V. COMPLIANCE WITH OTHER ORDINANCES

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 preliminary and final subdivision plats, 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.

A. 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. Flood Hazard Management Ordinance says that prior approval of the Department of Natural Resources is required for any type of construction, excavation, or filling in or on a floodway. All projects proposed to be located in a floodway must also comply with the requirements of this ordinance.

All applications made to and granted approval by the Indiana Department of Natural Resources (IDNR) do not in any way relieve a property owner of the necessity of securing easements or other property rights, permits or approvals from affected property owners and/or local, state and federal agencies.

B. Compliance with 327 IAC 15.5

All land disturbing activities including subdivision development and individual commercial, industrial and institutional site development that disturb ~~5 acres~~ *1 acre* 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 Board will make no determination of the applicability of this rule to individual projects. Copies of the Notice of Intent (NOI) letters shall also be filed with the Area Plan Commission prior to the start of land disturbing activity.

VI. CONSTRUCTION OF LANGUAGE AND DEFINITIONS

A. Construction of Language

The language of this Ordinance shall be interpreted in accordance with the following regulations:

1. The particular shall control the general.
2. In the case of any difference of meaning or implication between the text of this Ordinance and any illustration or diagram, the text shall control.
3. The word "person" includes a firm, association, organization, partnership, trust, company, corporation, or other legal entity, as well as an individual.
4. Words used in the present tense shall include the future; and words used in the singular number shall include the plural, and the plural the singular, unless the context clearly indicates the contrary.
5. The word "shall" is always the mandatory and not discretionary; the word "may" is permissive; the word "should" is a preferred requirement.
6. The phrase "used for" includes "arranged for", "designed for", "intended for", "maintained for", "constructed for", "converted for", "altered for", or "occupied for".
7. The word "lot" includes the words "metes and bounds tract", "legally platted lot", or "parcel".
8. Unless the context clearly indicates the contrary, where a regulation involves two or more items, conditions, provision, or events connected by the conjunction "and", "or", or "either ... or", the conjunction shall be interpreted as follows:
 - a. "and" indicates that all the connected items, conditions, provisions, or events shall apply.
 - b. "or" indicates that the connected items, conditions, provisions, or events may apply singly or in any combination.
 - c. "either—or" indicates that all the connected items, conditions, provision, or events shall apply singly but not in combination.

B. Definitions

For the purpose of this Ordinance, the following definitions shall apply

1. **Board** — The Drainage Board, Board of Works, or Town Board having jurisdiction over the land area being developed.
2. **Board of Works** — The Board of Public Works and Safety in either City identified in this section and any subordinate employee to whom they shall specifically designate a responsibility authorized by this Ordinance. The Board of Works shall have jurisdiction within the City, contiguous to the City, or within a two-mile radius of the existing corporation limits and within the limits of this Ordinance.
3. **Capacity (of a Storm Drainage Facility)** — The maximum flow that can be conveyed or stored by a storm water drainage system or structure without causing damage to the system or properties in the area adjacent to the site. Also, the maximum design flow or storage ability of a given engineered structure.
4. **Channel** — A natural or artificial watercourse which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. It has a defined bed and banks, which serve to confine and direct the flow of water.
5. **City** — City shall mean the City of Union City, Indiana, or Winchester, Indiana.
6. **Commercial Land Use** - Use of land for the manufacturing, wholesale distribution, warehousing, or retail sale of goods or services.
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. **Conduit** — A pipe, storm sewer, subsurface tile drain, manhole, inlet, or other type of drainage structure used to convey the flow of water within a drainage system.

9. **Contiguous** — Adjoining or in actual contact with.
10. **Culvert** — A closed conduit used for the passage of surface drainage water under a street, roadway, railroad, canal, or other impediment.
11. **Cut** — The material removed in excavation. Also, the difference between a point on the original ground surface and a designated point of lower elevation on the final grade.
12. **Detention Basin** — A facility constructed or modified to restrict the the excess waters that accumulate behind the outlet.
13. **Detention Storage** — The temporary detaining or storage of storm water in storage basins, lakes, in streets, parking lots, school yards, parks, open spaces, or other areas under predetermined and controlled conditions, with the rate of drainage there from regulated by appropriately installed devices.
14. **Drainage Area** — The surface area usually measured in acres or square miles from which water is carried off by a drainage system; a watershed or catchment area.
15. **Drainage Board** - The Drainage Board of Randolph County, Indiana, and any elected or appointed official to whom it shall specifically delegate the responsibilities authorized by this Ordinance.
16. **Drainage System** - The network of subsurface drainage tiles, pipes, culverts, swales, open ditches, ravines, manholes, inlets, streams, rivers, ponds and lakes which carry, store, or enhance the flow and storage of surface or subsurface drainage.
17. **Drop Manhole** — A manhole having a vertical drop pipe connecting the inlet pipe to the outlet pipe. The vertical drop pipe shall be located immediately outside the manhole.
18. **Dry Bottom Detention Basin** — A storage area designed to be completely drained after having provided its planned detention of runoff during a storm event.
19. **Duration** — The time period of a rainfall event.

20. **Erosion** — Wearing away of the land by running water, waves, temperature changes, ice or wind.
21. **Erosion Control Measure** - A practice or a combination of practices to control erosion and resulting sedimentation.
22. **Erosion Control Plan** - A written document of pertinent information by ordinance and submitted by the applicant for review and approval in compliance with applicable laws and ordinances.
23. **Excavation** - Any act by which earth, sand, gravel, rock or other similar material is dug into, cut, quarried, uncovered, removed, displaced, relocated, or bulldozed and shall include the conditions resulting there from.
24. **Fill** - Any act by which earth, sand, gravel, rock or any other clean material is placed, pushed, dumped, pulled, transported, or moved to a new location above the natural surface of the ground or on top of the stripped surface and shall include the conditions resulting there from. Also, the difference in elevation between a point on the original ground surface and a designated point of higher elevation on the final grade. Also, the material used to make a fill.
25. **Flood Elevation** — The elevation that represents the maximum level of high waters for a flood of given return period and rainfall duration.
26. **Flood or Flood Waters** — The water of any watercourse that is above the banks of the watercourse. It also means the water of any lake that is above and outside the banks thereof.
27. **Flood Hazard Area** — Any flood plain, floodway, floodway fringe, or any combination thereof which is subject to inundation by the peak discharge from a 100-year frequency flood event; or any flood plain as delineated by Zone A on a Flood Hazard Boundary Map.
28. **Flood Plain** — The area adjacent to a river, stream or ditch that is subject to inundation by flood waters, including the floodway fringe and the regulatory floodway.

29. **Flood Protection Grade** – The elevation above Mean Sea Level at which the lowest floor of any building should be located to protect against flood damage from a 100-year frequency rainfall event. If a basement is included, the basement floor is considered the lowest floor.
30. **Floodway** – The channel of a river or stream and those portions of the floodplains adjoining the channel which are reasonably required to carry and discharge the peak flow of the 100-year frequency rainfall event.
31. **Floodway Fringe** – That portion of the flood plain lying outside the floodway, which is Inundated by the 100-year flood.
32. **Footing Drain** - A subsurface tile drainpipe installed around the exterior of a basement wall or a crawl space foundation to relieve water pressure and prevent groundwater from entering a basement or crawl space.
33. **Grade** – The inclination or slope of a channel, canal, conduit, etc., or natural ground surface usually expressed in terms of the percentage the vertical rise (or fall) bears to the corresponding horizontal distance.
34. **IDNR**. The Indiana Department of Natural Resources.
35. **Impact Areas** – Areas defined and mapped by the Drainage Board 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 adequate outlet, a floodway or floodplain, land within 75 feet of each bank of any regulated drain or within 75 feet from the centerline of any regulated tile ditch.
36. **Impervious** – A term applied to material through which water cannot pass, or through which water passes with difficulty.
37. **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 appropriate Zoning Ordinance.
38. **Inlet** — An opening into a storm sewer system for the entrance of surface storm water runoff, more completely described as a storm sewer inlet.

39. **Institutional** — An established organization or corporation especially of a public character, including medical facilities, schools and churches.
40. **Junction Chamber** - A converging section of conduit, usually large enough for a person to enter, used to facilitate the flow from one or more conduits into a main conduit.
41. **Land Disturbing Activity** - Any man-made change of the land surface or sub-surface, including removing vegetative cover, excavating, filling, transporting, and grading. In the context of this ordinance, it includes only non-agricultural land disturbing activities on sites that also require a local improvement location permit or an approved subdivision plat.
42. **Lateral Storm Sewer** — A sewer that has inlets connected to it but has no other storm sewer connected.
43. **Manhole** — Storm sewer structure through which a person may enter to gain access to an underground storm sewer or enclosed structure.
44. **Major-Drainage System** — Drainage system carrying runoff from an area of one or more square miles.
45. **Major Subdivision** — Defined as all subdivisions not classified as minor subdivisions, including but not limited to subdivisions of four (4) or more lots, or any size subdivision requiring any new street or extension of the local government facilities or the creation of any public improvements.
46. **Minor Drainage Systems** — Drainage systems having an area of less than one square mile.
47. **Minor Subdivision** — defined as any subdivision which:
- a. contains no more than three (3) lots;
 - b. has all lots fronting on an existing street;
 - c. does not involve the construction of a new street or extension of an existing street;
 - d. does not necessitate the extension of municipal facilities or the creation of any public improvements; and,
 - e. does not adversely affect the remainder of the parcel or adjoining property.

48. **Off-Site** – Everything not on site.
49. **On-Site** – Located within the controlled area where runoff originates.
50. **Outfall** – The point or location where storm runoff discharges from a sewer or drain. Also applies to the outfall sewer or channel that carries the storm runoff to the point of outfall.
51. **Peak Flow** – The maximum rate of flow of water at a given point in a channel or conduit resulting from a particular storm or flood,
52. **Perimeter Drain** - A subsurface tile drain located around and below the perimeter of septic system absorption field in compliance with regulations established -by Randolph County Ordinance and administered by the Randolph County Health Department.
53. **Private Drain** - A storm sewer, subsurface tile drain, open ditch, grassed waterway or drainage structure that is located on land owned by one or more landowners and which was not established under the Indiana code as a Regulated Drain or which is not under the maintenance jurisdiction of the Randolph County Drainage Board and County -Surveyor.
54. **Radius of Curvature** – Length of radius of a circle used to define a curve.
55. **Rainfall Intensity** – The cumulative depth of rainfall occurring over a given duration, normally expressed in inches per hour.
56. **Reach** – Any length of river, channel or storm sewer.
57. **Regulated Area** — All of the land under the jurisdiction of the Randolph County Drainage Board, Board of Works, or Town Board as defined herein that has adopted this Ordinance
58. **Regulated Drain** -Any open ditch or subsurface tile drain that has been accepted and is under the jurisdiction of the Drainage Board in accordance with the 1965 Drainage Act and its amendments (IC 36-9 27).

59. **Regulated Drain Easement** - A legally enforceable access strip of land measured at right angles 75 feet from the top of each bank of an open drainage way, the center line of a buried tile drain, or storm sewer determined to be a regulated rural or urban drain by the Randolph County Drainage Board and verified through records located in the Randolph County Surveyor's Office. Regulated drain easements in platted subdivision urban drains may be less than 75 feet wide if so approved by the Drainage Board.
60. **Regulatory Flood** — A flood with a peak having a probability of occurrence of 1 % in any given year, which is commonly referred to as a 100-year flood as calculated by a method and procedure that is acceptable to the Drainage Board. If a permit for construction in a floodway is required by the IDNR, the regulatory peak discharge shall be calculated by the method and procedure acceptable to the Drainage Board and the IDNR.
61. **Release Rate** — The amount of storm water release from a storm water control facility per unit of time.
62. **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 100 years has a one percent probability of being equaled or exceeded in any one year.
63. **Runoff** - The water derived from rains falling within a tributary basin, flowing over the surface of the ground, or collected in channels or conduits.
64. **Runoff Coefficient** — A decimal fraction relating the amount of rain which appears as runoff and reaches the storm drainage system to the total amount of rain falling. A coefficient of 0.5 implies that 50 percent of the rain falling on a given surface appears as storm water runoff.
65. **Sediment** — Material of soil and rock origin, transported, carried or deposited by water.

66. **Siphon** — A closed conduit or 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. A siphon utilizes atmospheric pressure to effect or increase the flow of water through a conduit. An inverted siphon is used to carry storm water flow under an obstruction such as a sanitary sewer.
67. **Site** - The entire area included in the legal description of the land upon which land disturbing activities have been proposed in an improvement location permit or subdivision application.
68. **Slope** - The face of an embankment or cut section; any ground whose surface makes an angle with the plane of the horizon. Slopes are usually expressed in a percentage based upon vertical difference in feet per 100 feet of horizontal distance.
69. **Soil Survey** - A study conducted by the Natural Resources Conservation Service (former Soil Conservation Service) in which maps of each legal land section of Randolph County have been prepared detailing the types of soil that can be found on land in various parts of the county.
70. **Spillway** — A waterway in or about a hydraulic structure, for the escape of excess water.
71. **Stilling Basin** — A basin used to slow water down or dissipate its energy.
72. **Storage Duration** — The length of time that water may be stored in any storm water control facility, computed from the time water first begins to be stored in the system.
73. **Storm Sewer** — A closed conduit for conveying collected storm water.
74. **Storm Water Drainage System** — All means, natural or man-made, used for conducting storm water to, through or from a drainage area to any of the following: conduits and appurtenant features, canals, channels, ditches, streams, culverts, streets and pumping stations.

75. **Subsurface Tile Drain:** A plastic, concrete, asbestos concrete or clay tile drain placed under a street curb, around the perimeter of a septic system absorption field, or attached to foundation drains, which serves as a drainage outlet and reduces the level of the groundwater table in adjacent soils.
76. **Swale** – A grassy or paved structure used to convey concentrated surface water runoff from its source to a storm sewer, conduit, channel, or other natural drainage outlet.
77. **Town** — Town shall mean the town of Farmland, Losantville, Lynn, Modoc, Parker City, Ridgeville, or Saratoga, all in Indiana.
78. **Town Board** — The Board of Trustees in any of the Towns defined in this section and any subordinate employee to whom they shall specifically designate a responsibility authorized by this Ordinance. The Town Board shall have jurisdiction within the corporate limits of the Town.
79. **Tributary** — Contributing storm water from upstream land areas.
80. **Urbanization** — The development, change or improvement of any parcel of land consisting of one or more lots for residential, commercial, industrial, institutional, recreational or public utility purposes.
81. **Watercourse** — Any river, stream, creek, brook, branch, natural or man-made drainageway in or into which storm water runoff or floodwaters flow either regularly or intermittently.
82. **Watershed** — See Drainage Area.
83. **Wet Bottom Detention Basin (Retention Basin)** — A basin designed to retain a permanent pool of water after having provided its planned detention of runoff during a storm event.

VII. STORM WATER CONTROL POLICY (See ordinance to Amend 2006-16)

It is recognized that (with the possible exception of the White River and Mississinewa River) the smaller streams and drainage channels serving Randolph County may not have sufficient capacity to receive and convey storm water runoff resulting from continued urbanization. Accordingly, the storage and controlled release rate of excess storm water runoff shall be required for any new major subdivision residential development, commercial, industrial or institutional development, and any commercial, industrial or institutional redevelopment in Randolph County.

Exceptions to the requirement are minor subdivisions as described in the Subdivision Control Ordinance. In addition, the Board, after thorough investigation and evaluation, may waive the requirement of controlled runoff set-out in this Ordinance.

The release rate of storm water from development, redevelopments, and new construction requiring controlled release ~~may not exceed~~ **must reduce** the storm water runoff from the land area in its present state of development. The developer must submit to the Board detailed computations of runoff before and after development, redevelopment or new construction, which demonstrate that runoff will not be increased.

These computations must show that the peak runoff rate after development for the 100-year return period storm of critical duration ~~must not exceed~~ **must reduce** the 10-year return period pre-development peak runoff rate. The critical duration storm is that storm duration that requires the greatest detention storage. (See Ordinance to Amend 2006-16)

The City of Winchester will regulate the 10 year post developed run-off rate to 2-year pre-developed runoff rate to provide stormwater management benefits across a wider range of storm events. This would apply to commercial, industrial, or general business projects in urbanized areas located in the "021" parcel number district.

VIII. INFORMATION REQUIREMENTS

The following information and data provided by an Indiana licensed professional engineer or land surveyor engaged in storm drainage design shall be submitted to the Board at the time of application for Primary Plat Approval for any major subdivision development, redevelopment or new construction, or at the time of application for an Improvement Location Permit (ILP) for any commercial, industrial, or institutional development, redevelopment or new construction on real estate which lies within the Regulated Area.

A PE or LS shall stamp/seal is required on all plans and reports associated with projects that disturb more than 1 acre of total site area in accordance with 327 IAC 15-5 (rule 5 erosion control) Rural farm drainage work is not included in these requirements

:

A. Topographic Map and Site Plan.

A plan drawn to scale showing the land to be improved, dimensions of the site, and a topographic map of the land and such adjoining land whose topography may affect the layout or drainage of the development. The map shall use United States Geological Survey (USGS) contour information at intervals of one foot when slopes are less than four percent and two feet when the slope exceeds four percent. On this plan the following information shall be shown:

1. Delineation of the drainage area in which the development is located.
2. Natural or man-made streams, rivers or ditches, the extent of the floodplains at the established 100-year flood elevation and the limits of the floodway, all properly defined.
3. The location of lakes, ponds, marsh or swamp areas, their floodplains and lines of inflow and outflow, if any.
4. The existing surface water flow direction within the drainage area.
5. Existing drainage facilities, regulated drains, farm drains, culverts, storm drains, inlets and outfall, if any of record.
6. Sanitary or combined sewers and outfalls, septic tank systems and outlets, if any of record.
7. Proposed contours and grading plan using the same contour intervals as shown for the existing condition.
8. Proposed drainage plan showing storm drains, culverts, wet bottom/dry-bottom detention basins, and all proposed easements over such drainage facilities.
9. *All elevations shall be referenced to either National Geodetic Vertical Datum of 1929 (NGVD) or North American Vertical Datum of 1988 (NAVD).*
10. *Indicate the extent and location of any jurisdictional wetland areas located on the subject property. A plan must be submitted which details how the wetland loss will be mitigated. The developer is responsible for all necessary coordination and compliance with IDNR or COE regulations.*

B. Soils Map

A soils map of the proposed development indicating soils names and their hydrologic classification as well as identification of the existing ground cover.

C. Drainage Facilities Plan and Calculations

A comprehensive study of the storm water drainage design to handle safely the storm water runoff and to detain the increased storm water runoff must be provided. The plan shall give consideration to both water entering the development from adjacent land and water within the boundaries of the development. In addition, the plan shall indicate the feasibility of the drainage plan, shall indicate the methods of , detention and the adequacy of downstream facilities. The plan shall show at a minimum:

1. The layout and design of the proposed storm sewers, the basis of their design, outfall and outlet locations and elevations, the receiving stream or channel and its 100-year return period water elevation, and the functioning of drains during high water conditions.
2. The location and design of the proposed street system, especially Including depressed pavements used to convey or temporarily store overflow from the heavier rainstorms, and the outlets for such overflow.
3. The locations, cross sections and profiles of existing streams and floodplains to be maintained, and new channels to be constructed.
4. The materials, elevations, waterway openings, and the basis for design of proposed culverts and bridges.
5. Existing detention ponds and basins to be maintained, enlarged, or otherwise altered and new ponds or basins to be built and the basis of their design.
6. The estimated location and percentage of impervious surfaces existing and expected to be constructed when the development is complete.
7. The slope, type and size of all sewers and other waterways.
8. For all detention basins, a plot or tabulation of storage volumes with corresponding water surface elevations and a plot or tabulation of the basin outflow rates for those water surface elevations.
9. Any interim plan that is to be incorporated into the development pending completion of the development.

D. Submittal and Consideration of Plans:

Two (2) sets of drainage plans and calculations shall be submitted to the Board twenty (20) days prior to their regularly scheduled meeting. *Two sets of drainage plans and calculations shall also be submitted to the City of Winchester for any development project partially or wholly within the Winchester corporation limit (within the '021' parcel number district) or within 2 miles of said corporation limit if located within the following regulated drain watersheds as delineated by the Randolph County Surveyor: Edwards-Cox-Suger Creek(524), Kemm-Parry(628), Wilson-Brown-Leavell-Monks(584), Salt Creek (common drain), Samuel Phillips(565), Samuel Irvin(547), Kora Davis(656), Gideon Bird(503). Projects located outside the Winchester Corporation limits but within the designated watersheds would be subject to the Randolph County Drainage Board Ordinance requirements with regard to threshold area (20,000 sq/ft) and allowable release rate criteria (10 year undeveloped vs. 100 year developed). The applicant shall receive City approval before or concurrent with approval from the Randolph County Drainage Board.* All drainage plans and calculations in compliance with the standards of this ordinance shall be approved by the Board. The Board and/or the County Surveyor shall stamp such approval on a

copy of such plans and deliver the same to the applicant. The Board shall approve or disapprove any drainage plans and calculations 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 Board minutes.

The Randolph County Surveyor or appropriate City or Town personnel is authorized to review engineering summaries of projects and based upon the same recommend to the Board exemptions from any and all requirements of this ordinance.

IX. DETERMINATION OF RUNOFF QUANTITIES X

Runoff quantities shall be computed for the area of the parcel under development plus the area of the watershed flowing into the parcel under development. The quantity of runoff which is generated as the result of a given rainfall intensity maybe calculated as follows:

A. Area Less Than or Equal to 200 Acres

For areas up to and including 200 acres, the Rational Method may be used. Typical runoff coefficients are listed herein. In the Rational Method, 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. A=tributary drainage area in acres. Guidance to selection of the runoff coefficient "C" is provided by Table 1 and Table 2 which show values for different types of surface and local soil characteristics. The composite "C" value used for a given drainage area with various surface types shall be the weighted average value for the total area calculated from a breakdown of individual areas having different surface types.

Table 3 provides runoff coefficients and inlet times for different land use classifications. In the instance of undeveloped land situated in an upstream area, a coefficient or coefficients shall be used for this area in its present or existing state of development.

Rainfall intensity shall be determined from the data shown in Table 6. 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.

Time of concentration (tc) is the combined time required for the runoff to reach the inlet of the storm sewer. It includes overland flow time and flow time through established surface drainage channels such as swales, ditches and sheet flow across such areas as lawns, fields, and other graded surfaces. It may be computed by using Figure 1.

B. For Areas Greater Than 200 Acres

For areas larger than 200 acres, hydrograph techniques and/or computer modeling methods may be used. Hydrograph techniques and computer modeling methods used to determine storm water runoff shall be proven methods, subject to approval of the Board.(see also Section XIV, subsection F)

X. AMOUNT OF RUNOFF TO BE ACCOMMODATED BY VARIOUS PARTS OF THE DRAINAGE FACILITY

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

A. Minor Drainage Systems

1. The minor drainage system such as inlets, catch basins, street gutters, swales, sewers and small channels that collect storm water must accommodate peak runoff from a 10-year return period storm. Rainfall duration shall be equal to the time of concentration or one hour if the time of concentration is less than one hour. A first quartile storm distribution shall be used for computer modeling. The allowable spread of water on Arterial and Collector Streets is limited to maintaining two clear 10-foot moving lanes of traffic. One lane is to be maintained on Local Streets, while Marginal Access Streets can have a water spread equal to one-half of their width.
2. Open channels carrying peak flows greater than 30 cubic feet per second shall be capable of accommodating peak runoff for a 50-year return period storm within the drainage easement.
3. Culverts shall be capable of accommodating peak runoff from a 50-year return period storm when crossing under a road which is part of the Indiana Department of Transportation rural functional classification system and are classified as principal or minor arterial, major or minor collector roads.

B. Major Drainage Systems

Major drainage systems are defined in Section VI, Subsection B.44 and Standards.

XI. STORM SEWER DESIGN STANDARDS

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

A. Hydraulic Capacity:

The hydraulic capacity of storm sewers shall be determined using Manning's Equations:

$$V = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

V = mean velocity of flow in feet per second

R = the hydraulic radius in feet

S = the slope of the energy grade line in feet per foot

n = roughness coefficient

The hydraulic radius, R, is defined as the cross sectional area of flow divided by the wetted flow surface or wetted perimeter. Typical "n" values and maximum permissible velocities for storm sewer materials are listed in Table 4. Roughness coefficient (n) values for other sewer materials can be found in standard hydraulics texts and references.

B. Minimum Size

The minimum size of all storm sewers shall be 12 inches. Rate of release for detention storage shall be controlled by an orifice plate or other devices, subject to approval of the Board, where the 12-inch pipe will not limit rate of release as required.

C. Grade

Sewer grade shall be such that, in general, a minimum of two feet of cover is maintained over the top of the pipe. Pipe cover less than the minimum may be used only upon approval of the Board. Uniform slopes shall be maintained between inlets, manholes and inlets to manholes. Final grade shall be set with full consideration of the capacity required, sedimentation problems and other design parameters. Minimum and maximum allowable slopes shall be those capable of producing velocities of two and one-half (2.5) and fifteen (15) feet per second, respectively, when the sewer is flowing full.

D. Alignment

Storm sewers shall be straight between manholes insofar as possible. Where long radius curves are necessary to conform to street -layout, the minimum radius of curvature shall be no less than 100 feet for sewers 42 inches and larger in diameter. Deflection of pipe sections shall not exceed the maximum deflection recommended by the pipe manufacturer. The deflection shall be uniform and finished installation shall follow a smooth curve.

E. Backfill Requirements

Any storm sewer constructed within a Randolph County highway must be approved by the Randolph County Highway Supervisor, or designee, prior to construction. Any sewer constructed within five (5) feet of an existing or proposed street, alley, driveway, or sidewalk shall be backfilled with granular material. Granular backfill shall be crushed or washed stone compacted to 95% maximum density. Granular backfill shall extend from the bottom of the trench excavation to the restoration materials. Pavement restoration shall be a minimum 4-inches thick consisting of three (3) inches of bituminous intermediate binder and one (1) inch of bituminous surface, or match existing pavement section, whichever is thicker.

F. Allowable Outlet Location

It shall be illegal to outlet the discharge pipe, emergency spillway, tile underdrain, or any other water discharge structure from a wet or dry retention/detention basin, or any storm sewers, sump pump drains, downspout drains, perimeter septic system tile drains, farm tile drains, foundation or floor drains into the right-of-way of any roadway including all Randolph County roads, Indiana state highways, federal highways, private streets, regulated open or tile drains, onto adjacent property, etc., without the written approval of the agency having jurisdiction over the roadway, regulated drain, or the owner of the property upon which the water will flow. Outletting of subsurface tile drains into a 6 or 8 inch outlet tile or open channel of a legal drain located within a county road right-of-way and which has been designed to serve such a purpose shall be permitted subject to plan approval of the County Surveyor or the County Highway Supervisor.

The excavation, filling, paving, and/or any other type of construction of roadside drainage ditches located within Randolph County Highway right-of-ways is PROHIBITED. Exceptions may be granted by the Drainage Board or the Randolph County Highway Superintendent and must be in writing PRIOR to beginning construction. Extension and paving of existing driveways within the road right-of-way shall be required to extend existing culverts and must seek and receive driveway construction approval from the Randolph County Highway Department.

G. Manholes

Manholes 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 or more storm sewers converge.
2. At the point of beginning or at the end of a curve, and at the point of reverse curvature (PC, PT, PRC).
3. Where pipe size changes.
4. Where an abrupt change in alignment occurs.
5. Where a change in grade occurs.
6. At suitable intervals in straight sections of sewer.

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

Size of Pipe (Inches)	Maximum Distance (feet)
12 thru 42	400
48 and larger	600

H. Inlets

Inlets or drainage structures shall be utilized to collect surface water through grated openings and convey it to storm sewers, channels or culverts. Inlet design and spacing shall be in accordance with Section 36-2.08 of the Indiana Department of Transportation's Design Manual Part IV — Volume 2 or other approved design procedure. The inlet grate opening provided must be adequate to pass the design 10-year flow with 50% of the sag inlet areas clogged. An overload channel from sag inlets to the overflow channel or basin shall be provided at sag inlets, so that the maximum depth of water that might be ponded in the street sag shall not exceed 7 inches.

I. Workmanship and: Materials

1. Workmanship

The specifications for the construction of storm sewers shall not be less stringent than those set forth in the latest edition of the Indiana, Department of Transportation's "Standard Specifications"; additionally, ductile iron pipe shall be laid in accordance with American Water Works Association (AWWA) C-600 and clay pipe shall be laid in accordance with American Society of Testing Materials (ASTM) C-12.

2. Materials

Storm sewer manholes and inlets shall be constructed of masonry, 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 extra strength clay pipe (ASTM C-700), ductile iron pipe (AWWA C-151), or concrete pipe (ASTM C-76) *Polyvinyl Chloride (ASTM D-3034 or D-2241), or High Density Polyethylene (ASTM F-2648 or ASSHTO M-294)*. Other pipe and fittings not specified herein may be used only when specifically authorized by the Board. Pipe joints shall be flexible and watertight and shall conform to the requirements of Section 715.02 — Materials, of the latest edition of the Indiana Department of Transportation's "Standard Specifications"

XII. OPEN CHANNEL DESIGN STANDARDS

All open channels, whether private or public, and whether constructed on private or public land, shall conform to the design standards and other design requirements contained herein.

A. Hydraulic Capacity

The waterway for channels shall be determined using Manning's Equation.

$$Q = AV = \frac{A 1,486}{n} R^{2/3} S^{1/2}$$

Where: A = Waterway area of channel in square feet
Q = Discharge in cubic feet per second (cfs)
V, R, S and n are explained in Paragraph XI Subsection A.

B. Channel Cross Section and Grade

The required channel cross section and grade are determined by the design capacity, the material in 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, 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. Velocities less than one and one-half (1 Y2) feet per second should be avoided because siltation will

take place and ultimately reduce the channel cross section. The maximum permissible velocities in vegetal-lined channels are shown in Table 7. Developments through which the channel is to be constructed must be considered in design of the channel section.

C. Side Slopes

Earthen channel side slopes shall be no steeper than 3 to 1. Flatter slopes may be required to prevent erosion and for ease of maintenance. Where channels will be lined, side slopes shall be no steeper than 1-1/2 to 1 with adequate provisions made for weep holes. Side slopes steeper than 1-1/2 to 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 surcharge.

D. Channel Stability

1. Definition –Characteristics of a stable channel are:

- a. It neither aggrades nor degrades beyond tolerable limits.
- b. The channel banks do not erode to the extent that the channel cross section is changed appreciably.
- c. Excessive sediment bars do not develop.
- d. Excessive erosion does not occur around culverts, bridges or elsewhere.
- e. Gullies do not form or enlarge due to the entry of uncontrolled surface flow to the channel.

2. Aged Conditions

Channel stability shall be determined for an aged condition and the velocity shall be based on the design flow or the bank full flow, whichever is greater, using “n” values for various channel linings as shown in Table

4. In no case is it necessary to check channel stability for discharges greater than that from a 100-year return period storm.

3. Post Construction

Channel stability must be checked for conditions immediately after construction. For this stability analysis, the velocity shall be calculated for the expected flow from a 10-year return period storm on the watershed, or the bank full flow, whichever is smaller. The "n" value for newly constructed channels in fine-grained soils and sands may be determined in accordance with the National Engineering Handbook 5, Supplement B, Soil Conservation Service and shall not exceed 0.025. The allowable velocity in the newly constructed channel may be increased by a maximum of 20 percent to reflect the effects of vegetation to be established under the following conditions:

- a. The soil and site in which the channel is to be constructed are suitable for rapid establishment and support erosion controlling vegetation.
- b. Species of erosion controlling vegetation adapted to the area, and proven methods of establishment are shown.
- c. The channel design includes detailed plans for establishment of vegetation on the channel side slopes.

E. Drainage of Waterways,

Vegetated waterways and dry-detention basins with a gradient of less than 1% that are subject to low flows of long duration, or where wet conditions prevail shall be provided with a subsurface tile drain to keep the channel bottom relatively dry and to prevent the establishment of weed or cattail growth. Subsurface tile drain lines may be outlet through a drop structure at the end of the waterway, through a standard tile outlet pipe or outlet into the storm sewer system. Sub-surface drainage tiles shall be installed with 2 feet of cover over the top of the tile and shall be offset from the centerline of the channel.

F. Appurtenant Structures

The design of channels will provide all structures required for the proper functioning of the channel and the laterals thereto and travelways for operation and maintenance. Recessed inlets and structures needed for entry of surface and subsurface flow into channels without significant erosion or degradation shall be included in the design of channel improvements. The design is also to provide the necessary flood gates, water level control devices, and any other appurtenance affecting the functioning of the channels and the attainment of the purpose for which they are built.

The effect of channel improvements on existing culverts, bridges, buried cables, pipelines and inlet structures for surface and subsurface drainage on the channel being improved and laterals thereto shall be evaluated to determine the need for modification or replacement. Culverts and bridges which are modified or added as part of channel improvement projects shall meet reasonable standard for the type of structure, and shall have a minimum capacity equal to the design discharge or governmental agency design requirements, whichever is greater.

G. Disposition of Spoil

Spoil material resulting from clearing, grubbing and channel excavation shall be disposed in such a manner which will:

1. Minimize overbank wash.
2. Provide for the free flow of water between the channel and floodplain unless the valley routing and water surface profile are based on continuous dikes being installed.
3. Not hinder the development of travelways for maintenance.
4. Leave the right-of-way in the best condition feasible, consistent with the project purposes, for productive use by the owner.
5. Improve the aesthetic appearance of the site to the extent feasible.
6. Be approved by the IDNR or U.S. Army Corps of Engineers (whichever is applicable) If deposited in the floodway.

H. Construction and Materials

1. Construction

Specifications shall be in keeping with the current standards of engineering practice and shall describe the requirements for proper installation of the project to achieve its intended purpose.

2. Materials

Materials acceptable for use as channel lining are:

- a. Grass
- b. Revetment Riprap
- c. Concrete
- d. Hand-laid Riprap
- e. Precast Cement Concrete Riprap
- f. Grouted Riprap
- g. Gabions

Other lining materials shall receive specific approval of the Board. Materials shall comply with the latest edition of the Indiana Department of Transportation's "Standard Specifications".

XIII. ACCESSORY DRAINS

A. Sump Pumps

Sump pumps installed to receive and discharge groundwaters or other storm waters shall be connected to the storm sewer where possible or discharged into a designated storm drainage channel. Sump pumps installed to receive and discharge floor drain flow or other sanitary sewage shall be connected to the sanitary sewers. A sump pump shall be used for one function only, either the discharge of storm waters or the discharge of sanitary sewage.

B. Down Spouts

All down spouts or roof drains shall discharge onto the ground or be connected to the storm sewer. No down spouts or roof drains shall be connected to the sanitary sewers.

C. Footing and Foundation Drains

Footing drains shall be connected to storm sewers where possible or designated storm drainage channels. No footing drains or drainage tile shall be connected to the sanitary sewer.

D. Basement Floor Drains

Basement floor drains shall be connected to the sanitary sewers.

XIV. STORM WATER DETENTION

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

A. Acceptable Detention Methods:

The increased storm water runoff resulting from a proposed residential major subdivision, commercial, industrial, or -institutional development should be detained on-site by the provisions of appropriate wet or dry bottom reservoirs, by storage on parking lots, streets, lawns, or other acceptable techniques. Measures which retard the rate of overland flow and the velocity in runoff channels shall also be used to control the runoff rate partially. Detention basins shall be sized to store excess flows from storms with a one hundred (100) year return period. Control devices shall limit the discharge to a rate no greater than that prescribed by this ordinance (see Section XIV Subsections E and F).

B. Design Storm:

Design of storm water detention facilities shall be based on a return period of once in 100 years. The storage volume and outflow rate shall be sufficient to handle storm water runoff from a critical duration storm, as defined in Section XIV Subsections E and F. Rainfall depth-duration-frequency relationships and intensity-duration-frequency relationships shall be those given in Tables 5 and 6.

C. Allowable Release Rate:

The allowable release rate of storm water originating from a proposed residential major subdivision, commercial, industrial, or institutional development shall not exceed the amount specified in Section VII – Storm Water Control Policy, and as described in Section XIV Subsections E and F. In the event the natural downstream channel or storm sewer system is inadequate to accommodate the release rate provided above, then the allowable release rate shall be reduced to that rate permitted by the capacity of the

Receiving downstream channel or storm sewer system and additional detention shall be required to store that portion of the runoff exceeding the capacity of the receiving sewers or waterways.

If more than one detention basin is involved in the development of the area upstream of the limiting restriction, 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 restriction.

D. Drainage System Overflow Design:

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 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 rate have previously been approved by the Board and evidence of its construction can be shown.

E. 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. The following eleven step procedure may be used to determine the required -volume of storage. Other design methods may also be used, subject to approval of the Board, and as described in Section XIV Subsection F.

Steps Procedure

1. Determine total drainage area in acres "A".
2. Determine composite runoff coefficient "Cu" based on existing land use (undeveloped).
3. Determine time of concentration "t" in minutes based on existing conditions.
4. Determine rainfall intensity "I," in inches per hour, based on time of concentration from data given in Table 6 for the ten (10) year return period.
5. Compute runoff based on existing land use (undeveloped), and ten (10) year return period:
 $QU = C_{uI}A$
6. Determine composite runoff coefficient "Cd" based on developed conditions and a one hundred (100) year return -period.
7. Determine the one hundred (100) year return, period rainfall intensity "Id" for various storm durations V, up through the time of concentration for the developed area using Table 6.
8. Determine developed inflow rates "Qd" for various storm durations "td" measured in hours.
 $Qd = CdIdA$
9. Compute a storage rate "Std" ' for various storm durations "td" up through the time of concentration of the developed area.
 $Std = Qd - Q,$
10. Compute required storage volume "SR" in acre-feet for each storm duration "td". This assumes a triangular hydrograph of duration (2*td) hours with the peak flow of Std at td hours.
 $SR = Std (td/1 2)$
11. Select the largest storage volume computed in step 10 for detention basin design.

F. Determination of Storage Volume – Other Methods:

Methods other than the rational method for determining runoff and routing of storm water may be used to determine the storage volume required to control storm water runoff. The procedures or methods used must receive the prior approval of the Board, The ILLUDAS, TR-20 and TR-55 models are approved by the Board for appropriate use in analysis of the runoff and routing of storm water. The use of these models or other approved procedures can be defined in a seven step procedure to determine the required storage volume of the detention basin.

Steps Procedure

1. Calibrate the hydrologic/hydraulic model that is to be used for prediction of runoff and routing of storm water.
2. For each storm duration listed in Table 5, perform steps three through six.
3. Determine the ten (10) year, undeveloped peak flow. Denote this flow by Q'_{Ou}
4. Determine the one hundred (100) year runoff hydrograph (1-1100d) for developed conditions.
5. Determine the hydrograph that must be stored (H''), by subtracting a flow up to WOU from the hydrograph (1-1100d) found in step 4.
6. Determine the volume of water (V), to be stored by calculating the area under the hydrograph ($W'o'$).
7. The detention basin must be designed to store the largest volume (V_s) found for any storm duration analyzed in step 6.

G. General Detention Basin Design Requirements:

Basins shall be constructed to detain temporarily the storm water runoff which exceeds the maximum peak flow rate authorized by this Ordinance. The volume of storage provided in these basins, together with such storage as may be authorized in other on-site facilities shall be sufficient to control excess runoff from the one hundred (100) year storm.

The following design principles 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 48 hours unless additional storms occur within the period.
2. The maximum planned depth of storm water stored (without a permanent pool) shall not exceed four feet.
3. All storm water detention facilities shall be separated by not less than 50 feet from any building or structure to be occupied.
4. All excavated excess spoil may be spread so as to provide for aesthetic and recreational features such as sliding hills, sports fields, etc. Slopes no steeper than 4 horizontal to 1 vertical for safety, erosion control, stability and ease of maintenance shall be permitted.

5. Safety screens having a maximum opening of 4 inches shall be provided for any pipe or opening to prevent children or large animals from crawling into the structures.
6. 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 Board.
7. Outlet control structures shall be designed to operate as simply as possible and shall require little or no maintenance and/or attention for proper operation. They shall limit discharges into existing or planned downstream channels or conduits so as not to exceed the predetermined maximum authorized peak flow rate.
8. Emergency overflow facilities such as a weir or spillway shall be provided for the release of exceptional storm runoffs or in emergency conditions should the normal discharge devices become totally or partially inoperative. The overflow facility shall be of such design that its operation is automatic and does not require manual attention.
9. Grass or other suitable vegetative cover shall be provided throughout the entire basin area. Grass should be cut regularly at approximately monthly intervals during the growing season or as required.
10. Debris and trash removal and other necessary maintenance shall be performed on a regular basis to assure continued operation in conformance to design.
11. A report shall be submitted to the Board describing (a) the proposed development; (b) the current land use conditions; (c) the method of hydraulic and hydrologic analysis used, including any assumptions or special conditions; (d) the results of the analysis; and (e) the recommended drainage control facilities. Hydraulic and hydrologic calculations, including input and output files, shall be included as appendices to the report.

H. Dry Bottom Basin Design Requirements:

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

1. Provisions shall be incorporated to facilitate complete interior drainage of dry bottom basins, to include the provisions of natural grades to outlet structures, longitudinal and transverse grades to perimeter drainage facilities, paved gutters, or the installation of subsurface drains.
2. The detention basin shall, whenever possible, be designed to serve a secondary or multipurpose function. Recreational facilities, aesthetic qualities (open spaces) or other types of use shall be considered in planning the detention facility.

I. Wet Bottom Basin Design Requirements:

Where part of a detention basin will contain a permanent pool of water, all the items required for detention storage shall apply except that the system of drains with a positive gravity outlet required to maintain a dry bottom basin will not be required. A controlled positive outlet will be required to maintain the design water level in the wet bottom basin and provide required detention storage above the design water level. However, the following additional conditions shall apply:

1. Basins designed with permanent pools or containing permanent ponds shall have a water area of at least one-half acre. If fish are to be maintained in the pond, a minimum depth of approximately 10 feet shall be maintained over at least 25 percent of the pond area. The remaining pond area shall have no extensive shallow areas, except as required by subsection (3) below.
2. 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.
3. A safety ledge four to six feet in width is required and must be installed in all ponds approximately 30 to 36 inches below the permanent water level. In addition, a similar maintenance ledge 12 to 18 inches above the permanent water line shall be provided. The slope between the two ledges shall be stable and of a material such as stone or riprap which will prevent erosion due to wave action.
4. A safety ramp exit from the pond is required in all cases and shall have a minimum width of 20 feet and exit slope to 6 horizontal to 1 vertical. The ramp shall be of a material that will prevent its deterioration due to vehicle use and/or wave action.
5. Periodic maintenance is required in ponds to control weed and larval growth. The pond shall also be designed to provide for the easy removal of sediment which will accumulate during periods of pond operation. A means of maintaining the designed water level of the pond during prolonged periods of dry weather is also required.
6. For emergency use, basin cleaning or shoreline maintenance, facilities shall be provided or plans prepared for auxiliary equipment to permit emptying and drainage.
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 aeration facilities shall be submitted with final engineering plans. Agreements for the perpetual operation and maintenance of aeration facilities shall be prepared to the satisfaction of the Board.

J. Parking Lot Storage:

Paved parking lots may be designed to provide temporary detention storage of storm waters on all or a portion of their surfaces. Outlets will be designed so as to empty the stored waters slowly. Depths of storage must be limited to a maximum depth of 7 inches so as to prevent damage to parked vehicles and so that access to parked vehicles is not impaired. Ponding should, in general, be confined to those positions of the parking lots farthest from the area served.

K. Facility Financial Responsibilities:

The construction cost of storm water control systems and facilities as required by this ordinance shall be accepted as part of the cost of land development. If general public use of the facility can be demonstrated, negotiations for public participation in the cost of such development may be considered.

L. Facility Maintenance Responsibility:

1. See Section XV, Subsection C concerning detention basins within residential major subdivisions.
2. On commercial, industrial and institutional developments, maintenance of detention facilities during construction and thereafter shall be the responsibility of the land developer/owner.

M. Inspections:

All public and privately owned detention storage facilities shall be inspected not less often than once every five years. For commercial, industrial and institutional sites, the property owner shall provide a certified inspection report by a licensed professional engineer or land surveyor covering physical conditions, available storage capacity and operational condition of key facility elements to the Board. For inspections within major subdivisions, see Section ACV, Subsection CA

N. Corrective Measures:

If deficiencies are found by the inspector, the owner of the detention/retention facility will be required to take the necessary measures to correct such deficiencies. If the owner fails to do so, the County will undertake the work and collect from the owner using lien rights, if necessary.

O. Joint Development of Control Systems:

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

P. Installation of Control Systems:

Runoff and erosion control systems shall be installed as soon as possible during the course of site development. Detention/retention basins shall be designed with an additional ten (10) percent 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.

Q. Detention Facilities in Floodplains:

If detention storage is provided within a floodplain, only the net increase in storage volume above that which naturally existed on 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.

R. Off-Site Drainage Provisions:

When the allowable runoff is released in an area that is susceptible to flooding, the developer may be required to construct appropriate storm drains through such area to avert increased flood hazard caused by the concentration of allowable runoff at one point instead of the natural overland distribution. The requirement of off-site drains shall be at the discretion of the Board.

S. Pond (or lake) Requirements:

Pond construction: Ponds, as defined as pools of water meant to be permanent in design, shall not cause water to back up, or be detained within 30” elevation of any adjoining property line upstream.

All new ponds are to be built so that the high waterline (spillway) is below any incoming field tile.

Existing ponds. Existing ponds can be held to this standard if it can be proved that they cause damage to an upstream neighbor.

Penalties: The pond owner can be held liable for damages caused by their pond. Fines will be the same as for non-compliant construction.

XV. EXISTING REGULATED DRAINS AND ESTABLISHMENT OF URBAN REGULATED DRAINS

The Randolph County Drainage Board has established a system of regulated rural and urban drains as shown on official maps located in the office of the Randolph County Surveyor. Maintenance and administrative jurisdiction over these drains is empowered to the Drainage Board by Section 36-9-27-15 of the Indiana Code.

A. Drainage Easements

When an existing regulated drain is within the property to be developed, easements must be provided to cover all elements of the drainage system and must be designed as follows:

1. To be adequate to install, access, and maintain the drainage facilities;
3. To minimize conflicts with utility easements; and
4. To maintain a sufficient buildable area on each lot or parcel.
5. No trees, shrubs, or other vegetative obstructions shall be allowed within drainage easements per Indiana Code 36-9-27-33.
6. No driveways shall be allowed in drainage easements except for the purpose of crossing a front yard drainage easement to provide access to the property.
7. Minimum drainage easements are as per Indiana Code 36-9-27-33.

B. Existing Regulated Drains

No individual may dredge, reconstruct, fill, or outlet any drainage tile or storm sewer pipe into a Randolph County Regulated Drain without the prior written approval of the Drainage Board. The Randolph County Surveyor, or designated representative, shall supervise any work done to a regulated drain by any individual granted such written authorization from the Drainage Board.

The Drainage Board may levy assessments to property owners within a regulated drain's watershed in order to maintain the drain in accordance with Indiana Code 36-9-27-44 and to reconstruct a regulated drain in accordance

With Indiana Code 36-9-27-50.

As per Indiana Code 36-9-27-66, whenever land has been assessed as benefited by the construction, reconstruction, or maintenance of a regulated drain and there is not an open or tiled drain connecting the land with the regulated drain or the waters from the land flow over or through land owned by others to reach the regulated drain, the owner of the land assessed may petition the Drainage Board to construct through the land of the other owners a new drain that will connect the petitioner's lands with the regulated drain.

A private crossing, control dam, or other permanent structure or obstruction may not be placed over or through a regulated drain unless the plans for the structure have been reviewed by the Randolph County Surveyor and approved in writing by the Drainage Board.

C. Establishment of Urban Regulated Drains

The Drainage Board shall require that developers of major residential subdivisions create an Urban Regulated Drain as part of the major subdivision plat. The Urban Regulated Drain shall include all storm sewers, subsurface drains, inlets, manholes, and detention basins within the subdivision.

1. Urban Regulated Drainage Easements shall maintain a minimum width of twenty (20) feet centered over all closed conduits or twenty (20) feet each side of an open urban regulated drain or detention basin.
2. A minimum fifteen (15) feet wide access easement shall be platted between the detention basin and the nearest public street right-of-way.
3. The County Surveyor shall establish a schedule for the assessment of each lot in the subdivision in an amount not to exceed \$100.00 per lot per year to provide an accumulating maintenance and repair fund. These funds can be used to inspect repair and maintain storm sewers, curb inlets, manholes, subsurface tile drains, outlet pipes, and detention basins in the subdivision. Within the context of this Ordinance, mowing shall not be defined as a maintenance activity covered by an assessment. Individual property owners shall maintain responsibility for mowing portions of the urban regulated drain within and adjacent to each individual lot.

XVI. DRAINAGE REQUIREMENTS FOR MINOR SUBDIVISIONS AND OTHER LAND DISTURBING ACTIVITIES

A. Driveway Requirements

Any site that derives access from a Randolph County highway shall be required to obtain approval from the Randolph County Highway Supervisor, or designee, prior to installation of a new access to the highway. A drainage culvert for the purpose of conveying water from the roadside ditch underneath the driveway shall be required to be

placed under all driveways entering onto a County road, unless a culvert is deemed unnecessary by the Randolph County Highway Supervisor. The minimum size for such a culvert shall be 12-inches in diameter and 30-feet in length. The size of the drainage culvert shall provide capacity for the flow from a 25-year design return period storm.

B. Allowable Drainage Outlet

It shall be illegal to outlet any storm sewers, sump pump drains, downspout drains, perimeter septic system tile drains, farm tile drains, foundation or floor drains into the right-of-way of any roadway including all Randolph County roads, Indiana state highways, federal highways, private streets, regulated open or tile drains, onto adjacent property, etc., without the written approval of the agency having jurisdiction over the roadway, regulated drain, or the owner of the property upon which the water will flow. Outletting of subsurface tile drains into a 6 or 8 inch outlet tile or open channel of a legal drain located within a county road right-of-way and which has been designed to serve such a purpose shall be permitted subject to plan approval of the County Surveyor or the County Highway Supervisor.

C. Maintenance of Existing Roadside Ditches

The excavation, filling, paving, and/or any other type of construction of roadside drainage ditches located within Randolph County Highway right-of-ways is PROHIBITED. Exceptions may be granted by the Drainage Board or the Randolph County Highway Superintendent and must be in writing PRIOR to beginning construction. Extension and paving of existing driveways within the road right-of-way shall be required to extend existing culverts and must seek and receive driveway construction approval from the Randolph County Highway Department.

D. Road Cuts and Restoration

Any excavation within a Randolph County highway must be approved by the Randolph County Highway Supervisor, or designee, prior to construction. All excavation and spoil removal is the responsibility of the development owner. The County Highway Department will provide and install backfill and pavement restoration materials given 48 hours notice prior to construction

XVII. CERTIFICATION REQUIRED

After completion of the project and before final approval and acceptance can be made, a professionally prepared and certified "As Built" set of plans shall be submitted to the Board for review. These plans shall include all pertinent data relevant to the completed storm drainage system and shall include:

- A. Pipe size and pipe material.
- B. Invert elevations.
- C. Top rim elevations.
- D. Lengths of all pipe structures.
- E. Data and calculations showing detention basin storage volume.
- F. Certified statement on plans stating the completed storm drainage system

substantially complies with construction plans as approved by the Board.

All such submitted plans shall be reviewed for compliance within 45 days after submission to the Board or County Surveyor, *and to the City of Winchester when dual City/County review of the project approval is required (see section VIII.D-Submittal)*. If notice of non-compliance is not given within 45 days of submission of the plans, the plans shall be construed as approved and accepted.

XVIII. CHANGES IN PLANS

Any revision, significant change or deviation in the detailed plans and specifications after formal approval by the Board shall be filed in duplicate with and approved by the Board 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. Revised copies of construction plans shall be filed with the Board, County Surveyor and the County Highway Supervisor.

XIX. ORDINANCE ENFORCEMENT AND PENALTIES

Individuals found to be in violation of this ordinance shall be subject to specific penalties including, but not limited to, a warning letter; a stop-work order, or a suit for injunction; issued by a representative of the County' Surveyor or the Board.

A. Stop-Work Order

A representative for the County Surveyor or Board shall post a written stop-work order indicating items/reasons for the order if:

1. Any land disturbing activity regulated under this ordinance is being undertaken without a permit;
2. The conditions of the permit are not being met.

Following the issuance of a stop-work order, the developer may only work on-site to bring the development into compliance, but no progress on the work may occur until a ruling is made by the Board. The Owner or Developer may appeal to the issuer of the stop-work order to retract it if the reason(s) for the stop-work order has/have been remedied prior to the next regularly scheduled Board meeting.

At the next regularly scheduled meeting of the Board, it shall make a ruling on the stop-work order to determine the remedial action required and the time period to complete the remedial action.

C. Penalty

If the remedial action is not completed in accordance with the Board Ruling, a penalty shall be imposed on the Owner or Developer up to a maximum of \$500.00 per day.

D. Legal Action

Any individual violating any of the provisions of this Ordinance shall be subject to the legal remedies available to the Board, which may include suit for injunction in Randolph County Circuit Court or Superior Court, penalties and fines, and reimbursement of legal fees.

XX. DISCLAIMER OF LIABILITY

The degree of protection required by this ordinance is considered reasonable for regulatory purposes and is based on historical records, engineering 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 Randolph County or any City or Town listed in Section VI, Subsection B adopting this ordinance, or any officer or employee thereof for any damage that may result from reliance on this ordinance or on any administrative decision lawfully made hereunder.

M. CORRECTIVE ACTION

Nothing herein contained shall prevent Randolph County, or any City or Town listed in Section VI, Subsection B adopting this ordinance, from taking such other lawful action as may be necessary to prevent or remedy any violation. All costs connected therewith shall accrue to the person or persons responsible.

XXII. REPEALER

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

KEMM-PARRY(628) LEGAL DRAIN-IMPACT AREA DECLARATORY IMPACT RESOLUTION

RANDOLPH COUNTY, INDIANA RESOLUTION # 2009-1

WHEREAS, the (City/County) Drainage Board desires to promote the safe and orderly development or redevelopment of property within the Kemm-Perry (#628) Legal Drain watershed, and

WHEREAS, portions of the existing drainage pipes, culverts and ditches associated with the Kemm-Perry (#628) Legal Drain have limited capacity to convey storm water runoff, and

WHEREAS, flooding conditions are known to exist and occur with a frequency that exceeds adjoining areas, and

WHEREAS, flooding conditions have caused and will continue to cause damages to existing properties and structures,

BE IT RESOLVED by the (City/County) Drainage Board that the portion of the Kemm-Perry (#628) Legal Drain watershed that is located south of the CSX Railroad be declared an Impact Drainage Area pursuant to (City of Winchester/or Randolph County) Drainage Ordinance § ??.??, and that all future development or redevelopment activity within said watershed is hereby limited to 0.20 cfs per acre of drainage discharge in the Kemm-Perry (#628) Legal Drain for storm events up to and including the 100-year return period storm event, and that all the landowners on that portion of the Kemm-Perry (#628) Legal Drain be notified of this declaratory resolution.



N. Bud Carpenter, President



Kathy Beumer, Vice President



Troy Prescott, Member

DATED AND SIGNED THIS 17th DAY OF AUGUST 2009

**KEMM-PARRY (628) LEGAL DRAIN – IMPACT DRAINAGE AREA DECLARATORY
RESOLUTION**

CITY OF WINCHESTER, INDIANA / COUNTY OF RANDOLPH

RESOLUTION NUMBER: 2009- 1

Whereas, the Randolph County Drainage Board desires to promote the safe and orderly development or redevelopment of property within the Kemm-Parry (628) Legal Drain watershed, and Whereas, portions of the existing drainage pipes, culverts and ditches associated with the Kemm-Parry (628) Legal Drain have limited capacity to convey storm water runoff, and Whereas, flooding conditions are known to exist and occur with a frequency that exceeds adjoining areas, and Whereas, flooding conditions have caused and will continue to cause damages to existing properties and structures. **BE IT RESOLVED** by the Randolph County Drainage Board, that the portion of the Kemm-Parry (628) Legal Drain watershed that is located south of the CSX Railroad be **DECLARED** an Impact Drainage Area pursuant to the City of Winchester and Randolph County, Indiana Drainage Ordinance, and that all future development or redevelopment activity within said watershed is hereby limited to 0.20 cfs per acre of drainage discharge in the Kemm-Parry (628) Legal Drain for storm events up to and including the 100 year return period storm event, and that all the landowners on that portion of the Kemm-Parry (628) Legal Drain be notified of this declaratory resolution.

** This resolution will only affect those individuals and or business owners who are contemplating development or redevelopment of improvements of more than 20,000 square feet (For example 200' x 100') **

AN ORDINANCE TO AMEND SECTION VII OF THE RANDOLPH COUNTY STORM WATER CONTROL ORDINANCE

This is an Ordinance to amend Section VII, Storm Water Control Policy to include agricultural farm buildings in the storm water control policy.

BE IT ORDAINED by the Board of County Commissioners of Randolph County, Indiana and the County hereby adopts the following:

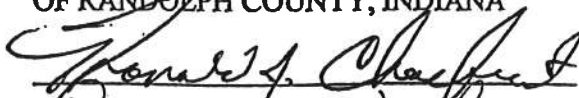
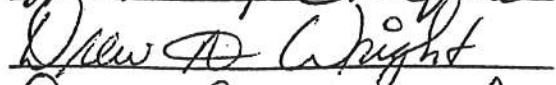

SECTION 1. Section VII of the Randolph County Storm Water Control Ordinance shall be amended to include agricultural farm buildings and shall read as follows:

VII. STORM WATER CONTROL POLICY.

It is recognized that (with the possible exception of the White River and Mississinewa River)) the smaller streams and drainage channels serving Randolph County may not have sufficient capacity to receive and convey storm water runoff resulting from continued urbanization. Accordingly, the storage and controlled release rate of excess storm water runoff shall be required for any new major subdivision residential development, commercial, industrial or institutional development and any commercial, industrial, institutional redevelopment in Randolph County or an any agricultural farm buildings

This Ordinance adopted by the Board of County Commissioners of Randolph County, Indiana this 1st day of . May, 2006.

BOARD OF COUNTY COMMISSIONERS
OF RANDOLPH COUNTY, INDIANA

ATTEST


Auditor

Storm Drainage Control Ordinance

Ordinance No. 2025

XXIII. ENACTMENT

NOW THEREFORE, BE IT ORDAINED BY THE COUNTY COMMISSIONERS OF RANDOLPH COUNTY, INDIANA, that the hereinbefore Storm Drainage Control Ordinance be adopted in its entirety this 18th day of December, 2000.

THE RANDOLPH COUNTY COMMISSIONERS

David Bentkendorf

President

Steve Brown

Commissioner

Greg Beumer

Commissioner

ATTEST:

[Signature]

Storm Drainage Control Ordinance

Ordinance No. 2025

XXIII. ENACTMENT

NOW THEREFORE, BE IT ORDAINED BY THE COMMON COUNCIL OF WINCHESTER, IN RANDOLPH COUNTY INDIANA, that the hereinbefore Storm Drainage Control Ordinance be adopted in its entirety this 15th day of ~~December, 2000~~ January 2001

COMMON COUNCIL OF THE CITY OF WINCHESTER, INDIANA

William C Monroe

Vicki Hemeny

Melanie Robinson

Map S Myers

Approved by Me, [Signature], Mayor of the City of Winchester, Indiana.

ATTEST: [Signature] Clerk-Treasurer

Storm Drainage Control Ordinance

Ordinance No. 2025

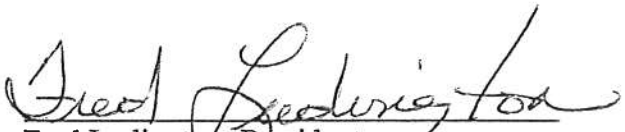
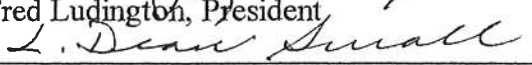

ORDINANCE #2000-18

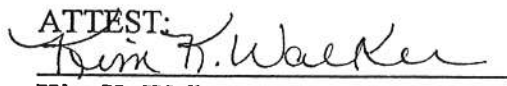
WHEREAS, IC-36-9-28.5 Mandates all cities, towns, and counties adopt a storm drainage, erosion and sediment control ordinance, and

WHEREAS, The Randolph County drainage board has compiled a proposed Ordinance to be presented to the county commissioners for adoption and have further requested notification if the town of parker city wishes to adopt the proposed ordinance.

NOW THEREFORE, Be it ordained by the Town Council of Parker City, Randolph County, Indiana, that the proposed storm drainage control Ordinance is hereby adopted by the Town of Parker City Randolph County, Indiana when said Ordinance is approved and adopted by the Randolph County Commissioners.

Town Council of Parker City, Randolph County Indiana


Fred Ludington, President

L. Dean Small

Jack A. Ripley

ATTEST:

Kim K. Walker

FILED

DEC 11 2000


SURVEYOR OF RANDOLPH COUNTY

Storm Drainage Control Ordinance

Ordinance No. 2025

NOW THEREFORE, BE IT ORDAINED BY THE TOWN BOARD OF SARATOGA, INDIANA, RANDOLPH COUNTY, INDIANA, that the hereinbefore Storm Drainage Control Ordinance be adopted in its entirety this 3 day of Feb, 2001.

FILED

FEB 05 2001

Phillip L. Biesel
SURVEYOR OF RANDOLPH COUNTY

ATTEST: *Joan Wannen*
Clerk-Treasurer

TOWN BOARD OF SARATOGA, RANDOLPH COUNTY, INDIANA

[Signature]

President
Christina L. Poole

Trustee
[Signature]

Trustee

Storm Drainage Control Ordinance

Ordinance No. 2025

NOW THEREFORE, BE IT ORDAINED BY THE TOWN BOARD OF LYNN, INDIANA,
RANDOLPH COUNTY, INDIANA, that the hereinbefore Storm Drainage Control Ordinance
be adopted in its entirety this 6 day of December, 2000.

FILED

DEC 15 2000

Phillip L. Biesel
SURVEYOR OF RANDOLPH COUNTY

ATTEST:

Keylene Staley
Clerk-Treasurer

TOWN BOARD OF LYNN, RANDOLPH COUNTY, INDIANA

Richard Johnson

President

Gary B. Mellin

Trustee

William J. Farnon

Trustee

Storm Drainage Control Ordinance

Ordinance No. 2025

NOW THEREFORE, BE IT ORDAINED BY THE TOWN BOARD OF FARMLAND, INDIANA,
RANDOLPH COUNTY, INDIANA, that the hereinbefore Storm Drainage Control Ordinance
be adopted in its entirety this 28 day of December, 2000.

TOWN BOARD OF FARMLAND, RANDOLPH COUNTY, INDIANA

Bill Nassary
President

Don Leonard
Trustee

Mary Lou Clark
Trustee

ATTEST: Bernice A. Jordan
Clerk-Treasurer

Storm Drainage Control Ordinance

Ordinance No. 2025

XXIII. ENACTMENT

NOW THEREFORE, BE IT ORDAINED BY THE COMMON COUNCIL OF UNION CITY, IN RANDOLPH COUNTY INDIANA, that the hereinbefore Storm Drainage Control Ordinance be adopted in its entirety this 28 day of December, 2000.

COMMON COUNCIL OF THE CITY OF UNION CITY, INDIANA

FILED

JAN 02 2001

Phillip L. Bisel
SURVEYOR OF RANDOLPH COUNTY

Roger Hoover

Susan E. Linder

Kathy R. Rothast

Michael J. Feil

Thomas K. Binkley

Approved by Me, *Phillip D. DeStanna*, Mayor of the City of Union City, Indiana.

ATTEST: *Sandra L. Leveney* Clerk-Treasurer

Figures And Tables

Table 1
Urban Runoff Coefficients for the Rational Method (ASCE, 1992)

<u>Description of Area</u>	<u>Runoff Coefficients</u>
Business	
Downtown	0.70 to 0.95
Neighborhood	0.50 to 0.70
Residential	
Single-family	0.30 to 0.50
Multi-units, detached	0.40 to 0.60
Multi-units, attached	0.60 to 0.75
Residential (suburban)	0.25 to 0.40
Apartment	0.50 to 0.70
Industrial	
Light	0.50 to 0.80
Heavy	0.60 to 0.90
Parks, cemeteries	0.10 to 0.25
Playgrounds	0.20 to 0.35
Railroad yard	0.20 to 0.35
Unimproved	0.10 to 0.30

Values Used to Determine a Composite Runoff Coefficient for an Urban Area
(ASCE, 1992)

<u>Character of Surface</u>	<u>Runoff Coefficients</u>
Pavement	
Asphalt and Concrete	0.70 to 0.95
Brick	0.70 to 0.85
Roofs	0.75 to 0.95
Lawns, sandy soil	
Flat, 2 percent slope	0.05 to 0.10
Average, 2 to 7 percent slope	0.10 to 0.15
Steep, 7 percent slope	0.15 to 0.20
Lawns, heavy soil	
Flat, 2 percent slope	0.13 to 0.17
Average, 2 to 7 percent slope	0.18 to 0.22
Steep, 7 percent slope	0.25 to 0.35
Water Impoundment	1.00

Table 2.
Rural Runoff Coefficients (Schwab et al., 1966)

<u>Vegetation and Topography</u>	<u>Open Sandy Loam</u>	<u>Soil Texture</u>	
		<u>Clay and Silt Loam</u>	<u>Tight Clay</u>
Woodland			
Flat 0-5% slope	0.10	0.30	0.40
Rolling 5-10% slope	0.25	0.35	0.50
Hilly 10-30% slope	0.30	0.50	0.60
Pasture			
Flat	0.10	0.30	0.40
Rolling	0.16	0.36	0.55
Hilly	0.22	0.42	0.60
Cultivated			
Flat	0.30	0.50	0.60
Rolling	0.40	0.60	0.70
Hilly	0.52	0.72	0.82

TABLE 4
TYPICAL VALUES OF MANNINGS "n" (1)

<u>Material</u>	<u>Manning's "n"</u>	<u>Desirable Maximum Velocities</u>
Closed Conduits		
Concrete	0.013	
HDPE	0.011	15 feet per second
PVC	0.010	15 feet per second
Vitrified Clay	0.013	15 feet per second
Brick	0.015	15 feet per second
Cast Iron	0.013	15 feet per second
Circular Corrugated Metal Pipe, Annular Corrugations, 2 2/3 x 1/2 inch		15 feet per second
Unpaved	0.024	
25% Paved	0.021	7 feet per second
50% Paved	0.018	7 feet per second
100% Paved	0.013	7 feet per second
Circular Corrugated Metal Pipe, Helical, 2 2/3 x 1/2 inch, Unpaved Corrugations		7 feet per second
12"	0.011	
15"	0.012	
18"	0.013	
24"	0.015	
36"	0.018	
48"	0.020	
60" or larger	0.021	
Open Channels		
Concrete, trowel finish	0.013	
Concrete, broom or float finish	0.015	
Gunite	0.018	
Riprap, placed	0.030	
Riprap, dumped	0.035	
Gabion	0.030	
Earth (uniform, short grass, few weeds)	0.025	(See Table 7)
Existing earth (fairly uniform, with some weeds)	0.030	(See Table 7)
Uniform channel, dense growth of weeds	0.035	(See Table 7)
Channel not maintained, dense weeds and brush	0.08 – 0.12	(See Table 7)
Swale with grass	0.05	(See Table 7)

(1) "n" values from Federal Highway Administration, 1973

TABLE 5

RAINFALL DEPTHS FOR VARIOUS RETURN PERIODS AND STORM DURATIONS FOR RANDOLPH COUNTY

DEPTH (Inches)						
Duration	Return Period (Years)					
	2	5	10	25	50	100
5 min.	0.43	0.50	0.56	0.64	0.71	0.78
10 min.	0.67	0.80	0.90	1.04	1.16	1.27
15 min.	0.84	1.02	1.14	1.33	1.48	1.62
20 min.	0.97	1.19	1.35	1.59	1.76	1.94
30 min.	1.11	1.38	1.58	1.86	2.07	2.29
40 min.	1.23	1.54	1.77	2.08	2.33	2.58
50 min.	1.32	1.66	1.92	2.26	2.54	2.81
60 min.	1.39	1.76	2.03	2.40	2.69	2.98
1.5 hrs.	1.65	2.04	2.28	2.62	2.96	3.18
2 hrs.	1.66	2.05	2.29	2.63	2.98	3.20
3 hrs.	1.77	2.29	2.53	2.92	3.17	3.54
4 hrs.	1.88	2.48	2.92	3.28	3.64	3.92
5 hrs.	1.95	2.60	3.00	3.35	3.70	4.05
6 hrs.	2.06	2.61	3.04	3.39	3.73	4.10
7 hrs.	2.10	2.80	3.15	3.78	4.13	4.55
8 hrs.	2.12	2.88	3.28	3.92	4.24	4.80
9 hrs.	2.16	2.97	3.33	3.96	4.32	4.86
10 hrs.	2.20	3.00	3.40	4.00	4.40	4.90
12 hrs.	2.50	3.05	3.48	4.03	4.44	4.95
14 hrs.	2.52	3.08	3.57	4.20	4.62	5.18
16 hrs.	2.56	3.20	3.68	4.24	4.70	5.20
18 hrs.	2.61	3.24	3.78	4.32	4.77	5.40
20 hrs.	2.68	3.40	3.80	4.40	4.80	5.46
24 hrs.	2.85	3.55	4.04	4.56	5.10	5.51

Data taken from Technical Paper #40, "Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years." (1961) also from NWS Hydro35, "Five to 60-Minute Precipitation Frequency for Eastern and Central United States." (1977)

TABLE 6

RAINFALL INTENSITIES FOR VARIOUS RETURN PERIODS AND STORM DURATIONS FOR RANDOLPH COUNTY

INTENSITY (Inches/Hour)						
Duration	Return Period (Years)					
	2	5	10	25	50	100
5 min.	5.18	6.00	6.72	7.68	8.52	9.30
10 min.	4.02	4.80	5.40	6.24	6.96	7.62
15 min.	3.36	4.08	4.56	5.32	5.92	6.50
20 min.	2.91	3.57	4.05	4.77	5.28	5.82
30 min.	2.22	2.76	3.16	3.72	4.14	4.58
40 min.	1.84	2.31	2.66	3.12	3.49	3.87
50 min.	1.58	1.99	2.30	2.71	3.05	3.37
60 min.	1.39	1.76	2.03	2.40	2.69	2.98
1.5 hrs.	1.10	1.36	1.52	1.75	1.97	2.12
2 hrs.	0.83	1.02	1.14	1.31	1.49	1.60
3 hrs.	0.59	0.76	0.84	0.97	1.06	1.18
4 hrs.	0.47	0.62	0.73	0.82	0.91	0.98
5 hrs.	0.39	0.52	0.60	0.67	0.74	0.81
6 hrs.	0.35	0.43	0.51	0.56	0.62	0.68
7 hrs.	0.30	0.40	0.45	0.54	0.59	0.65
8 hrs.	0.26	0.36	0.41	0.49	0.53	0.60
9 hrs.	0.24	0.32	0.37	0.45	0.48	0.54
10 hrs.	0.22	0.30	0.34	0.40	0.44	0.49
12 hrs.	0.21	0.25	0.29	0.34	0.37	0.41
14 hrs.	0.18	0.22	0.25	0.30	0.33	0.37
16 hrs.	0.16	0.20	0.23	0.26	0.29	0.32
18 hrs.	0.14	0.18	0.21	0.24	0.26	0.30
20 hrs.	0.13	0.17	0.19	0.22	0.24	0.27
24 hrs.	0.12	0.15	0.17	0.19	0.21	0.23

Data taken from Technical Paper #40, "Rainfall Frequency Atlas of the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years." (1961) also from NWS Hydro35, "Five to 60-Minute Precipitation Frequency for Eastern and Central United States." (1977)

TABLE 7

MAXIMUM PERMISSIBLE VELOCITIES IN VEGETAL-LINED CHANNELS (a)

COVER	Slope Range (2) (percent)	Permissible Velocity (1)	
		Erosion Resistant Soils (feet/sec.)	Easily Eroded Soils (feet/sec.)
Bermudagrass	0 - 5	8	6
	5 - 10	7	5
	over 10	6	4
Bahia Buffalograss Kentucky Bluegrass Smooth Brome Blue Grama	0 - 5	7	5
	5 - 10	6	4
	over 10	5	3
Grass Mixtures (2) Reed Canarygrass	0 - 5	5	4
	5 - 10	4	3
Lespedeza Sericea Weeping Lovegrass (3) Yellow Bluestem Redtop Alfalfa Red Fescue	0 - 5	3.4	2.5
Common Lespedeza (4) (5) Sudangrass (4)	0 - 5	3.5	2.5

- (1) Use velocities exceeding five (5) feet per second only where good covers and proper maintenance can be obtained.
- (2) Do not use on slopes steeper than ten (10) percent except for vegetated side slopes in combination with a stone, concrete, or highly resistant vegetative center section.
- (3) Do not use on slopes steeper than five (5) percent except for vegetated side slopes in combination with stone, concrete, or highly resistant vegetative center section.
- (4) Annuals - use on mild slopes or as temporary protection until permanent covers are established.
- (5) Use on slopes steeper than five (5) percent is not recommended.

(a) From Soil Conservation Service, SCS-TP-61, Handbook of Channel Design for Soil and Water Conservation.

TABLE 8

ROUGHNESS COEFFICIENTS (MANNING'S N) FOR SHEET FLOW (a)

Surface Description	n ¹
Smooth surfaces (concrete, asphalt, gravel, or bare soil).....	0.011
Fallow (no residue)	0.05
Cultivated soils:	
Residue cover ≤ 20%	0.06
Residue cover > 20%	0.17
Grass:	
Short grass prairie	0.15
Dense grasses ²	0.24
Bermudagrass	0.41
Range (natural).....	0.13
Woods: ³	
Light underbrush	0.40
Dense underbrush.....	0.80

VELOCITY EQUATIONS FOR SHALLOW CONCENTRATED FLOW

$$\text{Paved} \rightarrow V = 20.3282 s^{0.5}$$

$$\text{Unpaved} \rightarrow V = 16.1345 s^{0.5}$$

(a) From HERPICC Stormwater Drainage Manual – Revised July 1994.

¹ The n values are a composite of information compiled by Engman (1986)

² Includes species such as weeping lovegrass, bluegrass, buffalo grass, blue grama grass and native grass mixtures.

³ When selecting n, consider cover to a height of about 0.1 ft. This is the only part of the plant cover that will obstruct sheet flow.

FORMS

RANDOLPH COUNTY DRAINAGE BOARD

325 South Oak Street | Suite 206 | Winchester, Indiana 47394 | Phone: (765)-584-0609 ext 266

DRAINAGE PERMIT City of Winchester (021)

Permit Number: _____ Date: _____

Parcel number _____

Name of Project: _____

Location of Project: _____

Drainage Plan Design Firm: _____

This drainage system is eligible to be made a regulated drain. The necessary documents for the regulated drain are to be filed with the Winchester City Engineer and Randolph County Surveyor prior to the recordation of the plat.

Drainage is hereby approved as submitted per plans, plan amendments and/or written clarifications and is released for construction to begin.

Notice for Inspections

The Owner or the Owners agent must notify the City of Winchester Engineer and Randolph County Surveyor, 24 hours in advance of starting construction, for inspections to be made during construction.

Winchester City Engineer: _____ Date: _____

Randolph County Surveyor: _____ Date: _____

RANDOLPH COUNTY DRAINAGE BOARD

325 South Oak Street | Suite 206 | Winchester, Indiana 47394 | Phone: (765)-584-0609 ext 266

DATE

NAME
ADDRESS

RE: Drainage Certificate of Completion & Compliance

Dear _____

As part of the Randolph County's Drainage Ordinance, You required to complete the Certification of Completion & Compliance form. The following information is from the Drainage Ordinance.

“§52.18 Certifications Required.

After completion of the project and before the final approval and acceptance can be made, a professionally prepared and certified “As Built” set of plans shall be submitted to the Board for review. These plans shall include all pertinent data relevant to the completed storm drainage system and shall include:

- (a.) Pipe size and pipe material.
- (b.) Invert elevations.
- (c.) Top rim elevations.
- (d.) Lengths of all pipe structures.
- (e.) Data and calculations showing constructed detention basin storage volume.
- (f.) Certified statement on plans saying the completed storm drainage system substantially complies with the final plans as approved by the Board.

Within forty-five (45) days after completion of a land alteration for which a drainage permit was required and relative to which a certified plan was required to be filed, a registered professional engineer, land surveyor, or architect, engaged in storm drainage design, shall execute and file with the Randolph County Surveyor and Winchester City Engineer a Certificate of Completion and Compliance similar to attached.