PUBLIC MEETING - MONDAY, AUGUST 29, 2011

The Board of County Commissioners of Medina County, Ohio, met in a public hearing on this date with the following members present:
PATRICIA G. GEISSMAN STEPHEN D. HAMBLEY ADAM FRIEDRICK

Mr. Hambley offered the following resolution and moved the adoption of same, which was duly seconded by Mr. Friedrick.

RESOLUTION NO. 11 - 0788

RESOLUTION OF THE BOARD OF COUNTY COMMISSIONERS OF MEDINA COUNTY, OHIO ADOPTING RULES, REGULATIONS, PROCEDURES AND GENERAL SPECIFICATIONS FOR REGULATING EARTH-DISTURBING ACTIVITIES TO CONTROL SEDIMENT POLLUTION AND STORMWATER

WHEREAS, in the interest of preserving the public health and general welfare of the present and future residents of Medina County, it is necessary in the opinion of this Board to adopt rules, regulations, procedures and general specifications for regulating earth-disturbing activities to control sediment pollution and stormwater as allowed by Section 307.79 of the Ohio Revised Code; and

WHEREAS, Medina County, Ohio, was granted permit coverage to discharge stormwater to the waters of the State, by the Ohio Environmental Protection Agency (OEPA); and

WHEREAS, the Ohio Environmental Protection Agency (OPEA) permit obligates Medina County, Ohio, to adopt rules and regulations to control stormwater from earth-disturbing activities; and

WHEREAS, after due consideration of the recommendations of the Medina County Engineer and consideration of comments received at the public hearings, held on August 22, 2011 and August 29, 2011, as required under Section 307.79 of the Ohio Revised Code, this Board is of the opinion that said "Medina County Stormwater Management Rules and Regulations" is reasonable and should be adopted.

NOW, THEREFORE, BE IT RESOLVED by the Board of County Commissioners of Medina County, Ohio, that the "Medina County Stormwater Management Rules and Regulations" attached hereto as "Exhibit A" is hereby approved.

BE IT FURTHER RESOLVED that the Medina County Engineer, or his/her duly authorized agent, shall act as the administrator for these regulations.

Voting AYE thereon: Mrs. Geissman, Mr. Hambley and Mr. Friedrick

Adopted: August 29, 2011

Prepared by: Medina County Engineer's Office

EXHIBIT "A"

Medina County Stormwater Management Rules and Regulations

Prepared by:

MEDINA COUNTY ENGINEER

Michael J. Salay, P.E., P.S.

for

MEDINA COUNTY COMMISSIONERS

Adam Friedrick
Patricia G. Geissman
Stephen D. Hambley

August 2011

Medina County Stormwater Management Rules and Regulations

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Adopted August 29, 2011 by the Medina County Board of Commissioners

Chapter 1 GENERAL PROVISIONS

SECTION 1.01 TITLE

These regulations shall be cited as the Medina County Stormwater Management Rules and Regulations and are hereinafter referred to as the/these "Regulations."

SECTION 1.02 STATUTORY AUTHORIZATION

These Regulations of Medina County are promulgated pursuant to the Ohio Revised Code (O.R.C.) 307.79 and thereafter as amended, whereby a board of county commissioners may adopt rules to abate erosion of the soil or abate the degradation of the waters of the state by soil sediment. O.R.C. 307.79 further allows for the requirement of persons to file plans governing water management before non-farm, earth-disturbing activities commence. O.R.C. 307.79 further states that these Regulations shall be designed to implement phase II of the stormwater program of the national pollutant discharge elimination system established in Title 40 Codified Federal Register Part 122.

SECTION 1.03 ADMINISTRATION

The Board of Medina County Commissioners, hereinafter referred to as "Commissioners", shall appoint an official or person to be the Administrator of these Regulations. This Administrator shall be responsible for determination of compliance with these Regulations and shall issue such notices and orders as may be necessary and in accordance with the law.

SECTION 1.04 PURPOSE

The Commissioners adopt these Regulations to establish feasible and economically reasonable standards aimed at achieving a level of management and conservation practices that will abate erosion of the soil and degradation of the waters of the state by soil sediment, caused by non-farm soil-disturbing activities, and to establish standards aimed at compliance with Title 40 Codified Federal Register Parts 9, 122, 123, and 124, referred to as NPDES Stormwater Phase II and to address the quality of stormwater runoff, among other components, during and after soil disturbing activities.

It is the further intent of these Regulations to:

A. Permit development while keeping downstream flooding, erosion, and sedimentation at existing levels.

B. Reduce the need for costly maintenance and repairs to roads, embankments, ditches, stream channels, and stormwater management practices that are a result of inadequate stormwater control.

C. Establish a basis for the design of all storm drainage systems that will preserve the rights and options of both the dominant and servient property owners and help assure the long term adequacy of storm drainage systems.

D. Control stormwater runoff from sites undergoing soil disturbing activities and land use changes.

E. Assure that the rate of stormwater runoff originating from property is controlled so that surface water and ground water are protected, soil erosion is controlled, and flooding potential is not increased.

F. Reduce damage to receiving streams and impairment of their capacity which may be caused by the increase in the rate of water and/or pollutants being discharged.

G. Provide additional post-construction stormwater management standards for the Ohio EPA - designated "Urbanized Areas" within the Unincorporated Areas of Medina County.

H. Promote public health and safety and sound economic development within Medina County, by providing homebuilders, developers, and landowners with consistent, technically feasible, and operationally practical standards for runoff water quality management.

SECTION 1.05 SCOPE

A. The General Stormwater Management Requirements of these Regulations shall apply to all non-farm soil-disturbing activities performed on unincorporated lands of Medina County, Ohio except those specifically exempted by law.

B. The Post-Construction Stormwater Management Requirements of these Regulations shall apply to all non-farm soil-disturbing activities performed in the "Urbanized Areas" of the unincorporated lands of Medina County, Ohio as defined by the U.S. Census Bureau and the Ohio EPA, except those specifically exempted by law.

C. A Stormwater Pollution Prevention Plan is not required for a public highway, transportation, or drainage improvement, or maintenance thereof, undertaken by a government agency or political subdivision in accordance with a statement of its Standard Sediment Control Policies that is approved by the Medina County Board of Commissioners or by the Chief of the Ohio Department Natural Resources Division of Soil and Water Conservation.

D. Where these Regulations are in conflict with other provisions of law or ordinance, the most restrictive shall prevail.

SECTION 1.06 LIMITATIONS

These Regulations are meant to establish uniform design criteria for stormwater design and management practices for the unincorporated areas of Medina County. These Regulations do not replace the need for sound engineering judgement and is not intended to be a comprehensive document. The objective of these Regulations is to establish uniform criteria for consistency in the design of drainage and stormwater runoff controls.

SECTION 1.07 DISCLAIMER OF LIABILITY

Neither submission of a plan under provisions of these Regulations, nor compliance with provisions of these Regulations, shall relieve any person or other entity from responsibility for damage to any person or property otherwise imposed by law; nor shall it create a duty by the Commissioners, or by the Administrator, to those damaged by soil sediment pollution, construction site runoff, flooding, or water quality impacts.

SECTION 1.08 SEVERABILITY

If any clause, section, or provision of these Regulations is declared invalid or unconstitutional by a court of competent jurisdiction, validity of the remainder shall not be affected thereby.

SECTION 1.09 NUISANCES

These Regulations shall not be construed as authorizing any person to maintain a private or public nuisance on his property, and compliance with the provisions of these Regulations shall not be a defense in any action to abate such a nuisance.

SECTION 1.10 RESPONSIBILITY

Failure of the Administrator to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve the owner from the responsibility for the condition or damage resulting therefrom, and shall not result in the Commissioners or the Administrator, its officers, employees, or agents being responsible for any conditions or damage resulting therefrom.

SECTION 1.11 CONNECTION TO STORM SEWERS

Any connection to a storm sewer under the ownership of the Commissioners shall be subject to these Regulations and is subject to review and approval by the Administrator.

SECTION 1.12 EXTENSION/MODIFICATIONS

No extension or modification shall be made to any storm sewer under the jurisdiction of the Commissioners without the prior approval of the Administrator and/or the Medina County Engineer.

SECTION 1.13 SANITARY SEWERS

The stormwater drainage system shall not be combined with any part of a sanitary sewer system, nor shall sanitary sewer water be discharged thereto.

SECTION 1.14 CONSULTATIONS

In implementing these Regulations, the Administrator may consult with other technical experts as necessary. Any costs associated with such consultations may be assessed to the project's owner.

SECTION 1.15 EFFECTIVE DATE

These Regulations shall replace the existing regulations on the 31st day after adoption by the Board of Medina County Commissioners.

Chapter 2 DEFINITIONS

SECTION 2.01 INTERPRETATION OF TERMS AND WORDS

For the purpose of these Regulations certain rules or word usage apply to the text as follows:

A. Words used in the present tense include the future tense, and the singular includes the plural, unless the context clearly indicates the contrary.

B. The term "shall" is always mandatory and not discretionary; the word "may" is permissive. The term "should" is permissive, but indicates strong suggestion.

C. A word or term not interpreted or defined by this section shall be construed according to the rules of grammar and common usage so as to give these Regulations their most reasonable application.

SECTION 2.02 WORDS AND TERMS DEFINED

ACRE: A measurement of area equaling 43,560 square feet.

ADMINISTRATOR: The official or person designated by the Board of County Commissioners to administer these regulations.

BEST MANAGEMENT PRACTICE (BMP): Any practice or combination of practices that is determined to be the most effective, practicable (including technological, economic, and institutional considerations) means of preventing or reducing the amount of pollution to a level compatible with water quality goals. BMPs may include structural practices, conservation practices and operation and maintenance procedures.

CHANNEL: A natural stream that conveys water, or a ditch excavated for the natural flow of water.

CUT: An excavation that reduces an existing elevation.

DETENTION STRUCTURE: A permanent stormwater management facility for the temporary storage of runoff, which is designed so as not to create a permanent pool of water.

DISTURBED AREA: An area of land subject to erosion due to the removal of vegetative cover and/or soil disturbing activities.

DRAINAGE: The removal of excess surface water or groundwater from land by surface or subsurface drains.

ENGINEER: A Professional Engineer registered in the State of Ohio in accordance with O.R.C. 4733.

EROSION: The process by which the land surface is worn away by the action of wind, water, ice, gravity, or any combination of those forces.

EROSION and SEDIMENT CONTROL: The control of soil material, both mineral and organic, to minimize the removal of soil material from the land surface and to prevent its transport out of a disturbed area by means of wind, water, ice, gravity, or any combination of those forces.

FILL: The placement of material that raises the existing elevation.

FINAL STABILIZATION: All soil disturbing activities at the site have been completed and a uniform perennial vegetative cover with a density of at least 70% cover for the area has been established or equivalent stabilization measures, such as the use of mulches, geotextiles, or other means have been employed.

GRADING: Earth disturbing activity such as excavation, stripping, cutting, filling, stockpiling, or any combination thereof.

GRUBBING: Removing, clearing or scalping material such as roots, stumps or sod.

IMPERVIOUS: Not allowing infiltration which means any paved, hardened or structural surface regardless of its composition.

MAXIMUM EXTENT PRACTICABLE: The level of pollutant reduction that site owners of small municipal separate storm sewer systems regulated under 50 C.F.R. Parts 9, 122, 123, and 124, referred to as NPDES Storm Water Phase II, must meet.

NPDES: National Pollutant Discharge Elimination System. A regulatory program in the Federal Clean Water Act that prohibits the discharge of pollutants into surface water of the United States without a permit.

OHIO EPA: Ohio Environmental Protection Agency

ODNR-DSWC: Ohio Department of Natural Resources, Division of Soil and Water Conservation.

PERSON: Any individual, corporation, firm, trust, commission, board, public or private partnership, joint venture, agency, unincorporated association, municipal corporation, county or state agency, the federal government, other legal entity, or an agent or combination thereof.

PHASING: Development of a parcel of land in distinct sections, with the stabilization of each section occurring before clearing the next.

RAINWATER AND LAND DEVELOPMENT MANUAL - OHIO'S STANDARDS FOR STORMWATER MANAGEMENT, LAND DEVELOPMENT, AND URBAN STREAM PROTECTION: A manual published by the Ohio Department of Natural Resources that provides standards and specifications for stormwater practices. The most current edition of these standards shall be used with these Regulations.

RETENTION STRUCTURE: A permanent stormwater management facility that provides for the storage of runoff by means of a permanent pool of water.

RUNOFF: The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and is eventually returned to water resources, watercourses, or wetlands.

SEDIMENT: Soils or other surface materials that are or have been transported or deposited by the action of wind, water, ice, gravity, or any combination of those forces, as a product of erosion.

SEDIMENTATION: The deposition or settling of sediment.

SEDIMENT POLLUTION: Degradation of waters of the state by sediment as a result of failure to apply management or conservation practices to abate wind or water soil erosion, specifically in conjunction with soil-disturbing activities on land used or being developed for commercial, institutional, industrial, residential, or other non-farm purposes.

SLOUGHING: A slip or downward movement of an extended layer of soil resulting from the undermining action of water or the soil-disturbing activity of man.

SOIL AND WATER CONSERVATION DISTRICT: An entity organized under Chapter 1515 of the Ohio Revised Code; referring either to the Soil and Water Conservation District Board, or its designated employee(s), hereinafter referred to as the Medina SWCD.

SOIL DISTURBING ACTIVITY: Clearing, grubbing, grading, excavating, filling, or other alteration of the earth's surface where natural or human made ground cover is destroyed and which may result in, or contribute to erosion and sediment pollution.

STABILIZATION: The use of Best Management Practices, such as seeding and mulching, that reduces or prevents soil erosion.

STORM FREQUENCY: The average period of time within which a storm of a given duration and intensity can be expected to be equaled or exceeded.

STORMWATER MANAGEMENT: Safely conveying and/or temporarily storing stormwater runoff and releasing it at an allowable rate to minimize erosion and flooding.

STORMWATER POLLUTION PREVENTION PLAN (SWP3): A plan consisting of a narrative, drawings, and plan notes that detail the BMPs for (1) sediment and erosion control, (2) controlling pollutants other than sediments, and (3) stormwater management. This plan is required by Ohio EPA to meet the requirements of its National Pollutant Discharge Elimination System (NPDES) Permit program for construction activities.

TEMPORARY SOIL STABILIZATION: Establishment of temporary vegetation, mulching, geotextiles, sod, preservation of existing vegetation and other techniques capable of quickly establishing cover over disturbed areas to provide erosion control between construction operations.

USDA-NRCS: United States Department of Agriculture, Natural Resources Conservation Service.

WATERCOURSE: A definite channel with defined bed and banks within which concentrated water flows, either continuously or intermittently.

WATERSHED: The total drainage area contributing runoff to a single point.

WETLAND: Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and contain a predominance of hydric soils, and that under normal circumstances do support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas (40 Codified Federal Register 232, as amended).

Chapter 3 GENERAL STORMWATER MANAGEMENT REQUIREMENTS

SECTION 3.01 APPLICABILITY

No person shall cause or allow non-farm soil-disturbing activities to occur on a their land without full compliance with the criteria established by these Requirements.

A Stormwater Pollution Prevention Plan (SWP3), in accordance with these Requirements and the Medina County Sediment Control Rules and Regulations, is required to be developed and a Stormwater Management and Sediment Control Permit shall be obtained for all non-farm soil disturbing activities greater than 5000 square feet.

Submittal of a Stormwater Pollution Prevention Plan (SWP3) and approval by the Administrator does not relieve the owner from complying with the full requirements of the latest Ohio EPA Permit granting Authorization for Stormwater Discharges Associated with Construction Activities under the National Pollutant Discharge Elimination System (NPDES), if applicable for the site.

The design and construction of regulated stormwater management facilities and stormwater conveyances shall meet the standards, performance and design criteria, and provisions within these Regulations.

Although a SWP3 may not be required for approval by the Administrator under these Regulations for certain soil-disturbing activities, these activities should comply with the intent and all other provisions of these Regulations.

SECTION 3.02 STORMWATER RUNOFF CONTROL CRITERIA

3.02.01 PURPOSE OF STORMWATER RUNOFF CONTROL

Stormwater controls are premised on the policy that non-farm, earth-disturbing activities which increase the rate and/or volume of runoff will also increase the rate of erosion and volume of sedimentation. Therefore, earth-disturbing activities which increase the rate and/or volume of runoff shall be required to control the discharge rate of runoff prior to its release to off-site land, unless off-site facilities are provided to handle this change in runoff. The purpose of controlling the release rate is as follows:

A. Allow development while reducing damage to receiving water resources and drainage systems that may be caused by new development or redevelopment activities.

B. Protect and maintain the receiving stream's physical, chemical, and biological characteristics and stream functions.

C. Establish consistent technically feasible and operationally practical standards to

achieve a level of stormwater quantity control that will minimize damage to public and private property and degradation of water resources and will promote and maintain the health, safety, and welfare of the residents of Medina County.

D. Establish a basis for design of a stormwater drainage control system which will preserve the rights and options of both the dominant and servient landowners.

3.02.02 STORMWATER RUNOFF CONTROL CRITERIA

Stormwater runoff control addresses both peak rate and total volume of runoff.

A. The peak rate of runoff from an area after development shall not exceed the peak rate of runoff from the same area before development for all storms up to a 100-year frequency, 24-hour storm. In addition, if it is found a proposed development will increase the volume of runoff from an area, the peak rate of runoff from certain more frequent storms must be controlled further. The permissible peak rate shall be determined as follows:

1. Determine the total volume of runoff from a 1-year frequency, 24-hour storm occurring over the area before and after the proposed development. (Depth of runoff information is contained in the Appendix.)

2. Determine the percent of increase in volume of runoff due to development and using this percentage, select the "Critical Storm" from the following table:

If the percentage of increase in volume of runoff is:		The Critical Storm for discharge will be:
Equal to or greater than	and less than	
-	10	1 year
10	20	2 year
20	50	5 year
50	100	10 year
100	250	25 year
250	500	50 year
500	-	100 year

(As an example, if the total volume is shown to be increased by 35%, the critical storm is a 5-year storm.)

3. Multiple areas and design points may need to be analyzed separately, depending on drainage area boundaries and locations of design points.

B. The peak rate of runoff from the Critical Storm occurring over the development shall not exceed the peak rate of runoff from a 1-year frequency storm occurring over the same area under pre-development conditions. Storms of less frequent occurrence (longer return period) than the Critical Storm shall have peak rate of runoff not greater than that of the same storm under pre-development conditions. On-site land uses averaged over the last 10 preceding years before the development shall be considered as the pre-development condition for the purpose of calculating changes in runoff.

C. Runoff from off-site upstream areas should be routed around proposed development sites as much as possible. When off-site runoff must be routed through a proposed on-site stormwater detention facility, detention storage volume does not have to be provided for off-site upstream areas, although outlet structures should be sized to accommodate the total flow. Detention storage volume should be provided for the off-site upstream areas if these areas were used in the Critical Storm calculation.

D. Centralized detention is to be provided for all developments.

1. Residential developments shall provide the entire detention capacity for the phase being constructed.

2. Non-residential developments (i.e. commercial, retail, industrial, institutional, etc.) shall provide the entire detention capacity for the full-build condition for all sublots, lots, and blocks being created. When future sublots, lots, and blocks within a non-residential development have an undetermined use, the designer is to assume that the future land use will be developed under the current township zoning text that will generate the maximum stormwater runoff.

3.02.03 DETENTION WAIVER

A stormwater detention waiver may be granted if it can be demonstrated to the satisfaction of the Administrator that the post-development runoff rates and volumes do not exceed those generated prior to the development. A written request for a detention waiver must be accompanied by a detailed set of stormwater calculations prepared by a Professional Engineer, licensed in the State of Ohio. The calculations shall include the supporting data described in Section 3.03.03 of these regulations and the following:

A. Calculations of pre-development and post-development area-weighted curve numbers (CN). These calculations shall be supported by appropriately labeled and scaled drawings and/or maps.

B. Calculations of pre-development and post-development times-of-concentration. These calculations shall be supported by appropriately labeled and scaled drawings and/or maps.

C. Calculations of pre-development and post-development peak runoff rates for the 1 year, 2 year, 5 year, 10 year, 25 year, 50 year, and 100 year storm events.

3.02.04 DESIGN STORM CRITERIA

The Board of Medina County Commissioners have established these uniform design standards for all drainage systems, public or private, which affect more than one owner, so that any individual drainage system will be compatible with any adjacent drainage system. By having all drainage systems compatible, the chance of sedimentation caused by a drainage system failure is greatly reduced. Meeting the following standards and criteria does not relieve any person from liability from stormwater damage to another person's property.

A. The primary drainage system is that part of the stormwater drainage system which is used regularly for collecting, transporting, and disposing of stormwater runoff, snow melt, and other miscellaneous minor flows. The capacity of the primary drainage system should be equal to a maximum rate of runoff expected from a design storm of the established frequency. For purposes of design, the following frequency of return period storms will be used.

Structure Type	Frequency
Storm Sewers	5 year
Open Drainage Swales	10 year
Roadside Ditches**	5 or 10 year
Culverts	10 year
Bridges	25 year
Floodplain Structures	100 year

** Roadside ditches shall be designed to handle a five year storm except where an open drainage swale enters the roadside ditch, then a ten year storm design will be used.

B. The secondary drainage system is that part of the storm drainage system which carries the runoff which exceeds the capacity of the primary drainage system. The secondary drainage system should have the capacity to carry runoff from a storm with a return period of 100 years without posing significant threat to public safety or property.

C. In all cases, existing drainage patterns should be maintained, and diversions of surface runoff from one watershed to another should be avoided to the maximum extent practical.

3.02.05 PRIMARY STORM DESIGN CRITERIA

A. Depth of flow in artificial channels shall not exceed 0.8 bank full stage.

B. Depth of flow in roadside ditches shall be of such depth that the flow will not exceed the ditch capacity and flow onto private property except at designed discharge points.

C. Storm sewers are to be designed to carry the flows generated by the primary storm without exceeding the full pipe flow capacity.

D. In design of a culvert crossing under a road, the culvert shall be designed so that the headwater resulting from the primary design storm (10-year rainfall) shall not encroach onto the pavement.

3.02.06 SECONDARY STORM DESIGN CRITERIA

A. When a street is designated as the secondary drainageway, the depth of flow shall not exceed 6" at the crown of the street. The same maximum depth criteria will apply where a secondary drainageway crosses the street, except in the case of Section 3.02.06.D of these regulations. Where a secondary drainageway is located outside a street right-of-way, easements may be required.

B. In the design of new development, including the design of new drives, roads, and storm sewer systems, routing of flows from a 100-year rainfall should be planned. Generally, such flows shall be routed to maintain the previously existing drainage patterns as much as possible. If necessary, non-typical grading of new road right-of-way sections may need to be designed and constructed at culvert crossings or sags to allow the 100-year flows to be routed properly. Grading of the site and placement of open channels shall also be designed to accommodate the routing of these flows. These flood routing paths should be designed to reduce potential damage to persons and property in the event of failure of the stormwater system (plugged culverts, outlets, etc.)

C. The lowest opening elevation on a proposed building structure on the upstream side of an existing or proposed culvert crossing under a road should be set a minimum of eighteen (18) inches above the low point in the road. The lowest opening elevation for future structures are to be labeled on the grading plan of the construction drawings when a proposed road and culvert/bridge are being constructed. The lowest floor elevations for proposed building structures within FEMA Special Flood Hazard Areas shall comply with the Medina County Flood Damage Reduction Regulations.

D. All improvements in FEMA Special Flood Hazard Areas , including proposed roads within new subdivision developments, shall be designed and constructed in accordance with the Medina County Flood Damage Reduction Regulations.

E. Construction of road crossings or other structures within channels or watercourses should not cause an increase in depth of flow at the upstream property line.

SECTION 3.03 RAINFALL & HYDROLOGY

3.03.01 MEDINA COUNTY 24-HOUR RAINFALL DEPTHS

The following 24-hour rainfall depths are to be used for the unincorporated areas of Medina County and were derived from the Precipitation-Frequency Atlas of the United States, NOAA Atlas 14, Vol. 2, Version 3, NOAA, National Weather Service, Silver Spring, Md.

Return Period (Years)	Rainfall Depth (Inches)
1	2.08
2	2.49
5	3.08
10	3.57
25	4.27
50	4.86
100	5.48

3.03.02 RAINFALL INTENSITY - DURATION - FREQUENCY

The most familiar presentation of rainfall data is a set of curves representing different frequencies of occurrence of rainfall events with the intensity of the rainfall plotted against its duration. A series of intensity - duration - frequency curves for the rainfall in Medina County has been derived from the data published in NOAA Atlas 14. These curves and a tabular summary are shown in the Appendix and are labeled "Precipitation Intensity Estimates".

3.03.03 CALCULATING STORMWATER RUNOFF

A. Report Requirements

A report, that includes appropriate supporting calculations, is generally required when applying for a Stormwater Management and Sediment Control Permit that allows the installation of storm sewers, channels, culverts, detention facilities, or water quality features. The calculations should demonstrate that the proposed design complies with the standards within these regulations to the satisfaction of the Administrator.

Regardless of the type of calculation method used, at a minimum, the following information should be provided within a peak rate of runoff calculation report:

1. Drainage Area Map - delineating the area that drains to the design point(s); based on a topographic map plotted at a standard scale in a clearly legible format.

2. Weighted Runoff Coefficient (C) or NRCS Runoff Curve Number (CN) calculations, based on:

   a. Identification of soil type(s) and Hydrologic Soil Groups, according to current USDA-SCS/NRCS Soils Survey data.

   2 Identification of Current Land Use(s), based on latest available aerial photography. Land uses averaged over the last 10 preceding years shall be considered as the current condition for the purpose of calculating runoff.

See the Appendix for a listing of Runoff Coefficients and Curve Numbers. Curve Numbers may also be obtained from TR-55, "Urban Hydrology for Small Watersheds".

3. Time of Concentration calculation (used for Rational and SCS TR-55 Methods), with a flow path identified on a legible topographic map or plan. The time of concentration, t_c, is the time required for runoff to flow from the most remote point of the drainage area to the design point. (It is recommended that the TR-55 method of calculating Time of Concentration be used for most projects, even when Rational Method is used to compute peak flow. This time calculation method uses a summation of the times of sheet flow, shallow concentrated flow, and pipe and/or open channel flow. Sheet flow distance should be estimated based on site conditions, but in no case should the sheet flow distance be greater than 300 feet.

B. Acceptable Calculation Methods

1. Rational Method

The Rational Method is a formula used to calculate peak rate of discharge for small drainage areas. It shall not be used for designs when the drainage area is greater than 20 acres. The Rational Method may be used to generate peak flow rates and should not be used for generating runoff volumes or designing detention/retention facilities.

Rational Formula:

$Q=CIA$

Where: Q = peak rate of runoff (cfs)
C = runoff coefficient (dimensionless)*
I = rainfall intensity (in/hr)*
A = drainage area (acres)

*See the Appendix for acceptable runoff coefficients and the Medina County rainfall intensity-duration-frequency curves. Rainfall duration is considered to be equivalent to the Time of Concentration.

2. S.C.S. (TR-55) Method

Technical Release 55 (TR-55) utilizes the SCS runoff equation to calculate stormwater runoff volumes, peak rates of discharge, hydrographs, and storage volumes required for floodwater reservoirs.

The TR-55 manual remains a most useful reference containing complete curve number tables, methodologies, and etc. The procedures for this method are outlined in the current edition of SCS Technical Release 55 "Urban

Hydrology for Small Watersheds" (TR-55). Hydrologic computer models using TR-55 are available for download at the USDA Natural Resources Conservation Service (NRCS) website and from commercial computer software companies.

3. United States Geologic Survey Regression Equations

The Administrator may allow the use of the USGS Regression Equations developed for the state of Ohio, within the limits prescribed in each specific report, to determine peak flows. The Administrator shall consider the size of the drainage area, available data, the accuracy required for the design, and other relevant factors in the determination of whether or not the use of the USGS Regression Equations will be acceptable.

4. Alternative Methods

Alternative methods for calculating stormwater runoff may be utilized if approved by the Administrator prior to submittal of the report.

SECTION 3.04 PERFORMANCE AND DESIGN STANDARDS

3.04.01 APPLICABLE STANDARDS

Standards found within the most current edition of the Rainwater and Land Development Manual shall apply to all best management practices proposed in the SWP3. In the case of conflicts with other applicable standards, the stricter standard shall apply.

3.04.02 PROTECTION OF ADJACENT PROPERTIES

A. Properties adjacent to construction sites, including public land and waters of the state, shall be protected from adverse impacts created by grading and construction activities.

B. When a bridge or culvert crossing is installed within a watercourse, the depth of flow for the 100 year storm event should not be raised above the pre-construction elevation on any upstream properties. Calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations.

C. Adjacent properties are to be protected from flooding caused by diversions, removal of vegetative cover, construction of conduits within watercourses, or any other improvements and activities.

3.04.03 ACCESS TO STORMWATER FACILITIES

A. Stormwater facilities under public maintenance shall have adequate legal access provided by means of easement or dedicated right-of-way.

B. The minimum width of an easement along a storm sewer is twenty (20) feet. Larger diameter pipes, deeper facilities, and wider channels and flow paths may require larger easements to allow for maintenance and/or future replacement.

C. A permanent easement that is a minimum twenty-five (25) feet in width shall be provided around the perimeter of any pond or basin with public maintenance. The easement is to be measured from the water's edge at the elevation of maximum storage or the outside bottom of the embankment side slope, whichever creates the larger area.

D. Additional easements may be required to provide adequate access to facilities outside public right-of-ways. Proper planning should be used to ensure that access is available without having to traverse steep slopes, go through wooded areas, or cross existing or future improvements.

3.04.04 STORM SEWER DESIGN

Storm sewers are closed conduits designed to collect and convey stormwater runoff from street inlets, catch basins, runoff control structures, and other locations where the accumulation of stormwater is undesirable Storm sewers should be designed to convey stormwater to a suitable outlet. When designing a storm sewer system, existing drainage patterns should be maintained as practical.

A. Depth - The depth of a storm sewer system shall be consistent with the following controls:

1. Provide a minimum of 6 inches of cover from the top of pipe to the bottom of a pavement subbase.

2. Provide a minimum of 18 inches of cover for flexible pipe not under pavement.

3. Follow Medina County Engineer Construction Details and/or the pipe manufacturer's specifications for cover requirements if more stringent than the requirements listed above.

B. Velocity - A minimum velocity of 3 feet per second (fps) is recommended to insure self-cleaning. This velocity is calculated using the "just full" Manning's equation. The maximum allowable velocity shall be 12 fps unless special materials are included for protection against scouring.

C. All storm sewer pipe shall be designed and laid with a minimum slope of 0.5%. At the sole discretion of the Administrator, approval may be granted for pipes with a diameter of 36" or greater to be designed and laid with a minimum slope of 0.4% when special circumstances exist.

D. Hydraulic Design - Calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. Peak flow rate calculations shall comply with Section 3.03.03 of these regulations. The hydraulic design of storm sewers shall be based on Manning's Equation. The design calculations shall be in a worksheet-type format acceptable to the Administrator and shall be accompanied by drainage area maps. The calculations shall identify the design flows, proposed pipe materials, diameters, pipe slopes, inverts, and full-flow capacities. Hydraulic grade line elevations for both the primary and 100 year design storms may be required to be calculated and shown on construction drawings.

E. Manholes and Basins - Manholes or basins are to be located at junctions of conduits, at changes in conduit direction, and at changes in slope. Most standard catch basins and pavement inlet basins will provide sufficient access to small, shallow sewers. Catch basins or pavement inlets can be used to negotiate changes in sewer sizes or minor horizontal or vertical direction changes, but more pronounced changes or deeper depths will require manholes.

1. To facilitate maintenance activities, maximum spacing between manholes or basins that provide access to pipe diameters under 36 inches is 300 feet. For sewers sized 36 inches or larger, spacing between manholes should be a maximum of 500 feet.

2. Where curb and gutter typical sections will be used, a local depression of 2" below the normal gutter flow line shall be provided at street inlets.

3. The inverts of street inlets, manholes, and other structures shall be formed to minimize turbulence and the collection of debris.

4. Locate street inlet basins as follows:

   a. Place an inlet at low points of all vertical curves.
   b. Place inlets at the low points of intersections. No cross street flow is permitted for the primary design storm.
   c. Place inlets in low points of cul-de-sacs.
   d. The maximum spacing between street inlet basins are as follows:

Street Grade	Inlet Spacing
< 3%	300 feet
3% - 6%	250 feet
> 6%	200 feet

F. For all conduits that are part of a storm sewer system within a public right-of-way or under public maintenance, the minimum diameter shall be of 12 inches unless specifically waived by the Administrator. The Administrator shall allow the diameter of a ditch enclosure pipe to be reduced to10 inches where appropriate.

G. The elevations of the crowns of smaller upstream pipes should be matched to the elevation of the crown of the adjacent downstream pipe within manholes, catch basins, and inlet basins.

H. Use of gravity connections to the storm sewer system for roof and footer drains should be carefully designed and installed to prevent flooding of structures. Proper installation of roof and footer drain connections is the responsibility of the builder and building owner. Sump pumps, check valves, and back-up systems are strongly recommended for footer drains when hydraulic grade lines in the storm sewer system would potentially be higher than the lowest floor of the building.

3.04.05 CULVERT DESIGN

Culverts are used to convey stormwater in an open channel through an embankment. Optimum culvert design occurs when the embankment is perpendicular to the flow in the channel and is located on a relatively straight and stable section of the channel. Culvert location should perpetuate existing drainage patterns to the maximum extent practical.

A. A single-cell round pipe should be the designer's first choice within practical limitations. In cases where required cover or capacity precludes a round pipe, consideration should be given to a single elliptical concrete, metal pipe-arch, or box culvert. Occasionally, multiple cell designs will be required. For these cases, it is desired to limit the number of cells to two. A bend in the immediate upstream channel may cause the inside cell to collect debris and thereby substantially reduce the capacity of the culvert.

B. The ideal slope for a culvert is one that does not produce either silting or excessive velocities and scour. A culvert increases the flow velocity beyond the outlet in the open channel. High velocities are most damaging just downstream from the culvert outlet and the erosion potential at this point shall be protected as required.

C. Calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. Peak flow rate calculations shall comply with Section 3.03.03 of these regulations. The hydraulic design of culverts shall be based on nomographs contained in the latest version of FHWA Hydraulic Design Series No. 5, "Hydraulic Design of Highway Culverts" or computer modeling software/programs found acceptable by the Administrator. The calculations shall identify the proposed pipe materials, diameters, pipe slopes, inverts, inlet and tailwater conditions, headwater elevations, and flow capacities under inlet control and outlet control conditions.

D. For any culvert within a public right-of-way or under public maintenance:

1. Culverts installed under proposed streets are to be Class IV reinforced concrete pipe.

2. The design of the culvert shall conform to each of the following:

a. The 10-year headwater depth shall generally be no higher than the elevation of the edge of road pavement or top of curb.

b. The 100-year headwater depth should not exceed either twice the diameter or rise of the culvert or four feet above the crown of the culvert, whichever is less;

c. The 100-year headwater depth shall not exceed 6 inches at the crown of the street. (In the case of proposed roads in FEMA Special Flood Hazard Areas, the roads must be designed and constructed so that the road surface is elevated to or above the 100-year flood elevation.)

3. Single conduit and single cell designs shall be provided for culvert crossings under proposed public roads unless the use of multiple conduits or cells are specifically granted by the Administrator.

3.04.06 BRIDGE DESIGN

Bridges for public use shall be designed to meet the latest standards of the American Association of State Highway and Traffic Officials (AASHTO) and to pass water flow rates as outlined in Section 3.02.04 of these regulations.

3.04.07 OPEN CHANNEL DESIGN

The latest version of the Rainwater and Land Development Manual should be used for additional specifications and details for the design of channels.

A. Calculations shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. Peak flow rate calculations shall comply with Section 3.03.03 of these regulations. The hydraulic design of open channels shall be based on the Manning's Equation and/or computer modeling software/programs found acceptable by the Administrator. The calculations shall identify the proposed roughness factors, side slopes, longitudinal slope, depth of flow, and flow capacities. A hydraulic modeling analysis may be required if water surface profiles are determined by the Administrator to be necessary.

B. Multi-stage Channels

1. Multi-stage Channels should be used where stream channel relocation is unavoidable and a new stream channel must be constructed.

2. The capacity of the low-flow channel should be 50% of the 2-year storm event.

C. Drainage swales are an effective practice for intercepting off-site runoff and routing site runoff to suitable outlets or runoff control facilities.

D. Channel lining and stabilization should be designed and specified to withstand the design flow velocities. Vegetative protection, sod, turf reinforcement matting, rock or riprap, and gabions are examples of material used for channel lining and stabilization.

3.04.08 OUTLET PROTECTION

Outlet protection should be specified at the outlets of storm sewer pipes, culverts, or open channels where concentrated or high velocity flows enter less modified channels or natural streams. The latest version of the Rainwater and Land Development Manual should be used for additional specifications and details for the design of outlet protection. Outlet protection materials include rock or riprap, turf reinforcement matting, and concrete. Level spreaders may also be required in conjunction with outlet protection to convert concentrated flow to sheet flow without causing erosion, formation of gullies, or flooding.

3.04.09 DETENTION AND RETENTION FACILITY DESIGN

A. A design report, which includes a narrative description and calculations, shall be submitted to demonstrate that the proposed design complies with the standards within these regulations. Peak flow rate calculations shall comply with Section 3.03.03 of these regulations*. The design of the facility shall be based on the Storage Indication routing method. Computer modeling software or programs using this method may be used if found acceptable by the Administrator. The calculations shall identify pre-developed and post-developed conditions, Critical Storm determination, allowable outflows, inflow and outflow hydrographs, stage vs. storage relationships, and stage vs. discharge relationships.

(* Runoff Coefficients or Curve Numbers for the pre-development condition must reflect the average type of land use over the previous 10 years and not only the current land use. For post-construction conditions, an assumption of an impervious surface such as asphalt or concrete must be utilized for all parking areas and driveways even if a pervious material is to be used during opening day conditions. This will account for future improvements to the site.)

B. Detention Basins

1. The outside and inside slopes of detention basins should be 3:1 (H:V) or flatter to insure maintenance capability.

2. The bottom of a dry basin shall be sloped to the flow control device at a minimum of 1%.

3. The minimum top width of the embankment of a detention (dry) basin should be eight feet.

C. Retention Basins

1. The outside slopes of retention basins should be 3:1 (H:V) or flatter to insure maintenance capability.

2. The minimum top width of the embankment of a retention (wet) basin should be ten feet.

3. Unless otherwise stated in this section, retention basins shall meet the criteria outlined in Section 3.04.10, Pond Design.

D. General Requirements for Detention and Retention Basins

1. The principal spillway (primary outlet structure) shall be designed to convey flow from a 50-year, 24-hour storm without causing flow in the emergency spillway.

2. The emergency spillway, in conjunction with the principal spillway, shall have capacity to convey flow calculated for the 100-year storm event. The emergency spillway shall be trapezoidal in cross-section, have a minimum base width of 8 feet, and have side slopes of 2:1 or flatter. The depth of the emergency spillway shall have a minimum depth of one (1) foot and shall be sufficient to provide at least one half (½) foot of freeboard between the top of the embankment and the elevation of the water surface in the spillway during a 100-year storm event.

3. The hydraulic gradient of the storage facility shall be indicated on the construction drawings for the design and 100-year storm events.

E. When a detention/retention basin is to be used as a stormwater quality feature, the following criteria must be applied in the design:

1. Water from the detention/retention basin must be able to be released via the primary (i.e., first stage) outlet for detention in the event the water quality outlet is completely blocked. These two outlets must be kept separate.

2. For basins incorporating a water quality volume and a water quality outlet less than six (6) inches in diameter, the required stormwater detention storage volume must not include the water quality volume. The stormwater detention storage volume must be provided above the invert of the primary detention outlet to account for potential blockage of the water quality outlet and/or water remaining in the water quality volume zone during the required drawdown period.

3. An infiltration pipe system, screen, baffle, inverted outlet, or similar device should be used to help prevent floating debris from plugging water quality outlets which are less than six (6) inches in diameter.

F. The latest version of the Rainwater and Land Development Manual should be used for specifications and details for the design of sediment basins, water quality ponds, and retrofitting ponds for sediment control. Basins may need to be specified to be over-excavated to accommodate sediment storage.

G. The Administrator reserves the right to resolve any conflicts that may exist between the Rainwater and Land Development Manual and these Regulations concerning basin designs.

3.04.10 POND DESIGN

This section applies to low hazard ponds. For a pond with a dam that is subject to the Ohio dam laws, approval of the pond and dam must be obtained from the Ohio Department of Natural Resources (ODNR) Division of Soil and Water Resources - Dam Safety Program. Dam classification information is available from ODNR. A copy of ODNR approval shall be provided to the Administrator prior to construction. Upon construction completion, a copy of the letter of acceptance from ODNR shall be provided to the Administrator.

If proposed pond construction (not subject to ODNR approval) would disturb an area greater than 5000 square feet, a Pond Permit is required to be obtained from the Administrator prior to construction. For ponds with contributing drainage areas less than 10 acres, excavated ponds with less than 1.5 acres of surface area, and embankment ponds with less than 1.5 acres of surface area and less than 10 feet of effective dam height, the Pond Permit application may be processed by the Medina County Soil & Water Conservation District.

If spoil material from construction of the pond is used to create other fill areas on the site, a Stormwater Management & Sediment Control Permit may also be required to be obtained from the Administrator.

A. Design Standards for All Ponds

1. Required Standards

a. Except when stated otherwise by these regulations, pond design and construction shall be based on the latest edition of "Technical Guide, Section IV", Natural Resources Conservation Service (NRCS) - Ohio Conservation Practice Standard No. 378 (The most current standard is available via the Internet at www.nrcs.usda.gov/technical/efotg . Copies are also available in the office of the Administrator).

b. The minimum top width of the embankment of a pond shall be ten feet.

c. Slopes must be sufficiently flat to ensure a stable embankment and the combined upstream and downstream side slopes shall not be less than 5:1 (five horizontal to one vertical) with neither slope steeper

than 2:1 (H:V). (See Section D for additional slope requirements for publically used or maintained ponds.)

d. Side slopes below the normal water elevation shall not be steeper than 2:1 (H:V). (See Section D for additional slope requirements for publically used or maintained ponds.)

e. Outlet channels shall include adequate provisions for energy dissipation and erosion protection and be deemed stable.

f. Constructed earthen spillways shall be located in undisturbed soil.

g. Constructed earthen spillways shall have a minimum 20-foot long level section, parallel with line of flow.

h. The applicant shall comply with township zoning approval requirements and county health department requirements (regarding proposed drinking water sources and replacement areas for septic systems).

2. Recommended Design Criteria

a. The ratio of watershed area to water surface area should be between 4:1 and 40:1.

b. A pond should have at least twenty five percent (25%) of the pond's surface area at least eight feet deep at the normal water level.

c. A safety bench should be incorporated into the sides of the pond (see standards in Section 3.04.10(D)(1), below).

d. Where site topography allows, provisions should be included for completely draining the pond to allow for periodic cleaning and maintenance.

e. Shoreline protection should be provided where necessary to prevent wave action erosion.

f. Embankment protection should be provided to prevent erosion.

g. Embankments should be periodically mowed to prevent tree growth that can affect the integrity of the embankment.

h. The slopes on both the outside of a pond embankment and the inside of an embankment above the normal waterline should be 4:1 (H:V) or flatter to allow for easier mowing and maintenance access.

B. Minimum Design Standards for Ponds with Drainage Areas Less Than 10 Acres

1. The most current version of the Pond Permit Application packet prepared by the Medina County Soil & Water Conservation District shall be used.

2. A grassed spillway shall be used as the principal spillway. For a pond with an embankment, a four-inch minimum diameter trickle tube shall also be used to manage water level.

3. The trickle tube shall not penetrate the saturation zone of an embankment. (The saturation zone is below a 2:1 (H:V) slope line extending from the normal water surface elevation toward the outside toe of dam.)

4. The grassed spillway elevation shall be a minimum of 0.5 foot above the normal water surface elevation (i.e., trickle tube elevation).

5. Grassed spillway depth (i.e., elevation difference between grassed spillway elevation and top of embankment or top of bank) shall be as follows:

   a. For Excavated Ponds (height of fill less than three feet): 1.0 foot depth for spillway with 10 foot bottom width; 0.5 foot depth for spillway with 20 foot bottom width.

   b. For Embankment Ponds (height of fill three feet or more): 2.0 foot depth for spillway with 10 foot bottom width; 1.5 foot depth for spillway with 20 foot bottom width.

C. Minimum Design Standards for Ponds with Drainage Areas of 10 Acres or More

1. The basic design information required to be submitted to the Administrator for review/approval includes, but is not necessarily limited to, the following:

   a. A plan showing:

      i. the location of the pond on the property.
      ii. existing and proposed ground elevations (either by topographic contours or spot elevations) in the area of the proposed pond and embankment (if applicable).
      iii. the location of the proposed principal spillway (outlet structure) and the emergency spillway.
      iv. proposed location(s) of wasted spoils, including existing and proposed topography.
      v. soil erosion and sediment control measures.
      vi. construction details, including the embankment (if applicable), core trench, principal and emergency spillways (including elevations), outlet pipes, anti-seep collars, anti-vortex devices, trash guards, etc.
      vii. any other drainage-related features, such as culverts or swales,

in the vicinity of the proposed pond.

b. Design/sizing of the principal and emergency spillway structures, including hydrologic and hydraulic calculations. Peak flow rate calculations shall comply with Section 3.03.03 of these regulations. The design of the facility shall be based on the Storage Indication routing method. Computer modeling software or programs using this method may be used if found acceptable by the Administrator.

c. Evaluation of downstream conditions, e.g., homes and roadways below the dam including distances and locations in relation to the outlet channel.

2. The principal spillway (outlet structure) shall have capacity to convey flow from a 10-year, 24-hour storm without causing flow in the emergency spillway. For entirely excavated ponds (as defined in Standard No. 378), a 5-year design flow may be considered and allowed on a case-by-case basis.

3. The emergency spillway, in conjunction with the principal spillway, shall have capacity to convey flow calculated for the 100-year storm event. The emergency spillway shall be trapezoidal in cross-section, have a minimum base width of 8 feet, and have side slopes of 2:1 or flatter. The depth of the emergency spillway shall have a minimum depth of one (1) foot and shall be sufficient to provide at least one half (½) foot of freeboard between the top of the embankment and the elevation of the water surface in the spillway during a 100-year storm event.

4. The pond plan and design calculations shall be prepared, signed, and sealed by a licensed Professional Engineer.

D. Ponds Constructed for Public Use or Under Public Maintenance

Examples of ponds in this category are publically-maintained retention basins, sediment basins, fire ponds, and ponds in public parks and open spaces.

1. Public safety must be considered in the design. At a minimum, the perimeter of all water pool areas that are deeper than three (3) feet shall be surrounded by benches and slopes that meet the following standards:

a. An aquatic bench shall be provided. Side slopes of an aquatic bench (starting from shoreline of normal water elevation and sloping inward) shall not be steeper than 10:1 (H:V) for a minimum of 6 feet horizontally.

b. Side slopes beyond the aquatic bench and below the normal water elevation shall not be steeper than 2:1 (H:V).

c. The contours of the pond shall be designed and managed to eliminate drop-offs and other hazards.

d. The slopes on both the outside of a pond embankment and the inside of an embankment above the normal waterline shall be 3:1 (H:V) or flatter to ensure access for maintenance.

2. Where site topography allows, provisions shall be included for completely draining the pond to allow for inspection and other maintenance. Drain facilities may be an integral part of the flow control structure or a separate structure. Drain facilities are to be accessible from shore even during high pool levels.

E. Fire Ponds

Ponds designed for fire protection purposes in conjunction with construction of new major subdivisions shall meet the above requirements and the requirements of the Engineering Code for Subdivision Development of Medina County, Ohio, Appendix C.

SECTION 3.05 STORMWATER RUNOFF CONTROL METHODS

3.05.01 MANAGING STORMWATER RUNOFF

Nearly every development project will require measures to control the impacts of increased runoff from the project. These impacts include higher peak discharges, increased runoff volumes, accelerated flow velocity, and elevated pollutant loading.

The runoff control criteria stated in Section 3.02 necessitates the use of stormwater runoff control facilities in many development situations. The runoff control requirements may be achieved in a variety of ways. Positive results will be realized by adhering to the following basic steps:

A. Proper selection of runoff control mechanisms.

B. Proper design of facilities.

C. Construction of facilities in strict adherence to the design.

D. Implementation of a regular maintenance program by an owner, operator, and/or designated party.

3.05.02 PLAN FOR RUNOFF CONTROL

When the general layout of the site has been decided upon, a plan to control runoff from the site must be formulated.

A. Division of the Site into Drainage Areas - The quantities and locations of runoff traveling over the site should be determined. The manner of how runoff can be controlled in each drainage area should be considered.

B. Selection of Runoff Control Practices - Runoff Control practices can be divided into three broad categories: (1) non-structural management practices, (2) vegetative controls, and (3) structural controls. The Rainwater and Land Development Manual should be used to help select and design appropriate structural controls and management practices.

1. Non-Structural Management Practices - These practices are used to help minimize the need for structural practices. Good site design and construction management is as important as any physical practices used for runoff control. The following are only some management considerations:
   a. Reduction and disconnection of impervious areas.
   b. Wetland and stream setbacks.
   c. Low Impact Development methods.
   d. Use of phased construction.
   e. Minimization of piped systems outside of the road rights-of-way.

2. Vegetative Control - Preserving and/or establishing vegetation should be the first approach in preventing increases in volume or rate of runoff. This control is accomplished by protecting the soil surface as much as possible and not decreasing the over-land flow time.

3. Structural Controls - Where large increases in runoff occur, structural practices are generally necessary to control runoff. It is very important that structural practices be selected, designed, and constructed according to standards and specifications herein and as detailed in the Rainwater and Land Development Manual. Improper use or inadequate installation can create problems which are greater than the structure was designed to solve.

SECTION 3.06 STORMWATER MANAGEMENT PLAN CONTENT

3.06.01 GENERAL REQUIREMENTS

A. A Stormwater Management Plan shall provide the methodology and control measures that will be utilized to control stormwater runoff from a site in post-construction conditions. Typically, the Stormwater Management Plan should be designed as part of the overall Stormwater Pollution Prevention Plan (SWP3). The SWP3 shall incorporate measures as required by the standards of both these Regulations and the Medina County Sediment Control Rules and Regulations.

B. A Registered Professional Engineer (PE) shall certify the design, supporting calculations, and plan sheets when structural best management practices that require

calculations are incorporated into a Stormwater Management Plan. To the extent necessary, a Registered Professional Surveyor (PS) may be required to certify boundary lines, measurements, or land surfaces.

C. Pursuant to Ohio EPA NPDES Permit regulations, the permittee shall maintain a written document containing the signatures of all contractors involved in the implementation of the Stormwater Management Plan as proof acknowledging that they reviewed and understand the conditions and responsibilities of the Stormwater Management Plan.

3.06.02 STORMWATER MANAGEMENT PLAN REQUIREMENTS

The Stormwater Management Plan shall consist of three parts: (1) Narrative Information; (2) a Site Plan; and (3) Supporting Calculations. The Narrative Information should verbally explain the problems and their solutions with all necessary documentation. The Site Plan is a drawing or series drawings pictorially explaining information contained in the Narrative. The Supporting Calculations provide the basis for the sizes and dimensions of the practices specified on the Site Plan.

Proposed operations that discharge stormwater from construction activities and development sites are subject to the requirements below. The Stormwater Management Plan shall include the following items:

A. Narrative Information:

A written description for each Stormwater Management Plan shall provide:

1. A description of the nature and type of development (e.g., low density residential, shopping mall, highway, etc.):

2. Total area of the site and the area of the site that is expected to be disturbed (i.e., grubbing, clearing, excavation filling or grading, including off-site borrow areas):

3. An estimate of the impervious area and percent imperviousness created by the construction activity;

4. A calculation of the runoff coefficients for both the pre-construction and post construction site conditions;

5. Existing data describing the soil and, if available, the quality of any discharge from the site;

6. A description of prior land uses at the site;

7. An implementation schedule which describes the sequence of major construction operations (i.e., grubbing, excavating, grading, utilities and

infrastructure installation) and the implementation of erosion, sediment and stormwater management practices or facilities to be employed during each operation of the sequence;

8. The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water(s) and the areal extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive discharges from disturbed areas of the project. For discharges to an MS4, the point of discharge to the MS4 and the location where the MS4 ultimately discharges to a stream or surface water of the State must be indicated;

9. Location and description of any stormwater discharges associated with dedicated asphalt and dedicated concrete plants covered by this permit and the best management practices to address pollutants in these stormwater discharges;

10. A copy or description of any OEPA site specific permit requirements in addition to fulfilling the requirements of the Construction General Permit;

11. A cover or title page identifying the name and location of the site, the name and contact information of all construction site operators, the name and contact information for the person responsible for authorizing and amending the SWP3, preparation date, and the estimated dates that construction will start and be complete (If the construction site operators are not yet determined at time of plan approval, the developer/owner name and contact information should be listed. Once construction site operators are determined, a revised cover page should be submitted to the Administrator.);

12. A log for documenting grading and stabilization activities during construction, as well as amendments to the SWP3 which occur after construction activities commence (to be kept on-site and updated by the developer's site contractor, inspector, or consultant);

13. A list of any conservation easements or other restrictive uses of the properties that are part of the project.

B. Site Plan Content:

Plans shall be drawn at a standard engineering scale of sufficient size to show adequate detail. In all cases, plans shall be clearly legible. It is preferred that at least one sheet be provided which allows a view of the entire site for analysis. If a smaller scale is used to permit inclusion of the entire site on one sheet, separate sheets providing an enlarged view of areas on individual sheets should also be provided. The following items shall be provided within the plans and follow the applicable Performance and Design Standards as outlined in Section 3.04 of these regulations:

1. North arrow, title block, scale, and existing and proposed parcel lines;

2. Soils types depicted for all areas of the site and identification of locations of any unstable or highly erodible soils;

3. Existing and proposed two (2) foot contours with both labeled accordingly;

   a. Existing contours should be extend beyond site boundaries as necessary to indicate off-site drainage patterns.

   b. The toe of proposed fill slopes should be a minimum of five (5) feet from adjacent property lines.

4. A delineation of drainage watersheds expected during and after major grading activities as well as labeling of the size of each drainage watershed, in acres;

5. Surface water locations including springs, wetlands, streams, lakes, water wells, etc., on or within 200 feet of the site;

6. The boundaries of wetlands or stream channels and first subsequent named receiving water(s) the permittee intends to fill or relocate for which the permittee is seeking approval from the Army Corps of Engineers and/or Ohio EPA;

7. Existing and planned locations of buildings, roads, parking facilities and utilities;

8. Permanent stormwater management practices to be used to control pollutants in stormwater after construction operations have been completed, subject to applicable regulations;

9. Detail drawings and specifications for all permanent and temporary structural stormwater management practices and improvements, including a detailed sequence of installation and decommissioning of practices;

10. Any additional information and/or notes as determined by the Administrator.

C. Supporting Calculations

The SWP3 submittal shall include any necessary calculations used for design of storm sewers, culverts, channels, detention/retention basins, water quality measures, ponds, and any other stormwater management improvements. The calculations shall conform with Section 3.03.03 and Section 3.04 of these regulations, and applicable sections of the Medina County Sediment Control Rules and Regulations.

Chapter 4 POST-CONSTRUCTION STORMWATER MANAGEMENT REQUIREMENTS

SECTION 4.01 APPLICABILITY

No person shall cause or allow non-farm soil-disturbing activities to occur on their land within the designated "Urbanized Areas" as defined by the U.S. Census Bureau and Ohio EPA without full compliance with the criteria established by these Requirements.

A SWP3 in accordance with these Requirements, the General Stormwater Management Requirements contained in these Regulations, and the Medina County Sediment Control Rules and Regulations is required to be prepared for all non-farm soil disturbing activities affecting an area greater than one acre within the designated "Urbanized Area". Maps indicating the boundaries of the "Urbanized Areas" are located in the Appendix. For a specific determination regarding a parcel's location in relation to the Urbanized Areas, contact the Administrator.

Activities that are exempt from these Requirements are: construction activities that do not include the installation of any impervious areas; abandoned mine reclamation activities regulated by ODNR; stream and wetland restoration activities, wetland mitigation activities; and, linear construction projects (e.g., pipeline or utility line installation) which do not result in the installation of additional impervious areas.

Submittal of a Stormwater Pollution Prevention Plan (SWP3) and approval by the Administrator does not relieve the owner from complying with the full requirements of the latest Ohio EPA Permit granting Authorization for Stormwater Discharges Associated with Construction Activities under the National Pollutant Discharge Elimination System (NPDES), if applicable for the site.

SECTION 4.02 COMPLIANCE WITH FEDERAL AND STATE REGULATIONS

Approvals issued in accordance with these Regulations do not relieve the applicant of the responsibility for obtaining all other necessary permits and/or approvals from the US Army Corps of Engineers, the Ohio EPA, and other federal, state, and/or local agencies not listed herein. If requirements vary, the most restrictive requirement shall prevail. These permits may include, but are not limited to those listed below. Proof of compliance with these federal and state regulations may be required to be submitted with the Stormwater Pollution Prevention Plan before the Administrator of these Regulations will approve or recommend approval.

4.02.01 OHIO DAM SAFETY LAWS

The provisions of the Ohio Dam Safety Laws shall be followed. Proof of compliance with the Ohio Dam Safety Law administered by the ODNR Division of Water shall be, but is not limited to, a copy of the ODNR Division of Water permit number, a copy of the project approval letter from the ODNR Division of Water or a letter from the site owner's professional engineer explaining why the Ohio Dam Safety Law is not applicable.

4.02.02 NPDES PERMITS

The provisions of the National Pollutant Discharge Elimination System(NPDES) Permits for construction activity, by the Ohio EPA, shall be followed. Proof of compliance shall be, but is not limited to, a copy of the Ohio EPA NPDES Permit number or an acceptable letter from the site owner explaining why the NPDES Permit is not applicable.

4.02.03 FEDERAL AND STATE WETLAND PERMITS

The provisions of the U.S. Army Corps of Engineers dredge and fill permits for federally-protected wetlands and the provisions of Ohio EPA's Isolated Wetlands Permits shall be followed. Wetlands and other waters of the United States shall be delineated by protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of the application of these regulations. Proof of compliance shall be, but is not limited to, the following:

A. A copy of the U.S. Army Corps of Engineers Individual Permit or the Ohio EPA Isolated Wetland Permit, whichever is required for the project, showing project approval and any restrictions that apply to site activities.

B. A site plan showing that any proposed fill of waters of the United States conforms to the general and specific conditions specified in the applicable Nationwide Permit.

C. A letter from the site owner verifying that a qualified professional has surveyed the site and found no wetlands or other waters of the United States. Such a letter shall be noted on site plans submitted to the Administrator.

SECTION 4.03 POST-CONSTRUCTION STORMWATER MANAGEMENT

In order to control post-construction water quality damage and damage to public and private lands, the owner of each development area shall be responsible for developing an acceptable post-construction stormwater management plan. Post-construction stormwater management practices treat runoff from a development site after construction is complete. These practices are to be designed to meet the requirements of the latest Ohio EPA Permit granting Authorization for Stormwater Discharges Associated with Construction Activities under the National Pollutant Discharge Elimination System (NPDES). The use of non-structural land management practices in conjunction with the use of structural practices is encouraged. The project designer should determine the appropriate Best Management Practice after considering a variety of factors, including: the characteristics of the resource to be protected, the feasibility of implementation and maintenance, and governmental requirements.

Construction activities shall be exempt from these requirements if it can be demonstrated that these post-construction stormwater management requirements have been provided as part of a larger common plan of development or if they are addressed in a regional or local stormwater management plan.

4.03.01 BEST MANAGEMENT PRACTICES

Detailed guidelines for land management practices and structural practices for post-construction stormwater management practices are provided in the latest version of the ODNR "Rainwater and Land Development" manual. Methods for controlling increases in the rate and volume of stormwater runoff and practices to treat stormwater runoff quality may include, but are not limited to, the following:

A. Flow attenuation by increasing friction. (For example, using grass-lined swales with ditch enclosures, rather than paved street gutters where practical, and discharging roof water to vegetated areas, or grass and rock lined drainage channels.)

B. The use of setbacks from wetlands and streams that will allow the natural processes to occur within these areas. Recharging groundwater and reducing flood hazards and sediment loads are some of the benefits provided by these setbacks.

C. Induced infiltration of increased stormwater runoff into the soil where practical.(For example, constructing special infiltration areas where soils are suitable or have been amended, or retaining topsoil for all areas to be revegetated).

D. Provisions for detention and retention of stormwater, with properly designed retention basins being preferred. (For example, utilizing permanent ponds as stormwater quantity and quality controls that provide multiple use areas for detention, recreation, wildlife, fire protection, and aesthetics. Constructed wetlands, extended dry detention basins, or subsurface storage areas are other options.)

E. The use of Low Impact Development methods such as bioretention areas, bio-swales, and infiltration trenches.

F. The use of Oil/Grit Separators to remove contaminants from small areas where activities contribute large loads of grease, oil, mud, grits, or floatables to stormwater runoff. (For example, fueling stations should pre-treat parking lot runoff with Oil/Grit Separators.)

G. Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel to provide non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and function are maintained and protected (e.g., no significant change in the hydrological regime of the receiving water).

4.03.02 BEST MANAGEMENT PRACTICE DESIGN

A. The SWP3 shall contain a description of the post-construction BMPs that will be installed during construction for the site and the rationale for their selection. This information shall also include a map delineating the drainage area for each BMP and a written explanation showing how it meets the Ohio EPA and/or Rainwater & Land Development manual design criteria. When designing stormwater ponds, the applicant must consider public safety as a design factor for the pond and alternative

designs must be implemented where site limitations would preclude a safe design.

B. Large Construction Activities (disturbance of five or more acres of land or disturbance of less than five acres, but a part of a larger common plan of development or sale which will disturb five or more acres) - BMP(s) selected must be able to detain stormwater runoff for protection of stream channels, stream erosion control, and improved water quality. The selected BMP(s) must be sized to treat the water quality volume as defined in the latest Ohio EPA Permit granting Authorization for Stormwater Discharges Associated with Construction Activities.

C. Transportation Projects - implement BMP(s) in compliance with the latest version of the Ohio Department of Transportation's "Location and Design Manual, Volume Two Drainage Design".

D. Offsite Mitigation of Post-Construction - requires Ohio EPA approval.

E. Redevelopment projects - follow criteria listed in the latest Ohio EPA Permit granting Authorization for Stormwater Discharges Associated with Construction Activities.

F. Non-structural Post-Construction BMPs - encouraged to reduce size of structural post-construction BMPs.

G. Use of Alternative Post-Construction BMPs - requires Ohio EPA approval.

H. Small Construction Activities (disturbance of one or more, but less than five acres and is not part of a larger common plan of development or sale which will disturb five or more acres) - SWP3 must include a description of measures that will be installed during construction process and an explanation of the technical basis used to select BMP's where flows exceed pre-development levels.

4.03.03 INSPECTION AND LONG-TERM OPERATION & MAINTENANCE

Inspection and Long-Term Operation and Maintenance plans shall be implemented for all post-construction BMPs. Except for stormwater facilities in dedicated easements in subdivisions with public roads, an Inspection and Long-Term Operation and Maintenance Agreement that binds the owner and all subsequent owners of the lands where a stormwater management facility is to be constructed shall be provided . Such Agreements shall be stand-alone documents, shall include all post-construction BMPs, shall be recorded with the deed of the property(s) encompassing the site, and shall provide or stipulate the following:

A. Clearly identify each facility and its location.

B. Identify the designated party(s) responsible for annual inspections and long-term maintenance, including repairs as necessary for the facility(s). Stormwater facilities in dedicated easements in subdivisions with public roads will be inspected and maintained by the Medina County Engineer's Office. Inspection, operation, and

maintenance of stormwater facilities on private property and subdivisions with private roads shall be the responsibility of the property owner.

C. Include routine and non-routine maintenance tasks that assure the continued performance of the post-construction BMPs, the cleaning and maintenance of all stormwater management facilities such that the full water quality volume is available, and the function of the facility as designed.

D. Include a schedule for inspection and maintenance.

E. Commit to performance of inspection and maintenance of the BMP(s).

F. Commit to submittal of an Annual Inspection and Maintenance Report to the Administrator no later than June 30th of each year.

G.. Prohibit the alteration to any facility without prior written approval from the Administrator of these regulations.

H. Allow the Administrator of these regulations access to all stormwater management facilities at reasonable times for inspections to document their condition and to ensure facilities are functioning as designed and approved.

Alterations to these stipulations or termination of any of these requirements shall be prohibited in the Agreement. Once a draft version is approved, a copy of the properly recorded Agreement document shall be submitted to the Administrator of these regulations prior to closing of the issued Medina County Stormwater Management and Sediment Control Permit.

Failure to adhere to the above Inspection and Long-Term Operation and Maintenance requirements will constitute a violation of these Regulations.

Chapter 5 ADMINISTRATION

SECTION 5.01 STORMWATER POLLUTION PREVENTION PLAN SUBMITTAL & REVIEW

5.01.01 When a Stormwater Pollution Prevention Plan (SWP3) is required, two (2) copies shall be submitted to the Administrator along with the applicable fee, completed Stormwater Management and Sediment Control Permit application, and all necessary supporting calculations. The Administrator should be consulted for the current fee schedule.

5.01.02 For a proposed major subdivision, an SWP3 shall be submitted to the Administrator after the acceptance of the preliminary plan by the Medina County Planning Commission, and concurrently with the submittal of construction drawings to the Medina County Highway Engineer. Approval of the SWP3 shall be a condition precedent to final plat approval by the Medina County Planning Commission.

SECTION 5.02 PERMIT ISSUANCE

5.02.01 A Stormwater Management and Sediment Control Permit must be applied for and obtained prior to commencing any regulated soil-disturbing activity that is greater than 5000 square feet. To apply for this permit, a completed application form and accompanying SWP3 with supporting calculations must be submitted to the Administrator for review. Upon the Administrator's approval of the SWP3 and the applicant's payment of permit fees, the Stormwater Management and Sediment Control Permit will be issued.

5.02.02 A Stormwater Management and Sediment Control Permit is also required to ensure compliance with the Medina County Sediment Control Rules & Regulations and the Medina County Flood Damage Reduction Regulations. Therefore, the SWP3 shall also show conformance with these additional regulations, when applicable.

5.02.03 For applicable sites, proof that a Notice of Intent (NOI) has been submitted to the Ohio EPA shall be required by the Administrator prior to the issuance of a Medina County Stormwater Management & Sediment Control Permit.

5.02.04 A Pond Permit is to be obtained prior to the construction of a pond. The Pond Permit Application outlines the procedures to obtain the permit. Additionally, a Stormwater Management and Sediment Control Permit may be required by the Administrator when pond construction involves extraneous grading, changes in drainage patterns, and/or floodplain impacts.

SECTION 5.03 INSPECTION, COMPLIANCE, AND VIOLATIONS

5.03.01 No person or entity shall violate, cause or knowingly permit to be violated any provisions of these regulations, or fail to comply with any such provisions or with any lawful requirements of any public authority made pursuant to these regulations, or knowingly use, cause or permit the use of any lands in violation of these regulations or in violation of any permit granted under these regulations.

5.03.02 The Administrator will make regular inspections of development areas to determine compliance with these rules and regulations. All construction activities, including permanent stormwater facilities, will be constructed in conformity with approved SWP3 plans. If it appears that a violation of these regulations has occurred, the owner or his appointed representative shall be notified of the deficiencies or non-compliance by the Administrator in writing.

5.03.03 If the Commissioners determine that a violation of any rule adopted hereunder or an administrative order allowed under O.R.C. 307.79 or other applicable provision of the law exists, then the Commissioners may request, in writing, that the Prosecuting Attorney of Medina County seek an injunction or other appropriate relief to abate excessive erosion or sedimentation and secure compliance with these regulations or order. In accordance with O.R.C. 307.79 in granting relief, the court may order the construction of sediment control improvements or implementation of other control measures and may assess a civil fine. Each day of a violation of a rule adopted or administrative order issued in accordance with the law shall be considered a separate violation subject to a civil fine.

SECTION 5.04 VARIANCE

5.03.01 The Commissioners may grant a variance to these regulations where the owner or his appointed representative can show that a hardship exists whereby compliance with these regulations is not appropriate. The variance is to be based upon an exceptional topographic or other existing physical conditions that are peculiar to the particular parcel of land. This peculiar condition must not have resulted from previous actions by the owner.

5.03.02 Adverse economic conditions shall not be considered as a valid reason or hardship for a variance request to be granted. No variances will be granted where activities occur that will defeat the purposes of these regulations.

5.03.03 The request for a variance shall be submitted to the Administrator and shall state the specific variances sought and include sufficient data to justify the granting of a variance.

SECTION 5.05 APPEALS

Any person aggrieved by any order, requirement, determination, or any other action or inaction by the Commissioners in relation to these regulations may appeal to the court of common pleas. Such an appeal shall be made in conformity with Chapters 2505 and 2506 of the Ohio Revised Code. Written notice of appeal shall be served on the clerk of the Medina County Board of Commissioners and the Administrator.

SECTION 5.06 FINAL INSPECTION APPROVAL & MAINTENANCE

To receive final inspection and acceptance of any project, the following must be provided or completed:

5.06.01 Removal and restoration, as required, of all temporary erosion and sediment control measures.

5.06.02 Final stabilization and all permanent erosion and sediment control measures must be established.

5.06.03 Permanent stormwater management facilities must be installed and made functional per the approved SWP3.

5.06.04 Provide an "as-built"survey of all structural and non-structural practices as required by the Administrator. The "as-built survey" must be certified (sealed, signed and dated) by a Registered Surveyor and/or Engineer, as applicable, with a statement certifying that the stormwater facilities as designed and installed meet the requirements of the SWP3 originally found in compliance by the Administrator. This may include a new set of stormwater facility calculations to be provided if the design was altered significantly. The "as-built" survey must minimally provide the location and dimensions of such facilities and reference the entity or individual(s) responsible for long-term maintenance.

5.06.05 Medina County will assume responsibility for drainage systems of adequate design and construction once a "Perpetual Maintenance Agreement", under Section 6131 of the Ohio Revised Code, has been filed and approved.

Ownership and/or easements for the purpose of maintenance shall be granted to the County for access to all structures and facilities for which the County is assuming permanent maintenance responsibility.

Financing of the permanent maintenance of the stormwater control structures and facilities shall be handled through a "Perpetual Maintenance Agreement", whereby all benefitting property owners of the improvement will be assessed their proportionate share of the maintenance costs. These assessments will be certified in accordance with Section 6131 of the Ohio Revised Code.

SECTION 5.07 COMPLIANCE WITH OTHER REGULATIONS

Approvals issued in accordance with these regulations do not relieve the applicant of the responsibility for obtaining all other necessary permits and/or approvals from the US Army Corps of Engineers, the Ohio EPA, and other federal, state, and/or county agencies not listed herein. If requirements vary, the most restrictive requirement shall prevail.

Projects disturbing one or more acres of land are required to conform with the Ohio EPA General Construction Permit that authorizes stormwater discharges associated with construction activity. Proof that a Notice of Intent (NOI) for the site has been submitted to the Ohio EPA shall be required by the Administrator prior to the issuance of a Medina County Stormwater Management & Sediment Control Permit.

Medina County Stormwater Management Rules and Regulations

APPENDIX A

DEPTH OF RUNOFF VALUES

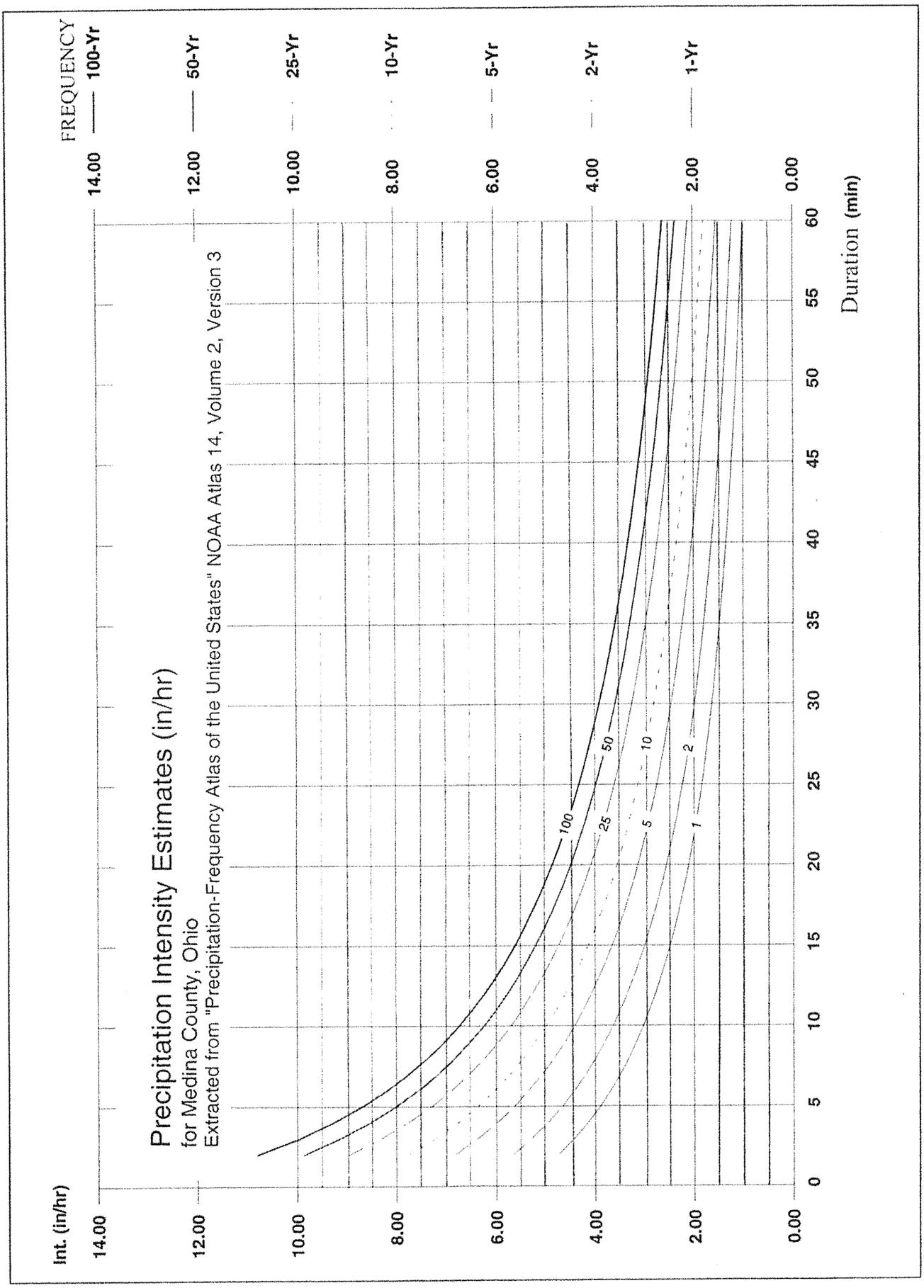
Medina County Stormwater Management Rules and Regulations - Appendix A

RUNOFF DEPTH, FOR ONE (1) - YEAR FREQUENCY 24 HR. RAINFALL AMOUNT OF 2.08 INCHES		
SCS CURVE NUMBER (CN)	RUNOFF DEPTH (INCHES)	
65	**0.17**	Based on Table 2-1, SCS TR-55 (1986) Manual
66	0.19	
67	0.21	
68	0.23	
69	0.25	
70	**0.28**	
71	0.30	
72	0.33	
73	0.36	
74	0.39	
75	**0.42**	
76	0.46	
77	0.50	
78	0.54	
79	0.57	
80	**0.61**	
81	0.66	
82	0.71	
83	0.76	
84	0.81	
85	**0.86**	
86	0.92	
87	0.98	
88	1.04	
89	1.10	
90	**1.16**	
91	1.24	
92	1.32	
93	1.40	
94	1.48	
95	**1.56**	
96	1.65	
97	1.75	
98	1.85	

Medina County Stormwater
Management Rules and Regulations

APPENDIX B

RAINFALL INTENSITY-DURATION-FREQUENCY DATA


IDF file: 2009noaa.IDF
Precipitation Intensity Estimates (in/hr)
for Medina County, Ohio
Extracted from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
FREQUENCY
100-Yr
50-Yr
25-Yr
10-Yr
5-Yr
2-Yr
1-Yr
Int. (in/hr)
Duration (min)
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0
5
10
15
20
25
30
35
40
45
50
55
60
100
50
25
10
5
2
1

Precipitation Intensity Estimates (in/hr)

for Medina County, Ohio

Extracated from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3

ARI (years)	5 (min)	10 (min)	15 (min)	20 (min)	25 (min)	30 (min)	35 (min)	40 (min)	45 (min)	50 (min)	55 (min)	1 (hr)	2 (hr)	3 (hr)	6 (hr)	12 (hr)	24 (hr)
1	3.90	3.02	2.47	2.11	1.85	1.64	1.48	1.35	1.24	1.15	1.07	1.00	0.59	0.42	0.25	0.15	0.09
2	4.67	3.64	2.97	2.56	2.24	1.99	1.80	1.64	1.51	1.40	1.30	1.22	0.71	0.51	0.30	0.18	0.10
5	5.64	4.38	3.59	3.13	2.75	2.46	2.23	2.04	1.88	1.75	1.64	1.54	0.91	0.65	0.38	0.22	0.13
10	6.38	4.93	4.04	3.55	3.13	2.81	2.55	2.35	2.17	2.03	1.90	1.79	1.06	0.76	0.45	0.26	0.15
25	7.32	5.59	4.61	4.08	3.61	3.25	2.96	2.73	2.54	2.37	2.23	2.11	1.28	0.91	0.54	0.31	0.18
50	8.02	6.08	5.02	4.49	3.98	3.59	3.28	3.03	2.82	2.65	2.49	2.36	1.46	1.04	0.62	0.36	0.20
100	8.69	6.53	5.41	4.86	4.32	3.91	3.58	3.32	3.10	2.91	2.75	2.61	1.64	1.17	0.70	0.40	0.23

Medina County Stormwater
Management Rules and Regulations

APPENDIX C

RATIONAL COEFFICIENT (C)
AND RUNOFF CURVE NUMBER (CN) VALUES

HYDROLOGIC SOIL GROUPS

RUNOFF COEFFICIENTS

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP			
		A	B	C	D
Cultivated land: without conservation treatment		.32	.50	.66	.74
: with conservation treatment		.17	.30	.43	.50
Pasture or range land: poor condition		.26	.45	.61	.69
: good condition		.05	.16	.36	.47
Meadow: good condition		.05	.13	.30	.43
Wood or Forest land: thin stand, poor cover, no mulch		.05	.23	.41	.54
: good cover		.05	.10	.29	.41
Open Spaces, lawns, parks, golf courses, cemeteries, etc.					
good condition: grass cover on 75% or more of the area		.05	.16	.36	.47
fair condition: grass cover on 50% to 75% of the area		.05	.28	.45	.57
Commercial and business areas (85% impervious)		.69	.77	.83	.86
Industrial districts (72% impervious)		.50	.66	.74	.80
Residential:					
Average lot size	Average % Impervious				
1/8 acre or less	65	.41	.59	.72	.77
1/4 acre	38	.16	.37	.54	.64
1/3 acre	30	.12	.32	.50	.61
1/2 acre	25	.09	.29	.47	.59
1 acre	20	.06	.26	.45	.57
2 acres		.05	.23	.41	.50
Paved parking lots, roofs, driveways, etc.		.96	.96	.96	.96

The coefficients are applicable for storms of five to ten year return frequencies.

For recurrence intervals longer than ten years, the indicated runoff coefficients should be increased assuming that nearly all of the rainfall will become runoff and should be accommodated by an increased runoff coefficient.

Table 2-2a Runoff curve numbers for urban areas [1/]

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area [2/]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.) [3/]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) [4/]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5/]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1/]

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment [2/]	Hydrologic condition [3/]	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
	C&T+ CR	Poor	65	73	79	81
		Good	61	70	77	80
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good. Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition	A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. [2]	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. [3]	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 [4]	48	65	73
Woods—grass combination (orchard or tree farm). [5]	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. [6]	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 [4]	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

1 Average runoff condition, and $I_a = 0.2S$.

2 *Poor:* <50%) ground cover or heavily grazed with no mulch.
Fair: 50 to 75% ground cover and not heavily grazed.
Good: > 75% ground cover and lightly or only occasionally grazed.

3 *Poor:* <50% ground cover.
Fair: 50 to 75% ground cover.
Good: >75% ground cover.

4 Actual curve number is less than 30; use CN = 30 for runoff computations.

5 CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

6 *Poor:* Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.
Fair: Woods are grazed but not burned, and some forest litter covers the soil.
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

MEDINA CO. SOILS - Hydrologic Groups

SOIL	MAP SYMBOLS FOUND IN SOIL SURVEY	HYDROLOGIC SOIL GRP.
Bennington	BnA, BnB	C
Berks	BrF	C
Bogart	BtA, BtB	B
Canadice	Ca	D
Caneadea	CcA, CcB	D
Canfield	CdA, CdB, CdB2, CdC2	C
Cardington	CfB, CgB, CgC2, CgE2	C
Carlisle	Ch	A/D*
Chagrin	Cm	B
Chile	CnA, CnB, CnC, Coc2, CoE2, CoF2, CpA, CpB, CpC	B
Condit	Cy	D
Ellsworth	ElB, ElB2, ElC, ElC2, ElE2, ElF, EsB, EsC2	C
Fitchville	FcA, FcB, FlA	C
Geeburg	GbC	C
Glenford	GfA, GfB, GfC2	C
Haskins	HsA, HsB	C
Holly	Hy	D
Jimtown	JtA, JtB	C
Linwood	Ld	A/D*
Lobdell	Le	B
Lorain	Ln	C/D*
Luray	Ly	C/D*
Mahoning	MgA, MgB, MlA, MlB	D
Miner	Mr	D
Olmsted	Od	B/D*
Orrville	Or, Os	C
Oshtemo	Ot	B
Ravenna	ReA, Reb	C
Rawson	Ro	B
Rittman	RsB, RsB2, RsC, RsC2, RsD2, RsF	C
Schaffenaker	ScF	A
Sebring	Sg, St	D
Wadsworth	WaA, WaB	C
Wallkill	Wc	C/D*
Willette	Wt	A/D*
Wooster	WuB, WuB2, WuC2, WuD2, WuE2, Wuf	C

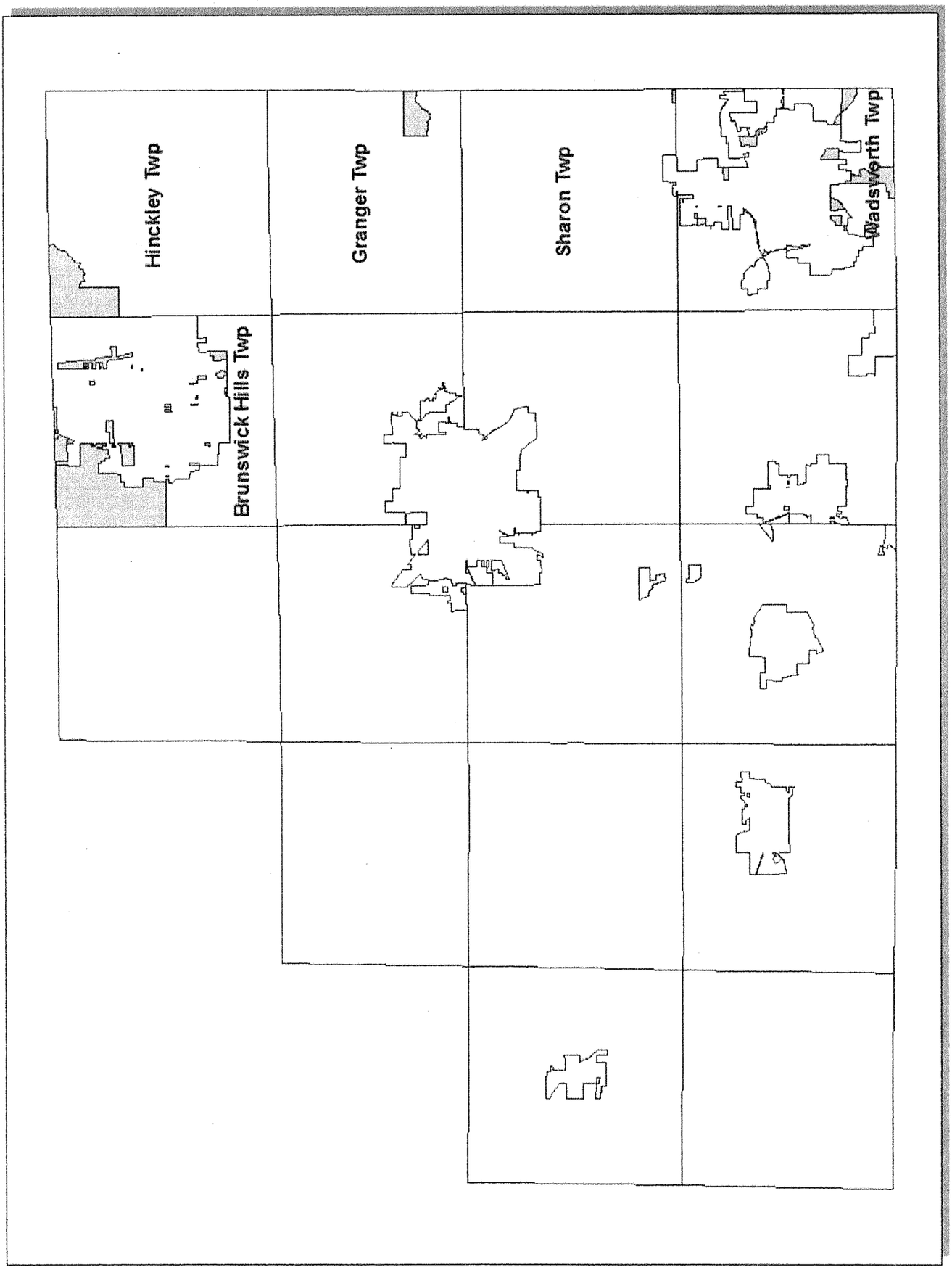
Note: *Two Hydrologic Soil Groups such as A/D, B/D or C/D indicates the drained/undrained condition.

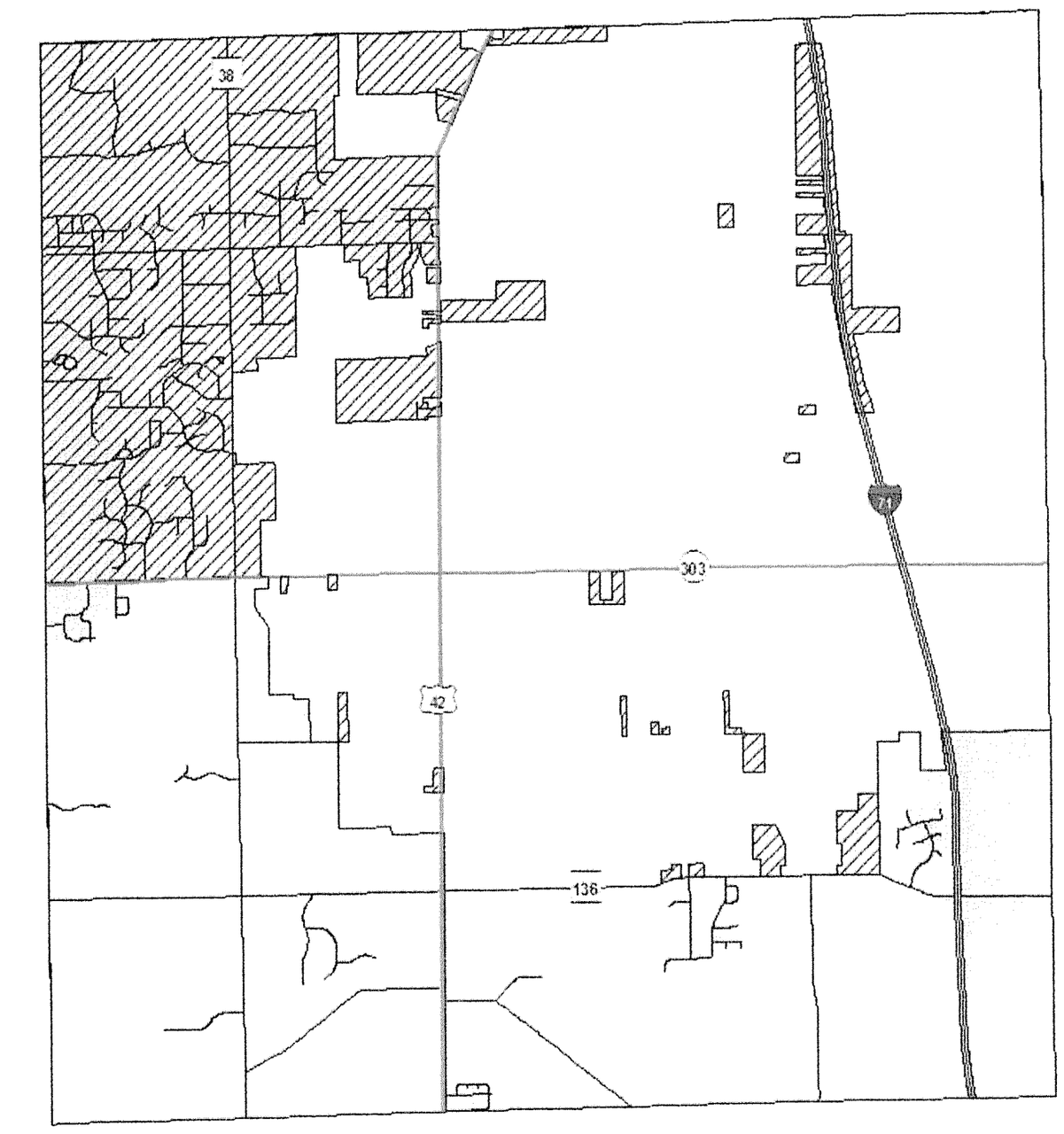
prepared by John E. Hocker

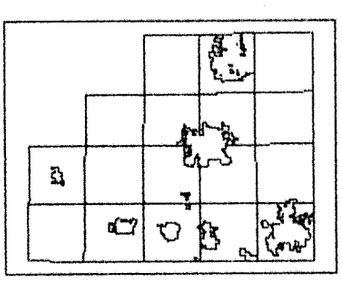
Medina County Stormwater
Management Rules and Regulations

APPENDIX D

URBANIZED AREA MAPS


Hinckley Twp
Granger Twp
Sharon Twp
Wadsworth Twp
Brunswick Hills Twp

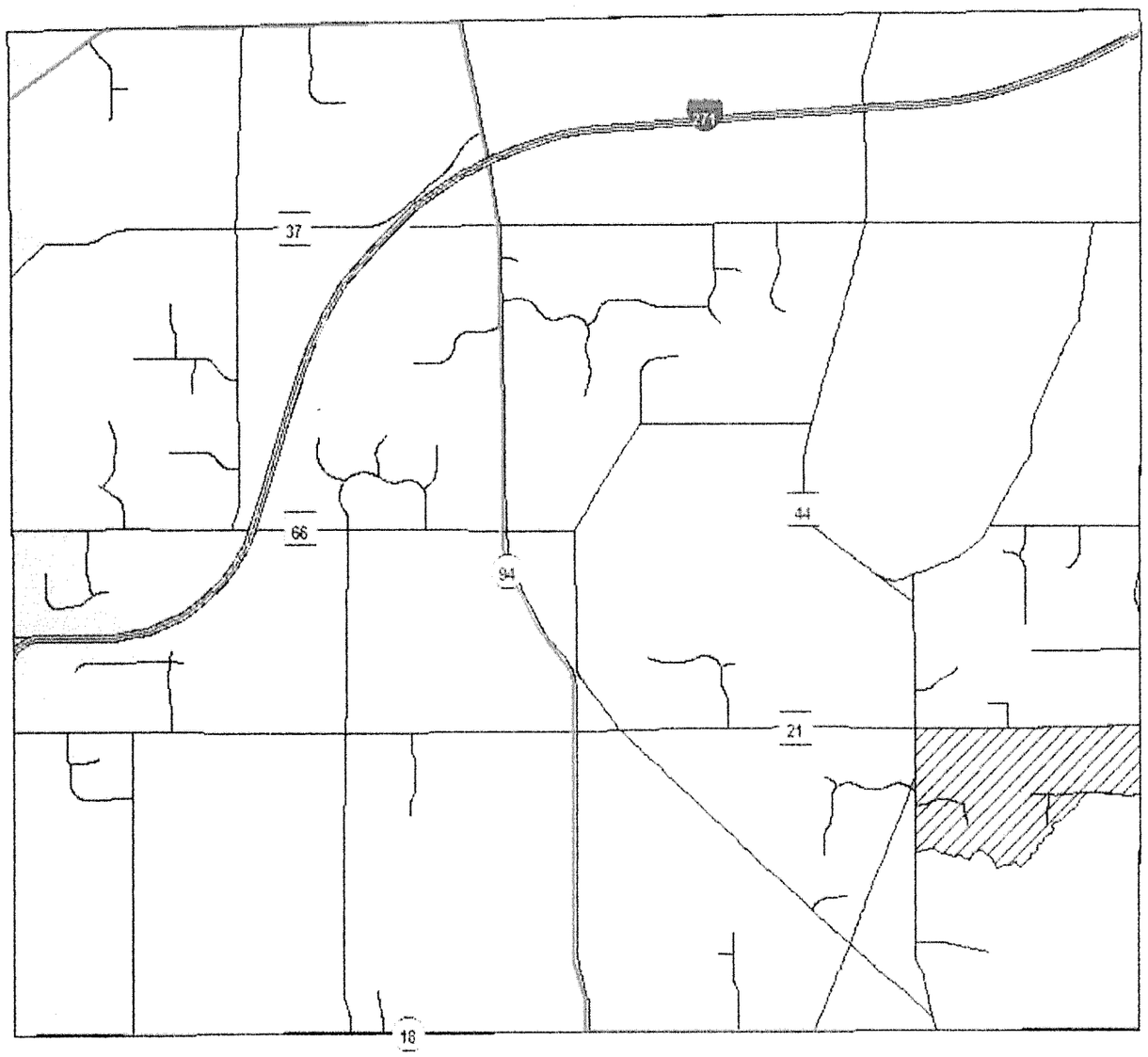


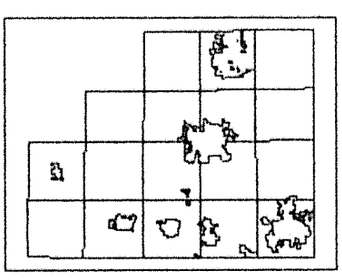


Brunswick Hills Township

township

Urbanized Area

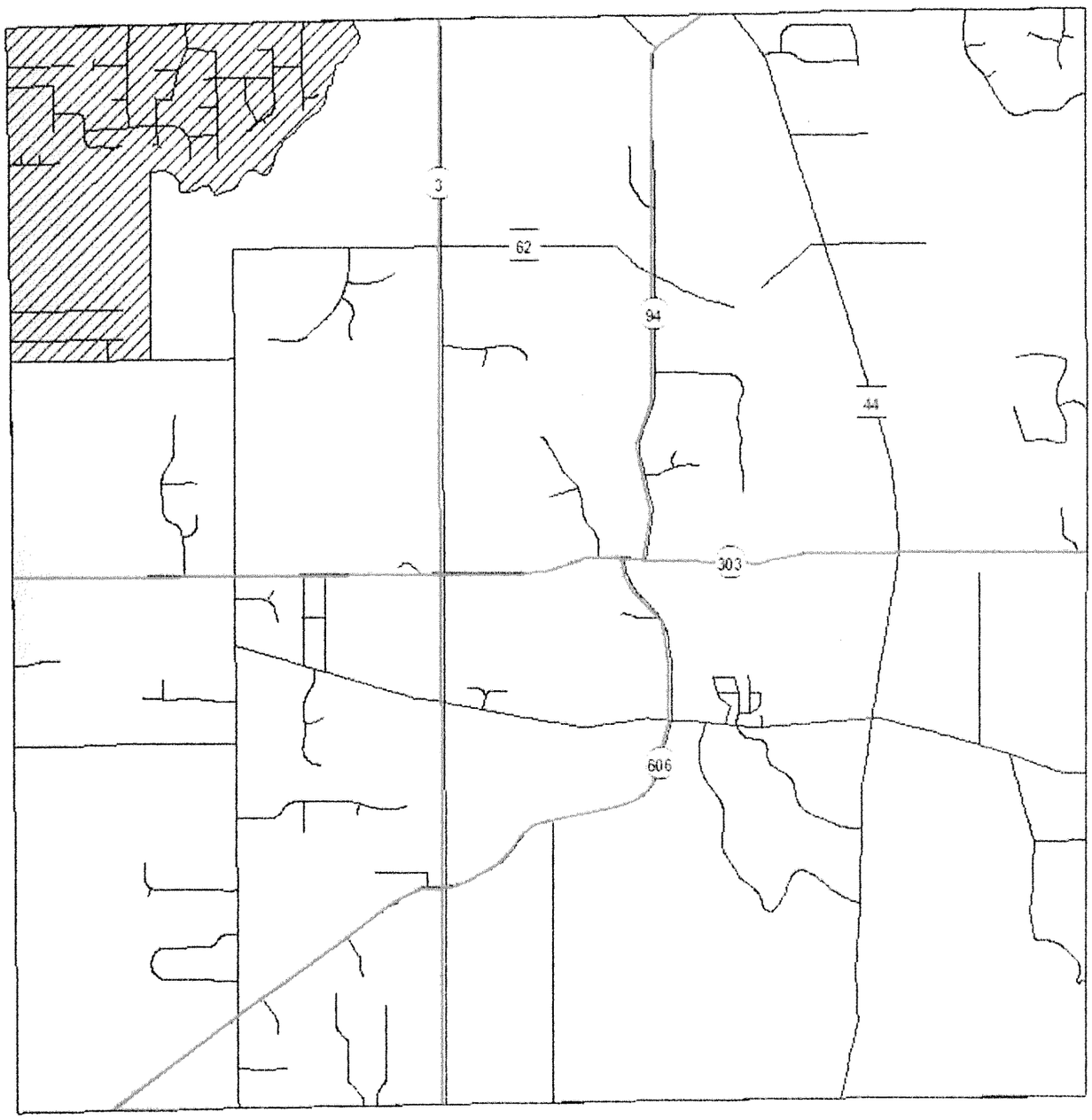


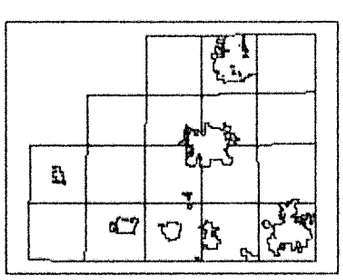


Granger Township

township

Urbanized Area

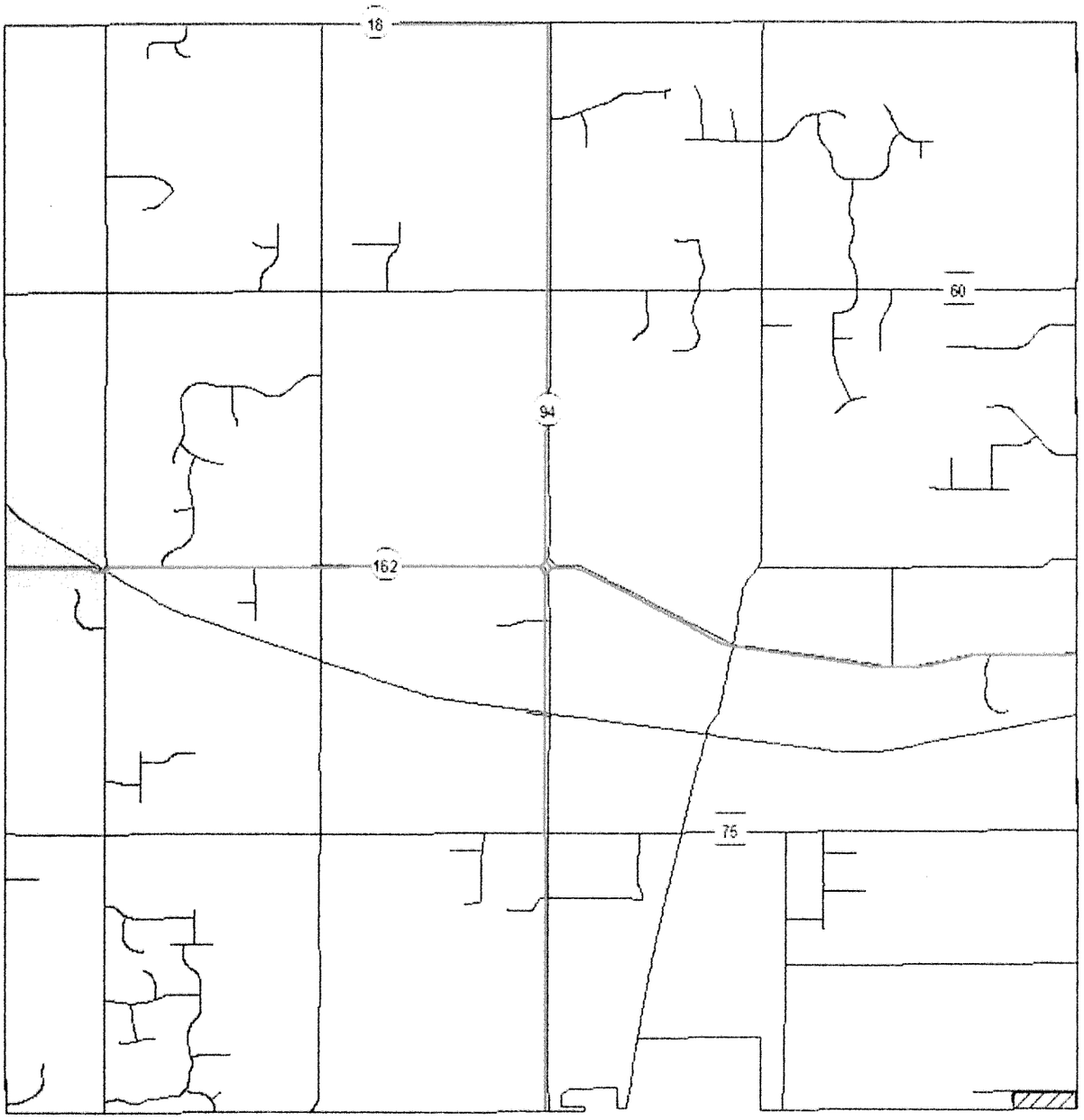


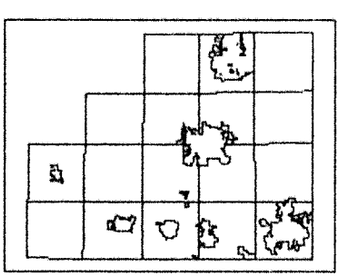


Hinckley Township

township

Urbanized Area

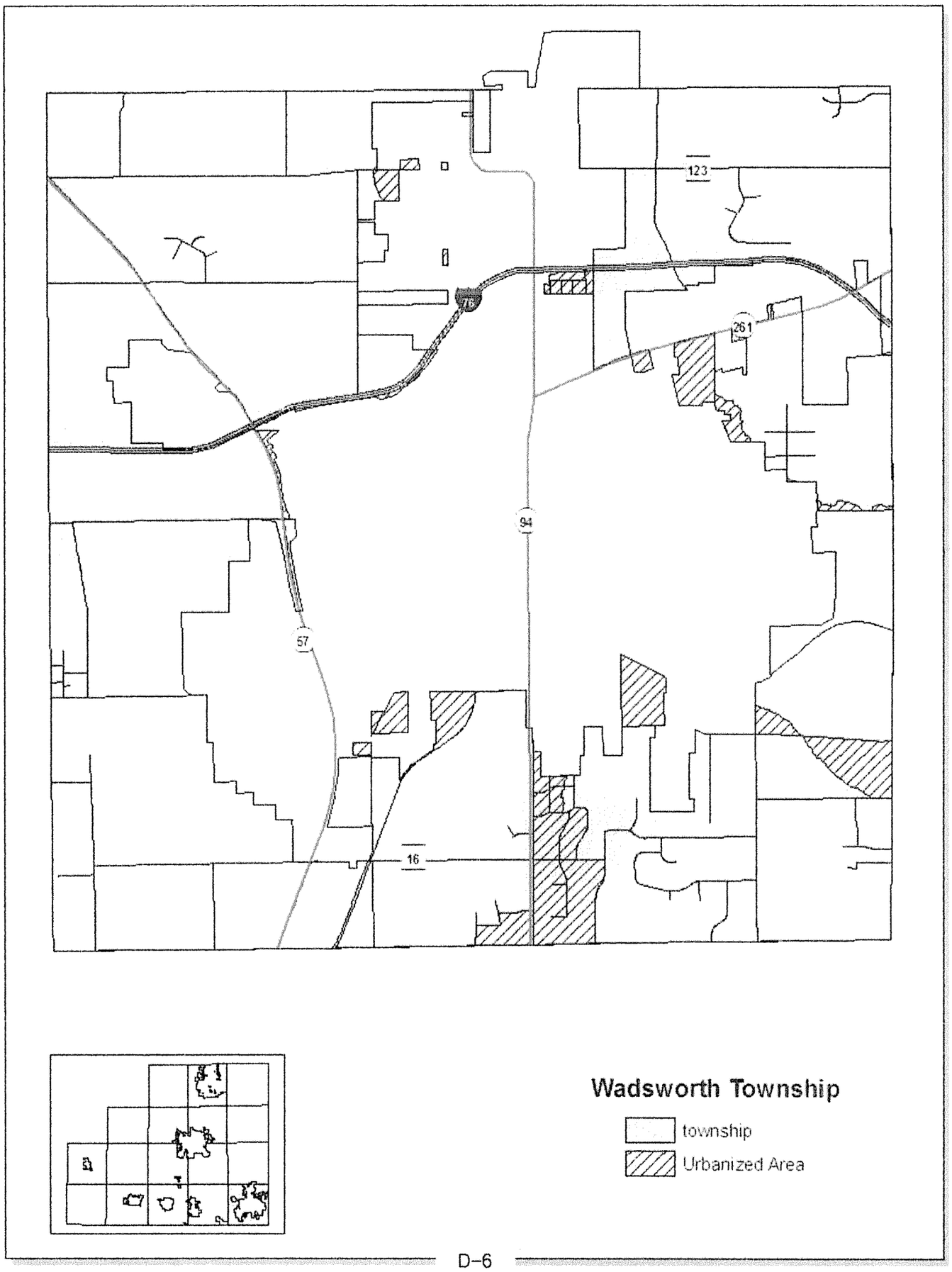




Sharon Township

township

Urbanized Area


123
76
261
94
57
16
Wadsworth Township
township
Urbanized Area