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ARTICLE 1.0 WMSC GENERAL PROVISIONS

SECTION 100 TITLE

These regulations shall be known and may be cited as the Clermont County Water Management and Sediment Control Regulations and are hereinafter referred to as “WMSC Regulations”.

SECTION 110 STATUTORY AUTHORIZATION

These WMSC Regulations of Clermont County are promulgated pursuant to Section 307.79 of the Ohio Revised Code, whereby a Board of County Commissioners may adopt rules to abate soil erosion and water pollution from soil sediment.

SECTION 120 ADMINISTRATION

These WMSC Regulations of Clermont County shall be administered by the Clermont County Building Inspection Department. The Chief Building Official of the CCBD shall be the administrator and shall enforce these regulations and issue such notices and orders as may be necessary.

SECTION 130 MEANS OF APPEAL

Any person(s) or entity aggrieved by any decision or interpretation by the Clermont County Building Inspection Department made under the provision of these regulations may appeal the matter to the Clermont County Board of Appeals, which shall be referred to as “The Board” for the purposes of this section.

130.1 Board of Appeals

130.1-1 Composition: The Board shall consist of five (5) members as follows:

- A. One Engineer, Registered in the State of Ohio.
- B. One Surveyor, Registered in the State of Ohio.
- C. One Developer/Real Estate Professional.
- D. Two members shall come from the professional community, preferably with knowledge in the construction field or an Attorney admitted to the Ohio Bar.

130.1-2

Terms: Members shall be appointed by the Clermont County Board of Commissioners and:

- A.** Shall serve three (3) year terms.
- B.** Shall hold office from the date of appointment until the end of the appointed term. However, he/she shall remain on the board until a successor takes his/her place or thirty (30) days, whichever occurs first.
- C.** Any member appointed to fill a vacancy occurring before the expiration of a term shall hold office for the remainder of that term.
- D.** A minimum of three (3) members must be present to constitute a legal meeting.
- E.** In the event a conflict of interest arises, as determined by the Clermont County Board of Commissioners, an alternate member (as described in Section 130.1-1 A-D) with the same qualifications shall be appointed by the Clermont County Board of Commissioners.

130.1-3

Purpose

- A.** The purpose of the Appeals Board is to allow an appeal by any person(s) or entity aggrieved by a decision fo the Clermont County Building Inspection Department or by a requirement or regulation that cannot be met in a specific circumstance.
- B.** If the decision of the Appeals Board is to rule in favor of the requested relief, the person(s) or entity shall be granted a variance. A variance from these regulations can only be granted when the application demonstrates the following:
 - (1) The variance request is consistent with the general purpose and intent of these regulations and will not cause damage to other properties or the surrounding environment or endanger the public health, safety or welfare.
 - (2) The variance request indicates special or unusual conditions that exist on the development site or project area.

- (3) Strict application of these regulations would cause undue hardship for the applicant or deprive the applicant of reasonable use of the development site.

130.2 Hearing and Conduct, Board of Appeals

130.2-1 The Board of Appeals shall set a date for a public hearing upon receiving the appeal request form the applicant and shall arrive at a decision fifteen (15) days after the hearing.

130.2-2 The Board of Appeals shall keep a full and complete record of all proceedings which shall be open to public inspection.

130.2-3 Appeals from the decision made by the Board of Appeals may be taken, to the Clermont County Court of Common Pleas.

130.3 Application for Variance, Board of Appeals

A **variance** is sought when a disagreement with these regulations occurs and a person or group of people apply to the Board of Appeals to eliminate their compliance with these regulations in regard to the specific disagreement. Applications for variances shall:

130.3-1 State fully the specific variance requested, the grounds for the variance, and the facts as they are presented by the person(s) requesting the variance.

130.3-2 Be signed by the owner or his agent.

130.3-3 Complete the Application for Variance Form. See Appendix E - Exhibit I.

130.4 Conditions for Issuing a Variance, Board of Appeals

130.4-1 The variance does not become effective until approval has been granted and the final design plan fulfills the requirements of these regulations not affected by the variance.

130.4-2 The granting of a variance shall not relieve the applicant of the responsibility to comply with all applicable orders, rules, and conditions of a site development permit or a building permit.

SECTION 140 PURPOSE AND INTERPRETATION

The Board of Clermont County Commissioners adopts these regulations to

establish management and conservation practices which will eliminate or abate soil erosion and degradation of the waters of the State from sediment caused by non-farm earth disturbing activities. These regulations further intend, but are not limited, to accomplish the following:

- 140.1** Eliminate or minimize downstream flooding, erosion, and sedimentation damages caused by development and other earth disturbing activities.
- 140.2** Eliminate or reduce damage to receiving streams which may be caused by increases in the volume of the runoff entering the streams or by the sediment and pollutants contained in the stormwater runoff.
- 140.3** Establish a basis for the design of stormwater management systems in order to protect the current and future rights and options of both the dominant and servient property owners and help assure the long term adequacy of the stormwater management systems that will be required.

SECTION 150 WMSC APPLICATIONS

These WMSC Regulations shall apply to all non-farm earth disturbing activities performed on the unincorporated lands of Clermont County, Ohio except those activities excluded in Ohio Revised Code Section 307.79 as follows:

- 150.1** Strip mining operations regulated under Section 1513.01 of the Ohio Revised Code.
- 150.2** Surface mining operations regulated under Section 1514.01 of the Ohio Revised Code.
- 150.3** Public highways, transportation, and drainage improvements or maintenance thereof undertaken by a government agency or political subdivision provided that its standard sediment control policies have been approved by the Board of Clermont County Commissioners or the Chief of the Division of Soil and Water Conservation of the Department of Natural Resources and provided further that such sediment control practices are no less restrictive than these WMSC Regulations.

SECTION 160 DISCLAIMER OF LIABILITY

Neither submission of a plan under the provision herein nor compliance with the provisions of these WMSC Regulations shall relieve any person(s) from responsibility for damage to any person(s) or property otherwise imposed by law; nor shall it create a duty by the Board of

Clermont County Commissioners or the Clermont County Building Inspection Department to those impacted by soil sediment pollution and stormwater runoff.

SECTION 170 SEVERABILITY

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

SECTION 180 EFFECTIVE DATE

180.1 The WMSC Regulations became effective on April 2, 1990.

180.2 These Revised WMSC Regulations become effective on September 18, 1992, the thirty-first (31st) day following the date of their adoption by the Board of Clermont County Commissioners.

SECTION 190 REFERENCES

1. Hammer, Mark J., MacKichen, Kenneth A., "Hydrology and Quality of Water Resources," John Wiley and Sons, New York, New York, 1981.
2. Lindeburg, Michael R., P.E., "Civil Engineering Reference Manual," Professional Publications, Inc., Belmont, California, 1989.
3. Soil Conservation Service, U.S. Dept. of Agriculture, "Water Management and Sediment Control for Urbanizing Areas," 1987.
4. Soil Conservation Service, U.S. Dept. of Agriculture, Dept. of Engineering, "Engineering Field Manual for Conservation Practices," Washington, D.C., 1984.
5. Soil Conservation Service, U.S. Dept. of Agriculture, "Urban Hydrology for Small Watersheds (Technical Release No. 55)," Washington, D.C., 1986.
6. Clermont County Soil and Water Conservation District, "Clermont County Water Management and Sediment Control Regulations," 1990.

SECTION 191 AMENDMENTS

Whenever the public necessity, convenience, general welfare, or good water management practice requires, the Board of Clermont County

Commissioners may amend, change, or supplement these regulations in the procedure as specified in Section 307.79 of the Ohio Revised Code.

ARTICLE 2.0 WMSC DEFINITIONS

SECTION 200 INTERPRETATION OF WORDS AND TERMS

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

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

200.2 The term “shall” is always mandatory and not discretionary; the term “may” is permissive; the term “should” is permissive but indicates strong suggestion.

200.3 Any word or term not interpreted or defined by this article shall be construed according to the rules of grammar and common usage so as to give these regulations their most reasonable application.

SECTION 210 DEFINITIONS OF WORD AND TERMS

Administrator: Chief Building Official of the Clermont County Building Inspection Department.

Approved Subdivision or Development: Any development that has received formal plan approval from the Clermont County Planning Commission.

Channel: A natural or man-made depression in the earth utilized or designed to convey water.

CCBD: Clermont County Building Inspection Department.

Critical Area Seeding or Planting: Temporary, permanent, or dormant seeding that is required for areas that are susceptible to erosion and sedimentation. These areas include detention basins, channels or ditches, or steep slopes, or other similar type matters. These areas are to be stabilized immediately after final grade has been reached.

Cut: An excavation and/or the material removed in an excavation.

Detention Structure: A permanent structure used for the temporary storage of stormwater runoff and designed so as to not create a permanent pool of water.

Develop: The act of preparing a site through grading, excavation, fill, storm and sanitary sewer installation, or other similar procedures for non-farm commercial, industrial, residential, or other non-farm purposes.

Development: The end result that occurs through grading, fill, excavation, storm sewer, sanitary sewer, and utility installation, building construction and other structures, or other similar procedures for commercial, industrial, residential, or other non-farm purposes.

Development Area: Any contiguous area owned by one person(s) or entity and defined by a metes and bounds description or operated as one development unit within that contiguous area and used or proposed to be used for non-farm commercial, industrial, residential, or other non-farm purposes upon which earth-disturbances will occur.

Denuded Areas: Those areas that are stripped or cleared of all vegetative cover thereby exposing the bare soil to erosion.

Ditch: An open channel that is either natural or man-made for the purpose of drainage of stormwater runoff or irrigation.

Drainageway: Any natural or man-made stormwater conveyance system; typically a swale, ditch or an open channel.

Earth Disturbing Activity: Any grading, excavation, fill or other alteration of the earth's surface where natural or man-made ground cover is destroyed or altered and which may result in or contribute to erosion and sediment pollution.

Engineer (Designer): A Professional Engineer registered in the State of Ohio.

Erosion: The process by which the land surface is worn away by the action of water, wind, ice, or gravity; the detachment and movement of soil or rock fragments by wind, water, ice or gravity. Different types of erosion are defined below:

- 1. Channel:** The erosion process whereby the volume and velocity of a concentrated flow of water wears away and alters the bed and banks of a channel.
- 2. Gully:** The erosion process whereby water accumulates in narrow channels and over short periods during and immediately following rainfall or snow or ice melt, and actively removes soil from this

narrow area to considerable depth such that the channels so created would not be eliminated by normal smoothing or tillage operations.

3. **Rill:** An erosion process in which numerous small channels only several inches deep are formed as a result of concentrated sheet flow, and which if not abated can become gullies.
4. **Sheet:** The removal of a fairly uniform layer of soil from the land surface by the action of wind or water.

Erosion and Sediment Control: A system of structural and vegetative measures intended to minimize soil erosion and offsite sedimentation.

Excavation: A cut or any act by which earth, sand, gravel, rock or any other similar material is dug into, cut, quarried, removed, uncovered, displaced, relocated, or bulldozed and shall include the conditions, resulting therefrom and the material removed therefrom. The difference between a point on the original ground and a designated point of lower elevation on the final grade.

Facilities: Any structures, channels, ditches, or other improvements that are to be included in the stormwater management system.

Fill: ⁽¹⁾ Any act by which earth, sand, gravel, rock or any other similar materials placed, pushed, dumped, pulled, transported or removed to a new location above the natural surface of the ground or on top of the stripped surface or cut or an area of excavation and shall include the conditions resulting therefrom. The difference between a point on the original ground and a designated point of higher elevation on the final grade. ⁽²⁾The material used to create a fill.

Grading: Any stripping, cutting, filling, excavating, stockpiling, or any combination thereof and shall include any land in its cut or fill condition.

Grassed Waterway: A natural or man-made watercourse or constructed channel covered with erosion resistant grasses or similar vegetative cover materials used to conduct and convey surface water.

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

Impervious Surface: Those surfaces that do not allow the infiltration of stormwater.

Improvements: Any improvement to the existing stormwater drainage system including, but not limited to, the installation of stormwater conveyance systems such as paved or vegetation lined channels, ditches, or swales; the installation of stormwater conduits; or the installation roadway culverts.

Landslide: Rapid mass movement downslope of soil material under the influence of gravity.

Mulching: The application of suitable materials on the soil surface to conserve moisture, hold soil in place, and aid in establishment of vegetative cover.

Permanent Vegetation: The plant materials established for the purpose of producing long term vegetative cover of the ground surface, usually after final grading is complete.

Permit: Written permission given by the CCBD to proceed with the work (earth disturbing activities) stated in the WMSC plan submittal.

Permittee: Any person to whom a WMSC Permit has been issued and who is subject to inspection under it.

Project Area: The land lying within the geographical limits of the tract(s) or parcel(s) under consideration and on which the work (earth disturbing activities) will be performed.

Retention Structure: A permanent water control structure that provides for the temporary storage of stormwater runoff above the normal water level of a permanent pond.

Runoff: The portion of rainfall, snow and ice melt that flows across the ground surface and is eventually returned to streams.

SCS: Soil Conservation Service, U.S. Dept. of Agriculture.

Sediment: Soil material, both organic and inorganic, that is in suspension, is being transported or deposited, or has been moved from its original site or origin by the action of wind, ice or gravity as a product of the erosion process.

Sedimentation: The process of action of transporting or depositing sediment.

Sediment Basin: A barrier structure built across an area of water flow to settle and retain sediment conveyed by runoff water before it can leave the project area or development site.

Sensitive Area: An area or body of water that requires special management because of its importance to the well-being of the surrounding communities, region, or the State, and includes the following:

1. Wetlands, as noted on the National Wetlands Inventory
Note: The Clermont County Building Inspection Department shall not be held responsible for determining or monitoring wetland areas.
2. Ponds or small lakes and streams as determined by CCBD.

Site Development Permit: This permit is required before any earth disturbing activities can be initiated, for the purpose of developing a commercial, industrial, or subdivision development, on the development site (see development area).

Sloughing: A slip or downward movement of an extended layer of earth resulting from the undermining action of water or the earth disturbing activities that occur during construction.

Stormwater Management System: The combination of land grading pavement slope, open channels, underground conduits (storm sewers, culverts, underdrains), catch basins, manholes, dams, detention or retention facilities, or similar type improvements, designed according to acceptable engineering practice to properly transport, detain, store, or dispose of stormwater.

Subarea Delineation: Indication of the separate drainage areas and their approximate sizes - both on and off site - that contribute to the drainage of the project area or site.

Surveyor: A Professional Surveyor registered in the State of Ohio.

Temporary Vegetation: Short term vegetative cover used to stabilize the soil surface until final grading and installation of permanent vegetative cover.

Watercourse: A permanent stream, intermittent stream, river, brook, creek, channel, or ditch for conveying water whether natural or man-made.

Watershed: The total drainage area contributing stormwater runoff to a single point or watercourse. Some project areas and development sites may have more than one contributing watershed.

WMSC: Water Management and Sediment Control

WMSC Structures: Shall include all detention/retention basins, paved/lined channels, spillways/release structures, pipes/conduits, headwalls, outlet protection, and all similar type improvements.

ARTICLE 3.0 WMSC REGULATIONS GENERAL REQUIREMENTS

SECTION 300 SCOPE

300.1 The purpose of these regulations is to provide for control and management of stormwater drainage, stormwater detention or retention, and soil erosion and sedimentation. No person shall cause or allow earth disturbing activities on a development area except in compliance with the criteria and requirements established by these regulations.

300.2 These Water Management and Sediment Control Regulations shall apply to all earth disturbing activities involving land grading, excavation, cut, fill or other alteration on land used or being developed for non-agricultural commercial, industrial, residential, or other non-agricultural purposes, and shall establish criteria for the determination of the acceptability of such stormwater management and sediment and erosion control practices.

SECTION 310 GENERAL REQUIREMENTS

310.1 The Clermont County WMSC Regulations separates earth disturbing activities into four (4) types of site development.

310.1-1 **Site Development for subdivisions, commercial developments, and industrial developments.** These types of developments require a Site Development Permit prior to the issuance of a Building Permit.

A. Residential subdivision development shall include all proposed developments that are intended to divide existing tracts or parcels into a number of lots, streets, and open areas. All developments with lots greater than five (5) acres that do not need prior approval by the Clermont County Planning Commission are included in this category.

(1) Residential subdivisions that are of sufficient size to necessitate their further being developed in blocks or sections shall require a separate WMSC plan for each of the particular blocks or sections unless prior approval from the CCBD has been given releasing the developer from this requirement.

B. Multi-family and commercial/industrial developments shall include all proposed developments that are intended to divide existing tracts or parcels or to use the entire tract or parcel for apartment/condominium projects, commercial or industrial

developments, and other such similar uses.

310.1-2 **Site development for single commercial or industrial buildings, including additions and accessory buildings.** These buildings will require a WMSC plan whose complexity is dependent on the requirements and characteristics of the building site and proposed development. The WMSC plan required will be submitted along with the building plans and each set of building plans submitted will require a site plan.

310.1-3 **Construction of residential homes that are located in approved subdivisions and residential homes on single lots of any size, including additions and accessory buildings.** An approved subdivision is one that has received prior formal or final approval from the Clermont County Planning Commission.

310.1-4 **Cut, Fill or Grading including, but not limited to, the following factors and requirements:**

- A. Must occur on existing parcel(s) or lot(s)
- B. Includes grading for maintenance measures, landscaping purposes, improvements, etc.
- C. A Permit may be required, if the existing surface drainage is altered or if the proposed work within the project area constitutes a potential erosion hazard or acts as a source of sediment subject to any watercourse or adjacent lands.
- D. A permit shall be obtained when the cut or fill required in connection with a drainage improvement not in the public right-of-way exceeds 100 cubic yards.

310.2 Each development shall provide for the on-site detention of excess stormwater runoff resulting from that development. “Excess stormwater runoff” shall include all additional runoff resulting from increases in the impervious surfaces of the site, including all additions of buildings, roads, and parking lots; modification in contours, including excavation of fill, alteration of drainageways, and regrading of slopes, as compared to the condition of the site prior to development. **For the purposes of these regulations, onsite stormwater detention shall be required when the critical storm is equal to five (5) years or greater. If no detention is required, the offsite runoff velocities must be equal to or less than the two (2) year pre-developed rate.**

SECTION 320 WMSC PERMIT EXEMPTIONS

320.1 Any person(s) or entity(s) responsible for developing property must comply with the provisions of these regulations. Submittal of specific information may be required to determine compliance with these regulations. However, a WMSC Permit will not be required for the following:

- A. Excavations below finished grade for drain fields (including household sewage disposal systems permitted by the Clermont County General Health District), tanks, vaults, tunnels, equipment vaults, and swimming pools.
- B. Excavation or removal of vegetation in public utility easements by a public utility for the purpose of installing underground utilities where the public utility has standard sediment control practices that have been approved by Clermont County Building Inspection Department, Clermont County Soil and Water Conservation District, or the Chief of the Division of Soil and Water Conservation.

SECTION 330 VIOLATIONS, ORDERS, AND PERMIT REVOCATIONS

330.1 Inspections shall be conducted as determined necessary by the Clermont County Building Inspection Department. If, at any time during the course of construction, it is evident to the CCBD that the construction or earth disturbing activity has caused the existing drainage in the general area to be impaired, created an erosion hazard, or become a source of sediment to any adjacent storm water drainage system, public watercourse or any land, CCBD shall:

330.1-1 Verbally notify the responsible person that such activities are deficient and to take measures necessary to correct the situation within a specified length of time.

330.1-2 If within seven (7) days after receipt of such notification the deficiency has not been corrected, the CCBD will issue a stop-work order effective immediately and will notify the Clermont County Board of Commissioners in writing of the failure to correct the deficiency.

330.1-3 If the permittee continues construction activities in violation of a stop-work order and the Clermont County Board of Commissioners determines that a violation exists, the Board may request the Prosecuting Attorney to seek an injunction or other appropriate relief to abate excessive erosion or

sedimentation and secure compliance with these regulations. In granting relief the court may order the construction of sediment control improvements or implementation of other control measures.

330.1-4 In addition to the other actions taken by the Clermont County Board of Commissioners when corrective measures are not completed, the Clermont County Chief Building Official shall withhold the issuance of a Certificate of Occupancy for any building constructed on the project area until measures are taken to bring the activities into compliance with these regulations.

330.2 Permit Revocations

330.2-1 Permit revocation may be required if the steps taken in Section 330.1-4 are not sufficient to assure compliance of the permittee with these regulations or if the development of the site is done in such a manner as to adversely affect the health, safety, or welfare of person(s) residing or working in the vicinity of the project area, or if the development is detrimental to the public health or welfare.

330.2-2 No WMSC Permit shall be permanently revoked or suspended until a hearing is held by the Board of Clermont County Commissioners. Written notice of such a hearing shall be served on the permit holder by registered mail and shall state:

- A. Grounds for revocation in clear and concise language.
- B. The time, date and place where such a hearing is to be held. Such notice shall be served at least five (5) days prior to the date set for the hearing. At the hearing the permit holder shall be given the opportunity to be heard, and may call witnesses and present evidence on his/her behalf. The Board will then determine if the Permit shall be revoked at the conclusion of the hearing.

SECTION 340 NUISANCES

340.1 No persons(s) or entity(s) shall create conditions that cause increased stormwater flow onto adjacent lands, impair the existing drainage system, create an erosion hazard, or become a source of sediment to any adjacent stormwater drainage system, public watercourse or any land in the unincorporated areas of Clermont County, nor shall any person(s) or entity(s) create a nuisance in regard to Water Management and Sediment Control policies in the unincorporated lands of Clermont County.

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

SECTION 350 RESPONSIBILITY

350.1 Failure of the Clermont County Building Inspection Department to observe or recognize hazardous or unsightly conditions or to recommend corrective measures shall not relieve any person(s) or entity(s) from the responsibility for the condition or damage resulting therefrom, and shall not be construed to result in the Board of County Commissioners or Clermont County Building Inspection Department, its officers, employees, or agents being responsible for any condition or damage resulting therefrom.

ARTICLE 4.0 WMSC PLAN SUBMITTAL REQUIREMENTS

SECTION 400 SCOPE

400.1 In concurrence with Section 310 of the General Requirements, the WMSC plan submittal requirements will be separated into four types of site development: **(1)** those requiring a Site Development Permit to begin earth disturbing activities prior to obtaining building permits for the individual buildings; **(2)** construction of single commercial and industrial buildings; **(3)** construction of residential housing within an approved subdivision, located on single lots of any size, or located in a subdivision development with lots that are greater than five (5) acres in size (those not requiring Planning Commission approval); and **(4)** cut, fill, or grading on existing parcel(s) or lot(s) that exceeds 100 cubic yards and relates to site development or drainage improvement, or if the existing drainage is altered or impaired and the earth disturbing activities constitute an erosion/sediment hazard.

400.2 All lots, tracts, or parcels shall be graded to provide proper drainage away from buildings and convey it to a stable receiving outlet at non-erosive velocities as defined in Section 630.2-4. Each lot shall be graded in accordance with an approved stormwater management plan. All grading and drainage shall be subject to approval by the Clermont County Building Inspection Department.

400.3 All drainage improvements shall be as such design to adequately handle stormwater runoff according to the requirements of these WMSC Regulations. Concentration of surface water runoff shall only be permitted in swales or watercourses.

SECTION 410 WMSC PLAN (DESIGN) REQUIREMENTS

410.1 Requirements for Site Development Permit

410.1-1 Preliminary (Design) Plan Requirements

- A.** Preliminary Review Fee
- B.** Site Development Permit application form (Appendix A- Exhibit I).
- C.** Project Description Form (Appendix A - Exhibit II) or Narrative (Appendix A - Exhibit III).

D. Vicinity Map

E. Site Plan

- (1) Two (2) foot maximum contour intervals for existing condition. These regulations recognize the fact that these contours are not final and are subject to change at the final design stage. Interpolation of USGS maps is acceptable. Also, five (5) foot contour intervals may be appropriate for steeply sloping areas.
- (2) A 1" = 100' maximum scale.
- (3) Indicate existing or man-made drainage features.
- (4) Show proposed locations of stormwater management systems or features such as:
 - (a) Detention/retention basins
 - (b) Stormwater conveyance systems
 - (c) Proposed easements for WMSC structures, where applicable.
- (5) Show approximate limits of proposed grading or stripping.
- (6) Indicate onsite and offsite watershed routing and drainage subareas.
- (7) Indicate all lots or units.

F. Subarea Delineation

- (1) Required when more than one (1) drainage subarea is to be included in the stormwater calculations.

G. Indicate areas and locations of adjacent watersheds that will be critical to the onsite stormwater management design.

H. Data Resource Map (soils map)

- (1) Required if more than one type of soil is present on site.

- I.** Stormwater Analysis
 - (1) Indicate Design Method
 - (a) SCS-TR55 Method
 - (b) Rational Method - valid for areas of fifty (50) acres or less.
 - (2) Calculate “Critical Storm” from Section 510
 - (3) Calculate estimated volume of detention when possible.
- J.** Petitions for public (County) maintenance of specific WMSC facilities shall be submitted along with the preliminary design plan.
- K.** One (1) copy of the preliminary design plan and calculations shall be submitted to the CCBD for review.
- L.** The preliminary design plan submittal shall not be limited to the items listed in Section 410.1-1. Any additional information submitted to the Clermont County Building Inspection Department for the preliminary plan will be reviewed.

410.1-2

Formal (Final) Design Plan Requirements

- A.** Permit Fee
- B.** Site Development Permit Application (Appendix A- Exhibit I).
- C.** Project Description Form (Appendix A - Exhibit II) or Narrative (Appendix A - Exhibit III).
- D.** Vicinity Map showing the following:
 - (1) Drawn to a scale of not less than 1" to 2000'.
 - (2) The proximity to ponds, lakes, and streams, (both onsite and offsite) whose quantities and qualities could be affected by the proposed development.
 - (3) Areas that could be affected by stormwater runoff from the project site or offsite areas that will affect the drainage patterns of the project site and/or the offsite areas.

- (4) Offsite areas of the watershed that are included in the stormwater calculations for backwater stream analysis. This information should be submitted as a separate map for more complicated development sites.

E. Site plan shall include, but not be limited to, the following items:

- (1) Drawn to a scale of not less than 1" = 50'.
- (2) Certified by a registered Professional Engineer or Surveyor in the State of Ohio.
- (3) Name of proposed project, title, scale, north arrow, legend and date of all plan maps, name and address of the person(s) preparing the plan, the owner(s), and the person(s) responsible for developing the area.
- (4) Delineation of tracts, parcels, or lots of land.
- (5) Indicate the existing topography of the development site with a maximum distance of two (2) feet between contour intervals. It may be necessary to indicate one (1) foot intervals for areas that are predominantly flat and five (5) foot contour intervals for steeply sloping (ravine or valley) locations; discretion is left to the designer and subject to approval by the CCBD.
- (6) Show the proposed limits of grading, clearing, or stripping.
- (7) Show elevations of finished grade, lowest (first) floor of buildings, and other structures. First floor elevations for individual residential homes is not required unless it is critical for proper drainage.
- (8) Show project areas profiles for, but not limited to, the following:
 - (a) Cut and fill areas (or can indicate finished slopes directly on site plan if adequate).
 - (b) Existing and proposed drainage systems.
 - (c) Existing and proposed final grades.

- (9) Show cross-sections of, but not limited to, the following:
 - (a) Emergency spillway
 - (b) Paved, sod, or rip-rap channels
- (10) Show all easements for sanitary/stormwater runoff piping and structures - including detention or retention facilities.
- (11) Show all existing drainage areas, patterns, and facilities such as natural or man-made watercourses, retention/detention basins, or similar improvements.
- (12) Indicate the location for all proposed detention or retention facilities and include (at a minimum) the following, when needed:
 - (a) Inlet details; invert elevations, pipe sizes.
 - (b) Emergency overflow limits and facilities.
 - (c) Erosion protection for all outlets into basin.
 - (d) Headwall details at inlets/outlets.
 - (e) Anti-seep collar and riser details where required (typically for retention basins).
 - (f) Release structure details including:
 - 1. Orifice or restrictor plate sizes and invert elevations.
 - 2. Weir shapes, sizes, and elevations.
 - 3. Window sizes and elevations.
- (13) If more than one (1) drainage area is used for the stormwater runoff calculations, indicate all drainage subareas on the site plan. This typically requires the areas to be shown on a separate copy of the site plan for plan clarity.
- (14) Indicate watershed routing through the site on the plan or in

the narrative/description of project form.

- (15) Erosion and sediment control notes to be recorded on the site plan include, but are not limited to, the following:
- (a) “Construction Sequence” (Appendix A - Exhibit IV)
 - (b) Temporary, permanent, and dormant seeding specifications and mulching specifications (Appendix D - Exhibit I – pp1-4) for critical areas.
 - (c) Straw bale, filter barrier, and silt fence placement notes and details (Appendix B - Exhibits I-IIIa) where required.
 - (d) Storm drain inlet protection notes and details (Appendix B - Exhibit IV and IVa) where required.
 - (e) Jute mat protection (or its equivalent, does not need to be biodegradable) for final slopes greater than three (3) horizontal to one (1) vertical is required.
 - (f) Erosion and Sediment Control Plan Criteria (see Section 620 of the WMSC Regulations) and general notes.
 - (g) Appendix B - Exhibits I through III are provided to assist the designer. These are suggested details and any practices that are proven to be their equivalent are acceptable.
- (16) The locations of all erosion and sediment control, stormwater conveyance, and structural practices are to be shown and labeled on the site plan. This includes all temporary erosion and sediment controls, such as straw bale and channel protection.

- F.** Subarea delineation map.
- G.** Indicate offsite watershed contributions to design calculations and their locations.
- H.** Data Resource Map required for sites with multiple soil types.

Please include this information on the Project Description Form or the Narrative if a Data Resource Map is deemed unnecessary.

- I. Stormwater analysis as described in Sections 510 and 520.
- J. Design calculations and details of required WMSC facilities as described in Sections 530.1 and 530.2.
- K. Two (2) sets of the formal plan construction drawings and related details and one (1) set of stormwater design calculations shall be submitted to the Clermont County Building Inspection Department for review.
- L. The formal (final) design submittal shall not be limited to items A. through K. listed in Section 410.1-2. Additional calculations and details may be required by the review agency.

410.1-3 A Site Development Permit will be issued to the applicant upon approval of the final design plan and the payment of all fees. The applicant or developer is to then notify the CCBD within seven (7) days of the first earth disturbing activities. The holder of the permit must be able to produce the permit and display it onsite.

410.2 **Commercial and industrial buildings that occur, typically, on single lots.** The following information shall be submitted to the Clermont County Building Department to fulfill the water management and sediment control requirements necessary for a Building Permit application. **A separate WMSC Permit will not be required.**

410.2-1 No preliminary plan submittal is required.

410.2-2 Final WMSC Design Plan requirements shall be submitted as described in the following statements:

- A. One (1) copy of the following are to be submitted along with the building plans to the Clermont County Building Department:
 - (1) Project Description Form or Narrative (Appendix A - Exhibit II or III).
 - (2) All design calculations to be stamped by a Registered Professional Engineer in the State of Ohio.
 - (3) Any additional details required for the WMSC Final Plan

approval.

- B. A site plan stamped by a Registered Professional Engineer or Surveyor in the State of Ohio and any construction drawings containing details essential to the water management and sediment control plan must accompany each set of building permit plans submitted to the Clermont County Building Inspection Department.
- C. The final design requirements for the site plan and WMSC details have been stated in Section 410.1-2, items A through F. The WMSC requirements must be satisfied before a Building Permit can be issued for the project.

410.3 Residential housing within a subdivision or an approved development, or located on single lots.

410.3-1 No preliminary plan submittal is required.

410.3-2 A site plan satisfying the requirements of R-112.1, R-701.4 and R-701.3 - Addendum and Revisions to the 1989 CABO One and Two Family Dwelling Code - needs to be submitted with each set of building plans. See Appendix A - Exhibit V, for reproductions of the aforementioned code sections.

410.4 Cut, Fill or Grading on existing parcel(s) or lot(s).

410.4-1 No preliminary plans are required.

410.4-2 A site plan indicating the existing and proposed drainage systems as well as any other information required by the Clermont County Building Department or the reviewing engineer to satisfy the requirements of these regulations.

410.4-3 Stormwater management calculations, if necessary, to satisfy the requirements of these regulations.

410.5 Although the submission requirements of these regulations are specific, they are also the minimum requirements. The Clermont County Building Department may require a higher degree of design than specified when a known problem has been identified, or if a proposed storm water management system jeopardizes sensitive areas or where the design results are not adequate to protect the health, welfare, and safety or the residents and property of the affected area. **Also, the applicant shall meet the**

requirements of the General Health District, County Engineer's Department, and the Planning Commission in addition to these WMSC Regulations.

410.6 For developments that will be further subdivided into sections or phases and constructed separately with a significant amount of time between the construction of each section or phase, a separate WMSC formal (final) design plans may be required for individual sections or phases, or provisions shall be made to adequately handle the stormwater runoff until completion of the entire development.

For example, a particular subdivision development WMSC plan may require a detention basin onsite to decrease the offsite flow rate of stormwater. The basin could be constructed at any suitable location within the development site. If construction of the basin is scheduled to be included with the development of phase two of the project, and phase one of the development is scheduled to be constructed first, then the WMSC requirements of the site included in phase one would need to be analyzed and accounted for without the use of the detention basin until phase two is completed.

SECTION 420 FEES

420.1 The Clermont County Board of Commissioners, in conformance with Section 307.79 of the Ohio Revised Code, shall establish reasonable filing fees for plan review and site inspection. By separate resolution the Board shall revise the fees as is deemed necessary.

420.2 A permit to begin new construction or earth disturbing activities relating to new construction will not be issued until all fees have been paid.

420.3 Additional review fees will be assessed when plan or design changes by the owner, contractor, developer, or engineer require another extensive plan review.

420.4 All proposed developments that have not received formal plan approval from the Clermont County Planning Commission prior to April 2, 1990 shall be required to obtain a WMSC Site Development Permit prior to beginning any earth disturbing activities.

ARTICLE 5.0 WMSC REGULATIONS STORMWATER DESIGN CRITERIA

SECTION 500 SCOPE

500.1 Each development or project site shall provide for the onsite detention of the excess stormwater runoff resulting from the proposed development. To prevent downstream damages, peak rates of runoff from an area after development shall be no greater than the peak rates of runoff from the area prior to the proposed development.

500.2 Stormwater runoff velocities shall be kept to a minimum through the use of rip-rap or other type of channel protection to minimize the erosion of the existing watercourse due to the increased velocities that occur from the addition of man-made stormwater conveyance systems, such as culverts, pipes, and open channels.

500.3 It is not the intent of this section or of these regulations to restrict the freedom of the design engineer to the design methods listed in this article, but these methods are recommended for the purpose of complying with these regulations. Other methods of design may be used with prior approval from the Clermont County Building Inspection Department.

SECTION 510 WMSC CRITICAL STORM CRITERIA

510.1 Critical Storm Definition

The “Critical Storm” value for a particular project or development site provides the design engineer with the following:

510.1-1 A critical storm frequency that reflects the changes in land surface that occur to a particular project area after development. **Critical storm calculations shall utilize onsite drainage areas only.**

510.1-2 Insight as to whether or not onsite stormwater detention will be required, as the preliminary design stage.

510.2 Critical Storm Determination Utilizing the SCS-TR55 Method

The engineer should have access to a copy of “USDA, Urban Hydrology for Small Watersheds - 2nd Edition (Technical Release No. 55), Engineering Dept., Soil Conservation Service”. This manual will be known as SCS-TR55 for the purposes of these specifications. To assist the designer, worksheets from the SCS-TR55 manual have been included in these regulations in Appendix C - Exhibit II, Sheets D-2 through D-8.

The “Critical Storm” value can then be calculated using the following step by step procedure:

510.2-1

Calculate the volume of runoff, V_{pre} , under pre-development conditions for a storm frequency equal to two (2) years.

A. Curve Number (CN) Determination

A weighted curve number (CN) for the pre-developed site must be calculated using the information in Tables 2-2a through 2-2d from the SCS-TR55 Manual in Chapter 2. The runoff curve numbers found in the manual reflect the ground cover and soil characteristics for a particular project or development site. A weighted value is necessary because of the variety of soil types and ground cover conditions that can occur on one site.

B. The soil storage capacity, S, of the soil is then calculated from the weighted curve number by using equation 2-4 from Chapter 2 of the SCS-TR55 Manual:

$$S = (1000/CN) - 10 \qquad \text{Eqn. 510.2-1}$$

C. The quantity of runoff, Q, can then be determined from the storage capacity and the rainfall intensity of the area. The rainfall intensity values, P, for Clermont County for twenty-four (24) hour duration storms for various frequencies are listed below in Table I. Equation 2-3 from Chapter 2 of the SCS-TR55 Manual is as follows:

$$Q = (P - 0.2S)^2 / (P + .08S) \text{ inches} \qquad \text{Eqn. 510.2-2}$$

FREQUENCY (years)	INTENSITY, P (in/acre-ft)
2	2.9
5	3.6
10	4.1
25	4.7
50	5.1
100	5.6

TABLE I

D. Runoff volume determination

$$V_{pre} = [Q_{pre}^{(in)} / 12 \text{ in/ft}] * 43560 \text{ ft}^2/\text{acre} * A \text{ (acres)}$$

$$V_{pre} = \text{cubic feet}$$

510.2-2 Steps 1.A, 1.B, 1.C and 1.D are then repeated for the post-development site conditions (the post-development curve number will reflect the addition of impervious surfaces) to obtain the volume of runoff, V_{post} , for a two (2) year frequency storm for the post-development conditions.

510.2-3 Equation 510.2-3 is then used to determine the percent change in volume of runoff due to the development of the site.

$$[(V_{post} / V_{pre}) - 1.0] * 100\% = PC \quad \text{Eqn. 510.2-3}$$

510.2-4 Use Table II, below, to determine the critical storm based on PC, the percent change.

\leq	PC	$<$	CRITICAL STORM FREQUENCY
–		20	2
20		50	5
50		100	10
100		250	25
250		500	50
500		–	100

TABLE II

510.2-5 See Appendix C - Exhibit II, Sheet D-2 for the worksheet used to determine the curve numbers and runoff for pre and post development conditions.

510.3 Critical Storm Determination Utilizing the Rational Method

The information required to calculate the pre and post development flows for a particular project using the rational method are included in these regulations. The following is a step by step procedure for determining the percent change in flow for post versus pre development conditions.

510.3-1

The Rational Method design is limited to areas that are fifty (50) acres or less for purposes of these regulations. The Rational Method may be used for areas larger than fifty (50) acres if site conditions warrant and upon approval by the Clermont County Building Inspection Department.

510.3-2

Find Q_{pre} for a two (2) year frequency and a given storm duration (concentration time of runoff) under pre-development conditions, through the use of Eqn. 510.3-1 shown below:

$$Q = C * I * A \qquad \text{Eqn. 510.3-1}$$

Where: Q = flow in cfs

C = runoff coefficient

I = rainfall intensity

A = drainage area for the project site

A. Determination of the runoff coefficient (s), C

Table III shows a list of runoff coefficients for various pre and post development conditions.

SITE CONDITION	COEFFICIENT, C
Commercial/Industrial	0.80
Residential	
Single Family ¼ acre	0.50
½ acre	0.45
1+ acres	0.40
Multi-Family (A)	0.70
Parking Lots, Driveways, Etc.	0.95
Roofs, Imperious Surfaces	0.95
Lawns	
Up to a 2% Slope	0.20
2% to 7% Slope	0.25

Over 7% Slope	0.30
Farmland	0.30
Grassland	0.30
Woodland	0.25

(A) The runoff coefficient for multi-family residences may need to be found using a weighted value based on the amount of impervious surfaces and vegetated cover instead of using $C = 0.70$

TABLE III

- (1) A weighted C value will need to be calculated when more than one (1) of the above conditions exist on a particular project or development site.

B. Determination of the Rainfall Intensity, I

Table IV indicates rainfall intensity values in relation to runoff time of concentration (storm duration), t_c , and storm frequency. For areas of 30 acres or less, t_c values typically range from five (5) minutes to thirty (30) minutes.

C. Time of Concentration, t_c :

Time of concentration, t_c , is the time it takes for runoff to travel from the hydraulically most distant point to a point of reference or interest downstream. The chart in Appendix C - Exhibit I provides a graphical method for estimating overland flow time. This chart may be used to estimate the time for runoff to travel from the furthest point to an inlet or a defined channel.

Time of Concentration, t_c , is measured in minutes for use in Table IV.

FREQUENCY (YRS)	INTENSITY, I (IN/HR) $a / (t_c + b)$
2	$106 / (t_c + 17)$
5	$131 / (t_c + 19)$
10	$170 / (t_c + 23)$
25	$230 / (t_c + 30)$
50	$250 / (t_c + 27)$

100	$290 / (t_c + 31)$
-----	--------------------

TABLE IV

- D. Equation 510.3-2 can then be used to find the percent change in runoff between the pre and post development conditions.

$$[(Q_{\text{post}} / Q_{\text{pre}}) - 1.0] * 100\% = \text{PC} \quad \text{Eqn. 510.3-2}$$

- F. The Critical Storm value can be determined from Table II in Section 510.

510.4 Critical Storm Controls

510.4-1 The peak rate of runoff from the “Critical Storm” and all more frequent storms occurring on the development or project area cannot exceed the peak rate of runoff from a two (2) year frequency storm that would occur under pre-development conditions. For example, if the critical storm was calculated to be a ten (10) year frequency storm, the peak rate of stormwater runoff that would occur from the two (2), five (5), and ten (10) year post-development storms could not exceed the peak rate of runoff that would occur from a two (2) year frequency storm under pre-development conditions. A two (2) year critical storm value does not require detention, in most cases, but the outlet velocities must be equal to or less than the two (2) year pre-development outlet velocities.

510.4-2 Storms of less frequency occurrence than the critical storm up to the one hundred (100) year storm shall have peak rates of runoff equal to or less than the peak rates of runoff for the same frequency of storms under pre-development conditions. As shown in Table II, the two (2), five (5), ten (10), twenty five (25), fifty (50), and one hundred (100) year storm frequencies are considered adequate for these regulations.

SECTION 520 WMSC DESIGN METHODS

520.1 SCS-T55 Method

This method can be used for all project or development sizes for the purpose of these regulations. After determining the “Critical Storm” frequency described in Section 510 of these regulations, the following steps are needed to determine if onsite stormwater detention is needed and what volume of detention will be required.

It should be noted that the flow, Q and volume, V that were found during the critical storm calculation pertain to onsite drainage areas

only. In designing the stormwater management system for the development site, offsite drainage areas will need to be considered for the design of culverts, open channels, storm sewers, detention/retention basins, and other drainage improvements.

520.1-1

Determine T_c , Time of Concentration

The definition given in Section 510.3-2.C for the time of concentration is valid for the SCS-T55 Method, but does require further explanation of the components that make up the T_c for a particular development site.

$$T_c = T_{t1} + T_{t2} + \dots + T_{tm} \quad \text{Eqn. 520.1-1}$$

Where: T_t = Travel time (in hours) for a particular segment of the stormwater conveyance system.

m = Number of flow segments

520.1-2

Computation of Travel Time, T_t

Water moves through a watershed as ⁽¹⁾sheet flow, ⁽²⁾shallow concentrated flow, ⁽³⁾open channel flow, or a combination of these flows. The type of flow that occurs for a particular stormwater conveyance system and development site is best determined by field inspection and engineering judgment.

A. Sheet Flow

$$T_t = [(0.007) (n * L)^{0.5}] / [(P_2)^{0.5}(s)^{0.4}] \quad \text{Eqn.520.1-2}$$

Where: T_t = travel time (in hours)

n = Manning's roughness coefficient

L = flow length, 300 ft. maximum

P_2 = 2-year, 24 hour rainfall (ins.)

s = slope of land (ft/ft)

B. Shallow Concentrated Flow

$$T_t = L / (3600 * V) \quad \text{Eqn. 520.1-3}$$

Where: T_t = travel time
 L = flow length
 V = average velocity

C. Channel Flow

$$T_t = L / (3600 * V_m) \quad \text{Eqn. 520.1-4}$$

Where: T_t = travel time
 L = flow length
 $V_m = [1.49(r)^{2/3}(s)^{1/2}] / n$

Where: V_m = average velocity (ft/sec)
 r = hydraulic radius
 s = slope
 n = Manning's roughness coefficient

D. In watersheds with storm sewers, carefully identify the appropriate hydraulic flow path to estimate T_c . Storm sewers normally handle only a small portion of a large storm event.

E. See worksheet in Appendix C - Exhibit II, Sheet D-3 for time of concentration calculation.

520.1-3

Peak Flow Determination

A. Graphical Method

$$q_p = q_u * A_m * Q * F_p \quad \text{Eqn. 520.1-5}$$

Where: q_p = peak flow (cfs)
 q_u = unit peak flow (csm/in)
 A_m = total site area (mi²)
 Q = runoff (ins) See Eqn. 510.2-2

F_p = pond and swamp adjustment factor

- (1) The worksheet in Appendix C - Exhibit II, Sheet D-4 can be used to determine the peak flow for both the pre and post development site conditions.
- (2) Limitations to this method are as follows:
 - (a) Can only be used for developments and project areas that have only one distinct drainage area.
 - (b) The drainage area can typically contain only one major stream.
 - (c) Provides a determination of peak flow only.
 - (d) Cannot perform reservoir routing.

B. Tabular Hydrograph Method

- (1) This method is applicable for estimating the effects of land use change (development) in a portion of a watershed. It is effective in determining the composite hydrograph that results from the contributions of the defined subareas that are present in the watershed, while also measuring the change in runoff volume that occurs due to development of the land.
- (2) The entire watershed contributions to the development site or project area must be shown on the site plan and in the design calculations to achieve a better estimation of the increased stormwater flow that has occurred due to development.
- (3) The tabular method should be used when watershed subdivision into two (2) or more subareas is required for a particular development site or project area.
- (4) Follow the steps indicated in Chapter 5 of the SCS-TR55 Manual to use the tabular hydrograph method. See Appendix C - Exhibit II, Sheets D-5 and D-6 for the worksheets used to find the peak flow for the composite hydrograph at a particular point of interest. The point of interest could be located where the stormwater runoff

leaves the development site or enters a culvert.

- (5) The following limitations apply to the tabular hydrograph method:
 - (a) The accuracy of this method decreases as the complexity of the watershed increases.
 - (b) If the drainage areas of individual subareas differ by a factor of 5 or more, the accuracy of the method decreases.
 - (c) The travel time, T_t , for a particular subarea must be equal to or less than three (3) hours.
 - (d) The time of concentration, T_c , for a particular subarea must be equal to or less than two (2) hours.

520.1-4

Volume of Detention Determination

- A.** The detention basin is the most widely used form of controlling peak stormwater flow caused by the development of the site in question. The method used in Chapter 6 of the SCS-TR55 manual assists the designer in calculating a quick estimate for the amount of storage required. The estimate is valid for both single and multiple stage outflow devices. The following constraints apply when using this method for multi-stage outlets:
 - (1) Each stage requires a design storm and a computation of the storage required for it.
 - (2) The flow(s) from the upper stage(s) must include the flow(s) from the lower stage(s).
- B.** The designer should be aware that this method is not to be used for final design if an overestimation of 25% is not satisfactory.
- C.** This method has been found to be effective for final design of small detention basins.
- D.** See Appendix C - Exhibit II, Sheets D-7 and D-8 for the worksheets provided to calculate the required storage volume by this method.

- E. See Section 510.4-1 and -2 for the maximum outflow rate from the detention basin. This will require the designer to calculate the pre and post development storage volumes (using the worksheets in D. above) for all storms (up to 100 year) of less frequency than the critical storm.

520.2 The Rational Method

This method is limited to use for development sites or project areas that are fifty (50) acres or less in size under these regulations. The limitations of this method are similar to those stated in Section 520.1-3A.2(a) through 2(d) for the SCS-T55 graphical peak flow determination. Use of this method for larger areas is acceptable upon approval by the CCBD.

520.2-1 Peak flow for the project area or development site has already been determined by the rational method in Section 510.3 in determination of the critical storm frequency. Offsite drainage areas tributary to the site shall be included in the design of storm sewers, culverts, ditches/swales, and other drainageways but are not required to be detained onsite. Theoretically, they are assumed to by-pass detention.

520.2-2 Storage Volume Design for Detention or Retention Basins

Appendix C - Exhibit III contains the worksheets required to calculate the storage volume needed when using the rational method.

A. $q_2 = A * C * i_2$

Where: q_2 = the peak flow rate due to a two (2) year frequency storm under pre development conditions.

A = the drainage area for the development

C = runoff coefficients for the pre development conditions

i_2 = rainfall intensity from Section 510.3 Table IV for a two year frequency storm

B. $Q_{cr} = A * C * i_{cr}$

Where: Q_{cr} = the maximum peak flow rate due to a critical storm frequency under post development

conditions

A = the drainage area for the development

C = runoff coefficients for the post development conditions

i_{cr} = the maximum rainfall intensity from Appendix C - Exhibit III for the critical storm frequency

- C. The volume of storage calculated is that needed to reduce the critical storm peak flow rate under post development conditions to equal to or less than the two year pre development peak flow rate (q_2) found in step A. above.
- D. The required volume of detention may also be determined from the criteria defined in Section 510.4-2.

520.3 The design methods mentioned previously are recommended by the Clermont County Building Department. This department also recognizes the availability of other design methods, such as the Hydrograph Method and the Storage Indication Method. However, in the interest of expedient processing of plans and construction, the use of the standard procedures, manuals, and computers programs is preferred.

SECTION 530 WMSC DESIGN REQUIREMENTS AND SPECIFICATIONS

530.1 Detention/Retention Basins

530.1-1 Detention/Retention basins must be designed to limit the critical storm flow out of the basin to the two year pre developed rate and, also have the capacity to store all storm frequencies greater than the critical value up to the 100 year storm under post developed conditions and release the outflows at the pre developed rate for like years.

530.1-2 The bottom of the basin should be constructed with slopes equal to or greater than 0.5% to facilitate interior drainage.

530.1-3 Steep slopes are to be avoided and seeding and other erosion control measures are to be used to protect the slopes.

530.1-4 Paved (or equivalent) gutters shall be constructed from all inlet pipes to the outlet facility or structure.

530.1-5

Anti-seep collars or reinforced concrete pads placed under the discharge pipe(s) (see detail in Appendix C - Exhibit IV) are to be used on all pipe outlets for retention basins and detention basins with wide berms when required. Show anti-seep collar spacing and details, and concrete pad details when required.

530.1-6

Spillway Design and Details

- A.** The spillway area (plan view), cross section detail, and other spillway details shall be located on the site plan or accompanying construction drawings.
- B.** All basins shall have emergency spillways that will safely pass the peak flow for a one hundred (100) year frequency storm under post development conditions at a safe velocity into protected watercourses.
- C.** All outlet (release) structure details must be shown on the site plan or accompanying construction drawings.
 - (1) Pipe and orifice size(s)
 - (2) Invert elevations
 - (3) Provide weir length(s), type(s), and elevation(s)
 - (4) Provide window sizes, elevations, and locations.
- D.** Provide spillway crest elevations and a minimum of one (1) foot freeboard.
- E.** Provide all inlet (outletting into basin) / outlet capacity and velocity calculations.
- F.** Since these WMSC Regulations require that the outflow rate from a detention or retention basin be held to a two year pre development rate and the detention basin must also be designed to detain the expected runoff from a one hundred year post development condition, a two (2) stage orifice control may be required on most detention or retention basins.
- G.** A minimum depth of four (4) feet must be maintained in all retention basins to prevent stagnation of the pond.

- H. Parking lot detention shall be kept a maximum depth of eight (8) inches and be located in primarily non-parking areas.

530.2

Onsite Stormwater Drainage Systems

530.2-1

Culverts

- A. Culvert design review and field inspection under these regulations is limited to those culverts **not** located in the public right of way.
- B. Include backwater analysis when appropriate.
- C. All culverts should be designed and constructed to adequately handle velocities and discharges for the following storm frequencies:
 - (1) Ten (10) year frequency storm under post development conditions for tributary drainage areas less than one hundred (100) acres.
 - (2) Twenty-five (25) year frequency storm under post development conditions for tributary drainage areas greater than or equal to one hundred (100) acres.
- D. Show calculations indicating if culvert flow is governed by inlet or outlet control.
- E. Indicate volume and velocity of inflow and outflow from all culverts.
- F. Provide rip-rap protection when required.

530.2-2

Open Channels

- A. Design by standard engineering practices with the storm frequencies required as shown in 530.2-1.B (1) and (2) above.
- B. Indicate volume and velocity of outflow from the open channel.

530.2-3

Headwalls

Standard headwalls and/or wingwalls shall be constructed for all culvert inlets and outlets in swales and at the outfall of all storm sewers.

ARTICLE 6.0 EROSION AND SEDIMENT CONTROL MEASURES

SECTION 600 SCOPE

600.1 Effective erosion control planning requires a working knowledge of both the application of control measures in terms of their selection and location as well as the design and construction of the control measure. The purpose of this article of these regulations is to provide the engineer with a set of guidelines or minimum requirements that are to be used during the planning and installation of erosion and sediment control practices.

600.2 Every subdivision and non-farm commercial, industrial, and residential development shall require an erosion and sediment control system which is adequate to serve the development site or project area in order to protect the waters of the State and adjacent properties from pollution by sediment and soil erosion, and which meets the requirements of these regulations.

SECTION 610 GENERAL REQUIREMENTS

610.1 The erosion and sediment control system shall be designed such that during construction and after the development is completed, the sediment in the stormwater runoff shall be trapped and held within the development or project area until disturbed or denuded areas have been stabilized.

610.2 The development of an erosion and sediment control system consists of providing two (2) separate and distinct systems; the erosion control system and the sediment control system.

610.2-1 The erosion control system is installed to prevent the detachment of soil particles from the soil surface and to minimize soil particle movement into the stormwater runoff system leaving the development or project area for the purpose of limiting the pollution of waters of the State and adjacent property.

610.2-2 The sediment control system is installed to prevent the conveyance or movement offsite of soil materials during earth disturbing activities and after construction of the project area is completed for the purpose of minimizing the pollution of waters of the State and adjacent property.

610.2-3 A good combination of erosion and sediment control measures is important. Every opportunity to provide protection to the soil surface should be taken. This practice helps prevent erosion and makes sediment control measures efficient, effective, and less expensive.

- 610.3** To control sediment pollution in waters of the State caused by sloughing, landsliding, or dumping of earth material, or placing of earth material into such proximity that it may readily slough, slide, or erode into these waters by natural forces, no person(s) or entity(s) shall, unless in conformance with these regulations:
- 610.3-1** Dump or place earth material into waters of the State or in such proximity thereto that it may readily slough, slide, or erode into these waters unless such dumping or placing is authorized by the approving agency for purposes such as, but not limited to, constructing bridges, culverts, erosion control structures, and other in-stream or channel bank improvement work; or
- 610.3-2** Grade, excavate, fill or impose a load upon any soil or slope known to be prone to slipping or landsliding thereby causing it to become unstable unless qualified engineering assistance has been employed to explore slope stability problems and make recommendations to correct, eliminate, or adequately address the problems. Grading, filling, or construction shall commence only after the approving agency has reviewed and approved the recommendations in accordance with the requirements of these regulations.

SECTION 620 EROSION AND SEDIMENT CONTROL PLAN CRITERIA

620.1 Stabilization of Denuded Areas and Soil Stockpiles

- 620.1-1** Clearing of vegetation, cutting and filling, excavation or other earth disturbing activities shall be done in such a way that will minimize erosion. Permanent or temporary soil stabilization must be applied to denuded areas within fifteen (15) days after final grade is reached on any portion of the development or project area.
- 620.1-2** Any area as described above which will not be regraded or otherwise touched for longer than thirty (30) days must be stabilized and protected from erosion.
- 620.1-3** Soil stockpiled must be stabilized and protected with sediment trapping to prevent soil loss.
- 620.1-4** Permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized and protected from erosion. Permanent vegetation shall not be considered adequate until the ground cover established can prevent or control soil erosion.

620.2 Protection of Adjacent Properties

620.2-1 Waters of the State and properties adjacent to the site of earth disturbing activities shall be protected from sediment deposits through the use of buffer strips, sediment barriers, filters or dikes, sediment basins, or any combination of these or similar measures.

620.2-2 If vegetative buffers are to be used as part of the sediment control plan, they should only be used on development sites or project areas where only sheet flow runoff is expected. Also, the buffer strips shall be a minimum of fifteen (15) feet in width.

620.3 Timing and Stabilization of Sediment Trapping and Erosion Control Measures

620.3-1 Sediment and erosion control measures intended to trap and retain sediment onsite shall be constructed as a first step in earth disturbing activities. These measures shall be fully functional before any additional earth disturbances take place. These measures shall be maintained in functional condition until full stabilization of the earth disturbing activities has been completed.

620.3-2 Earthen sediment and erosion control structures must be stabilized (vegetative cover) within fifteen (15) days of installation.

620.4 Cut and Fill Slopes

Cut and fill slopes must be designed and constructed in a manner which will minimize erosion. Consideration must be given to the length and steepness of the slope, soil type, upslope drainage, subsurface conditions, and other applicable factors. Special consideration shall be given for the following conditions:

- (1) If any newly constructed slope meets or exceeds a horizontal to vertical ratio of 3:1.
- (2) Or, if any fill will be placed on an existing slope that meets or exceeds a horizontal to vertical ratio of 5:1.

Otherwise, adequate and appropriate slope stabilization measures shall be provided for all cut and fill areas.

620.5 Storm Sewer Inlet Protection

All storm sewer inlets which are made operable during construction should be protected so that sediment-laden stormwater will not enter the stormwater conveyance system without first being filtered to remove sediment. See Appendix B - Exhibit III for construction details, utilizing straw bales as inlet protection. This type of protection is used when low velocity (0.5 fps) sheet or overlands flow are expected.

620.6 Disposal of Temporary Erosion and Sediment Control Measures

620.6-1 All temporary erosion and sediment control measures shall be removed within thirty (30) days after final site stabilization is achieved as determined by the Clermont County Building Department or after temporary measures are no longer required as authorized by the CCBD.

620.6-2 Trapped sediment and other disturbed soil areas resulting from disposition of temporary measures shall be permanently stabilized to prevent further erosion and sedimentation.

620.7 Maintenance

Maintenance and repair of all temporary and permanent erosion and sediment control practices and or facilities as needed to assure continued performance of intended function shall be the responsibility of the developer and/or owner(s) until the development or project area is approved by the Clermont County Building Department and the development or project area is stabilized with all permanent cover to prevent erosion.

SECTION 630 EROSION AND SEDIMENT CONTROL DESIGN STANDARDS

630.1 Scope

The “Water Management and Sediment Control for Urbanizing Areas” manual will be used as a reference for all design criteria, procedures, policy, statements, and sample calculations shall be the basis for design, construction, and implementation of all sediment and erosion control systems, unless otherwise given or noted in these regulations.

630.2 Soil Stabilization Measures

630.2-1 Critical Area Definition

An area susceptible to erosion and sediment production, that requires special management to establish and maintain vegetation in order to

stabilize the soil.

630.2-2 Critical Area Planting or Seeding

- A. Temporary Seeding, See Appendix D - Exhibit I
- B. Permanent Seeding, See Appendix D - Exhibit I
- C. Dormant Seeding, See Appendix D - Exhibit I
- D. Mulching, See Appendix D - Exhibit I

630.2-3 Riprap (RR) Outlet Protection

- A. Riprap is primarily used to slow the velocity of concentrated runoff and to protect the soil surface from the erosive forces of concentrated runoff.
- B. The minimum thickness of the riprap layer shall be equal to 1.5 times the maximum stone diameter but not less than six inches.
- C. Design criteria for sizing the stone and determining the dimensions of the riprap pads used at the outlets of drainage structures is shown in Appendix C - Exhibit IV. Other design methods can be used upon approval by the Clermont County Building Inspection Department.

630.2-4 Non-erosive or “safe” velocities are as defined in the “Water Management and Sediment Control for Urbanizing Areas” manual in the technical standards section under Waterways, page 3.

630.3 **Runoff Control Measures**

630.3-1 Natural or constructed onsite stormwater open-channel conveyance systems shall be designed to carry the peak rate of runoff as defined in Section 530.2-2.

630.3-2 The design and necessity of other runoff control measures such as diversions and subsurface drainage, will be left to the discretion of the engineer subject to approval by the Clermont County Building Inspection Department.

630.4 **Sediment Control Measures**

630.4-1 If a temporary sediment basin is deemed necessary, a suitable maintenance plan outlining a procedure for sediment removal during construction shall be required on the final construction drawings. The procedure outlined in the SCS WMSC Manual is recommended.

630.4-2 Straw Bale Barriers (SBB)

- A.** The straw bale installation procedure is shown in Appendix B - Exhibit I (figures 1 - 3).
- B.** Straw bale barriers shall not be placed in drainage ways or swales that have more than two (2) acres of tributary drainage area.
- C.** Straw bales should be used when their effectiveness is required for less than three (3) months.
- D.** SBB should not be constructed in live swales or streams where the possibility of a washout exists.
- E.** See Appendix B - Exhibit Ia for additional construction notes.

630.4-3 Filter Barriers

- A.** The filter barrier installation procedure is shown in Appendix B - Exhibit II (Figures 1 and 2).
- B.** Filter barriers should be used when their expected life does not have to exceed three (3) months.
- C.** Flow rates through filter barriers are slower than those through straw bale barriers, but their filter efficiency is much higher.

630.4-4 Silt Fences

- A.** Silt fences have an expected life of six (6) months.
- B.** Silt fences are limited to sheet or overland flows because of their decreased permeability. They will trap more water behind them and cause structural failure of the fence if ponding becomes significant.
- C.** See Appendix B - Exhibit III and IIIa for construction details and placements notes.

ARTICLE 7.0 EASEMENTS, BONDS AND MAINTENANCE

SECTION 700 EASEMENTS

700.1 Drainage easements shall be provided for all stormwater conveyance systems, detention/retention structures, and drainage swales between lots, and shown on the final construction drawings and the record plat.

700.2 Drainage Easement Requirements

700.2-1 All drainage easements shall be of sufficient area to contain the facility plus allow adequate space for maintenance and repair operations. The drainage easement boundaries shall be determined by the design engineer and accepted following approval by the Clermont County Engineer's Office and the Clermont County Building Inspection Department. However, the following constraints are the acceptable minimums required:

- A.** A minimum drainage easement width equal to ten (10) feet for all stormwater conveyance systems.
- B.** The minimum easement for all detention or retention basins shall be the area defined by the one hundred (100) year storm elevation.

700.2-2 All drainage easements shall be located and labeled on the development (construction) drawings and the record plat(s) by a metes and bounds description

700.2-3 No structures or facilities shall be permitted within the drainage easement except those pertaining to the function of the WMSC facility.

700.2-4 Planting and seeding for detention basins and other WMSC facilities shall be limited to the "critical area planting" defined in Sections 210 and 630.2.

SECTION 710 PERFORMANCE/MAINTENANCE SURETY OR BOND

710.1 All water management and sediment control facilities that are directly related to the drainage of or from the roads, streets, alleys, ditches, sidewalks, or other such improvements located in a private development, in an unincorporated area of Clermont County, shall be included in the Performance/Maintenance Surety (bond) covered under Section IV, Parts A and B, of the "Engineering Rules and Regulations for Private Developments within the Unincorporated Areas of Clermont County, Ohio;" effective as of October 1, 1983.

SECTION 720 MAINTENANCE

720.1 The owner or developer shall maintain all WMSC facilities constructed and/or installed under the WMSC Permit and in accordance with Section 710.1. All WMSC facilities shall be maintained in designed working condition to meet the design standards and the requirements of these regulations. Failure to maintain the improvement or facility could result in action against both the surety and the owner/developer.

720.2 The maintenance responsibility stated in Section 720.1 shall be recorded on the deed for the property and on the record plat. Also, reference is to be made to the entity or individual(s) to be responsible for the maintenance.

720.3 Upon expiration of the Performance/Maintenance Surety Bond, the maintenance responsibility for the WMSC facilities contained within designated drainage easements shall revert to the individual(s) or group(s) of property owners. For additional information, see Section I, part D of the “Engineering Rules and Regulations for Private Developments within the Unincorporated Areas of Clermont County, Ohio.”

720.4 Petition for Permanent Maintenance of WMSC Facilities

720.4-1 Petition submittal procedure:

- A.** The Permanent Maintenance Petition shall be submitted to the Clermont County Building Inspection Department and the Clermont County Engineer’s Office at the preliminary “design” stage of the project.
- B.** Approval of the petition must then be granted by the Clermont County Engineer’s Office and the Clermont County Board of Commissioners.
- C.** Property tax assessments can then be charged to the individual lots that benefit from the drainage improvement or WMSC facility as predetermined by the Permanent Drainage Petition.

720.4-2 Approval for the permanent maintenance of WMSC facility or drainage improvement by the Clermont County Engineer’s Office shall be based on, but not limited to, the following factors:

- A.** The WMSC facility in question must be essential to the continued performance of the water management and sediment control plan

that was implemented at the time of development.

- B. When failure or reduced effectiveness of the WMSC facility shall adversely affect the health, safety, or welfare of the general public.
- C. When the WMSC facility in question is a benefit to or essential to the development as a whole or the general public.

720.4-3 Section 720.3 is included in these regulations as an outline, for a permanent maintenance petition submittal, for developers, owners, and their representatives. The Clermont County Board of Commissioners and the Clermont County Engineer's Office are to be contacted prior to submitting the petition.

720.5 Fiscal Provisions

720.5-1 In accordance with Section 6131.50 of the Ohio Revised Code, a general **Drainage Improvement Fund** shall be established by the Clermont County Engineer's Office and approved by the Clermont County Board of Commissioners for a development prior to the Clermont County Building Inspection Department's issuance of a Site Development Permit or a Building Permit. The Clermont County Board of Commissioners shall levy an assessment fee on each lot that will benefit from the permanent maintenance agreement. The amount of the assessment fee shall be determined by the owner/developer and subsequently approved or disapproved by the Clermont County Engineer's Office and the Clermont County Board of Commissioners.

720.5-2 The County Engineer may contract the maintenance work and pay these costs from the Drainage Improvement Fund.

**CLERMONT COUNTY
BUILDING INSPECTIONS DEPARTMENT**

WATER MANAGEMENT AND SEDIMENT CONTROL CCBD500

PERMIT APPLICATION FOR SITE DEVELOPMENT

Application Number

--	--	--	--	--

PROJECT NAME: _____

SUBDIVISION _____ Commercial/Industrial Park _____

No. of Lots _____ No. of Units _____

Total Area _____ (acres) Total Area _____ (acres)

PROJECT LOCATION: _____

Between: _____ and _____
(intersecting street) (intersecting street)

Village: _____ Township: _____

IDENTIFICATION: (address to include street no. and zip code)

Owner: _____ Phone: _____

Address: _____

Contractor: _____ Phone: _____

Address: _____

Plans/Calculations: _____ Phone: _____

Address: _____

FLOOD ZONE: Yes _____ No _____

FEES REQUIRED:

Preliminary Fee		Receipt No.	
Permit Fee		Receipt No.	
Total Fee		Total Due	

CERTIFICATION: I hereby certify that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and we agree to conform to the WMSC Regulations and all applicable laws of the State of Ohio and the County of Clermont.

owner/agent (print/type name) (date) (signature of)

CLERMONT COUNTY BUILDING INSPECTIONS DEPARTMENT

WSMC PROJECT DESCRIPTION FORM

CCBD510

Application No. _____ (To be supplied by CCBD)

Project Name _____

Project Location _____

Commercial Development _____ Subdivision _____ Residential _____

No. of units _____ No. of lots _____

Description of Proposed Work or Earth Disturbing Activities: _____

Description of Site Topography: _____

Existing Vegetation: _____

Existing Soil Types: _____

Are any hydric soils located on site? yes _____ no _____

Does any part of site classify as wetlands? yes _____ no _____

Total Area of Site: _____ (acres or sq. ft)

Area Graded/Stripped: _____ (acres or sq. ft)

Cut or Fill Required? yes _____ no _____

Cut Req'd _____ (cu. yds.) Fill Req'd _____ (cu. yds.)

Will any newly constructed slope exceed 3:1? yes _____ no _____

Will fill be placed on an existing slope of 5:1 or greater? yes _____ no _____

Will bare earth be exposed to erosion for more than 15 days after grading or stripping is complete?

yes _____ no _____

Description of Existing Drainage System: _____

Description of Proposed Drainage System: _____

Retention or Detention (please circle) Required? yes _____ no _____

If yes, briefly describe structure(s) proposed: _____

Define Adjacent Areas:

Natural Structures: _____

Man-made Structures: _____

Define Impervious Areas: _____

Total Impervious Area _____ (acres or sq. ft.)

Is any part of the subdivision or commercial development located in a floodway? yes _____ no _____

If yes, what provisions will be made to conform to the Clermont County Flood Damage Regulations? _____

Method of Analysis:

TR-55 _____ Other _____
Rational _____

Certification: I hereby certify that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and we agree to conform to the Water Management and Sediment Control Regulations and hereby authorize Clermont County Building Department employee(s) to enter the property to determine compliance with the water management and sediment control plan, regulations, building permit and all applicable laws of the State of Ohio and County of Clermont pertaining to water management and sediment control.

(Signature of Owner/Agent)

(Date)

PROJECT NARRATIVE

The project narrative can be used in place of the project description form and is recommended for some projects. The narrative should include the following information:

1. Project description that clearly defines the project.
2. Nature and purpose of the proposed earth disturbing activities.
3. Acreage of the overall development or project area, including all parcels, easements, and rights-of-way.
4. Description of the impervious areas to be installed or constructed in terms of acreage or square footage, whichever is appropriate.
5. Description of the existing site conditions including topography, vegetative cover, and drainage features.
6. Description of the off site adjacent areas including streams, ponds, lakes, building and structures, roads and bridges, etc., which may affect or be affected by the on site development.
7. Description of the on site soils (this would typically be included as part of the Data Resource Map on larger projects).
8. Erosion and sediment control measures to be constructed or installed, including “critical” areas requiring special attention during and after development, and temporary and permanent stabilization measures.
9. A brief description of the stormwater management systems that will be used to discharge the increased runoff into stable receiving outlets.
10. Identification and name, address and phone number of the plan designer (engineer), owner(s), and the person responsible for the development of the project area.

Note: Additional information may be required based on the characteristics of the proposed development.

CONSTRUCTION SEQUENCE

1. Clearing and grubbing for those areas necessary for the installation of erosion and sediment perimeter control measures.
2. Install erosion and sediment control measures.
3. Grading and Stripping of the remaining areas of the development site or project area.
4. Install stormwater management systems.
5. Temporary vegetative stabilization or erosion and sediment control measures.
6. Grading of roads, streets, or parking areas, etc.
7. Installation of all utilities.
8. Site construction.
9. Final grading, stabilization, and landscaping.
10. Removal of erosion and sediment control measures.

WMSC RESIDENTIAL SITE PLAN REQUIREMENTS

R-112.1 Plot (site) Plan

Drawn to scale and certified by an Professional Engineer or Surveyor, registered in the State of Ohio. The Plot Plan shall show the following:

1. The outline of the property showing all dimensions.
2. The proposed building or addition with distances to all property lines and other existing buildings on the property.
3. Show all walks and driveways.
4. The use of all structures proposed and existing.
5. The number of family units or housekeeping units.
6. All easements of record or proposed easements.
7. All stormwater management systems.
8. The limits of clearing, grading, excavation, or fill.
9. Show elevations above sea level for basement or lowest floor.
10. Show the approved drainage system from the downspout inlets to its outlet in a swale, street curb, or ditch, etc. Stormwater disposal and final grading shall comply with an approved subdivision plan, if any, and shall also comply with the WMSC Regulations as enforced by the CCBD.
11. Elevations of the existing and proposed grades at each corner of the proposed building and at each corner of the building site.
12. If property has sanitary sewer, show sanitary sewer line and sewer invert elevation at point of connection of building sewer. Sewer and water permit to be granted by the Clermont County Sewer District before a Building Permit can be issued or before construction is begun.
13. If property is to have onsite sewage disposal such information as may be required by the Clermont County General Health District must be included on the plot plan and a health permit must be issued before a building permit is granted or construction begun.
14. The driveway curb cut permit be issued by the Clermont County Engineer before a building permit is granted.

The following will require a plot plan as described above, but will not require certification by a registered Professional Engineer or Surveyor.

- (1) Additions or improvements: The cost of which does not equal or exceed fifty (50) percent of the market value of the original structure. Cost shall be confirmed by Building Official. See R-115.

- (2) Accessory Building: Any structure on the same lot with the main structure and of a nature customarily incidental and subordinate to the principle structure.

R-701.3 Roof Drainage

Gutters and Downspouts

All new houses and additions to existing houses shall have gutters and downspouts. Downspouts shall run to a collector. Collector shall run to an approved drainage system. Splash blocks shall not be approved.

R-701.4 Approved Drainage System

An approved drainage system refers only to ground water that may collect in the crawl space, or in the foundation drain tile, and rain water collected by gutters and downspouts. All such water shall be collected and carried by underground pipes of appropriate sizes to the front street ditch or gutter or to the rear, to a natural drain or swale on the owners property. There shall be no discharge of any such collector pipe on the side of the house between residences. Grading shall be done so that in all cases the grade shall slope away from the house. The natural ground drainage of the area shall not be impeded. It shall also be done, so spill off to adjoining property is not increased or the natural flow of stormwater changed. All approved drainage systems shall be shown on the plot (site) plan and approved by the Clermont County Building Department for conformance to the WMSC Regulations.

STRAW BALE PLACEMENT DETAILS

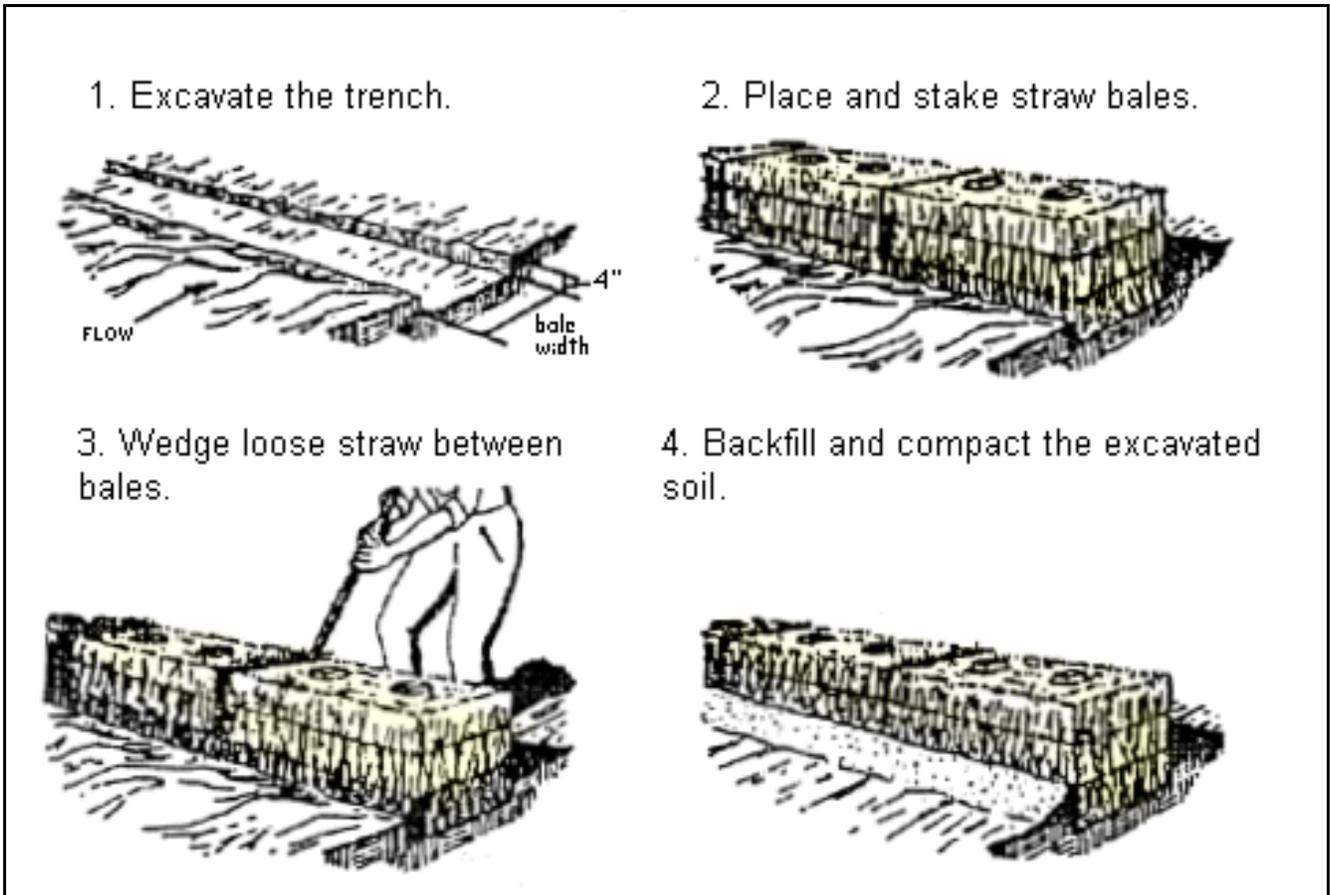


Figure 1

CONSTRUCTION OF A STRAW BALE BARRIER

STRAW BALE PLACEMENT DETAILS

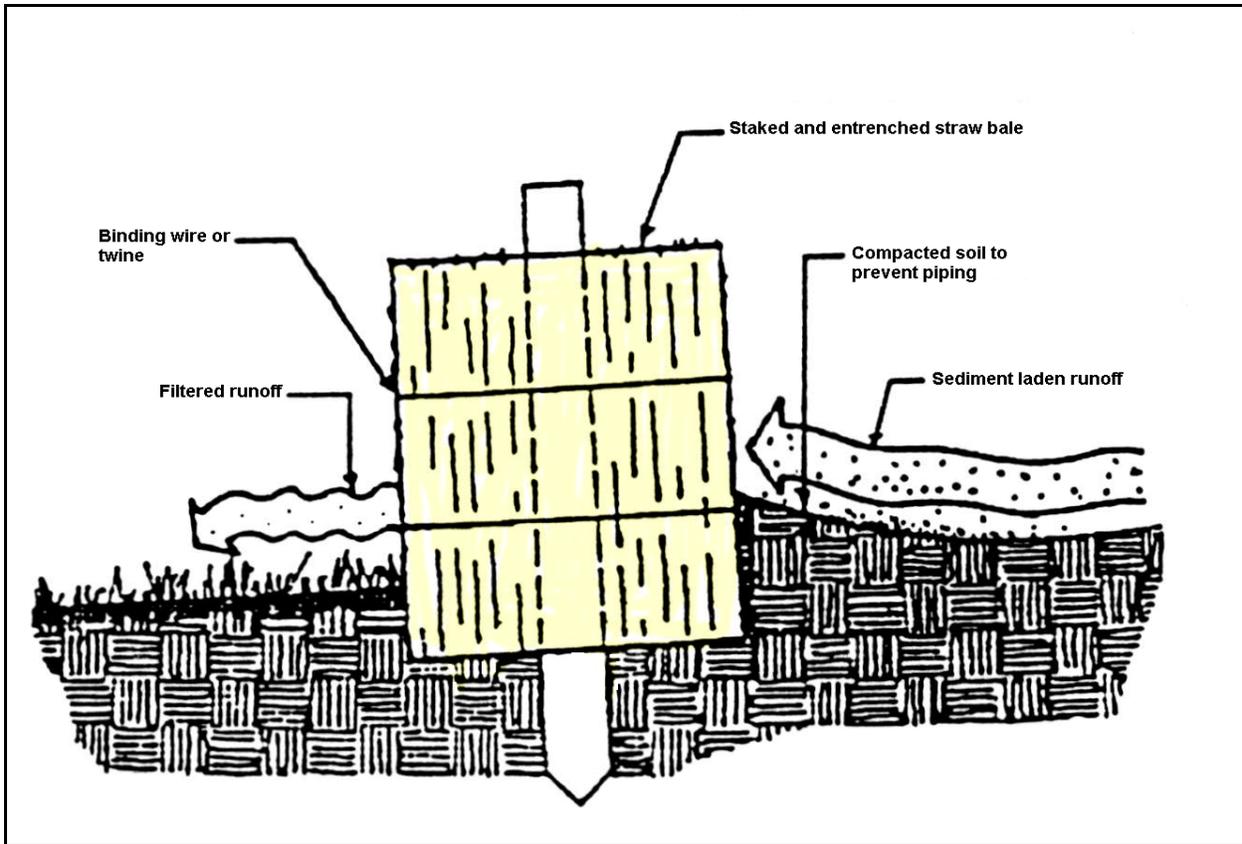


Figure 1

CROSS SECTION OF PROPERLY INSTALLED STRAW BALE

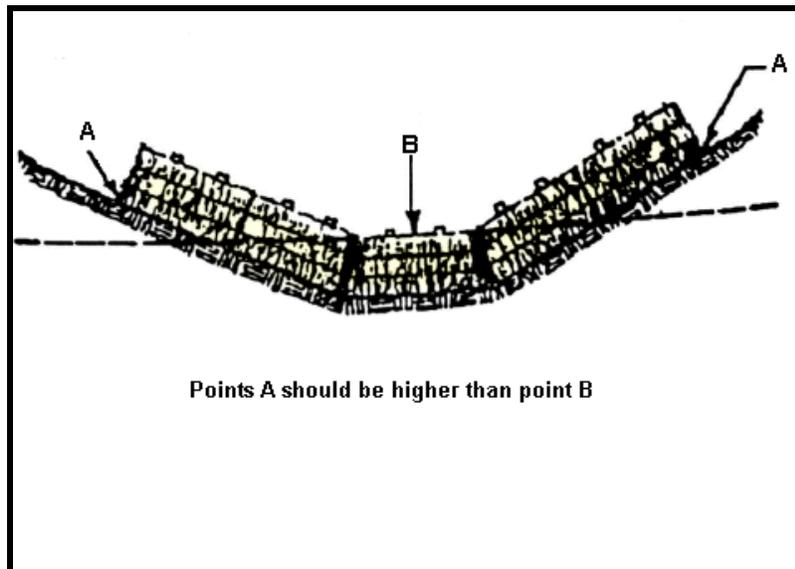


Figure 2

PLACEMENT OF STRAW BALE BARRIER IN DRAINAGE WAY

STRAW BALE PLACEMENT NOTES

I SHEET (OVERLAND) FLOW APPLICATIONS

1. Bales shall be placed in a single row, length on the contour, with both ends of adjacent bales tightly abutting one another.
2. All bales shall be either wire bound or string tied. Straw bales shall be installed so that the bindings are oriented around the sides rather than over and under the bales to prevent deterioration of the bindings.
3. The barrier shall be entrenched and backfilled. A trench shall be excavated the width of one bale and the length of the proposed barrier to minimum depth of four (4) inches. After the bales are staked and chinked, the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to four (4) inches against the uphill side of the barrier (see Appendix B - Exhibit I, page one and figure 1. on page two).
4. Each bale shall be securely anchored by at least two (2) stakes or rebars driven through the bale.
5. The gaps between the bales shall be chinked (filled by wedging) with loose straw to prevent runoff leakage between bales.

II CHANNEL FLOW APPLICATIONS

1. Bales shall be placed in a single row, lengthwise, oriented perpendicular to the contour, with adjacent bales tightly abutting one another.
2. See steps 2. through 6. for sheet flow applications.
3. The barrier shall be extended to such a length that the bottoms of the end bales are higher in elevation than the top of the lowest middle bale (Appendix B - Exhibit I, page 2 - figure 2).

III MAINTENANCE

1. Inspections shall be frequent and after each rainfall.
2. Close attention shall be paid to the repair of damaged bales, end runs, and the undercutting of barriers by runoff.
3. Sediment deposits must be removed when the level of deposition has reached approximately one-half the height of the barrier.
4. Any sediment deposits remaining in place after the straw bale barrier is no longer required shall be dressed to conform to the existing grade, prepared and seeded.

FILTER BARRIER PLACEMENT DETAILS

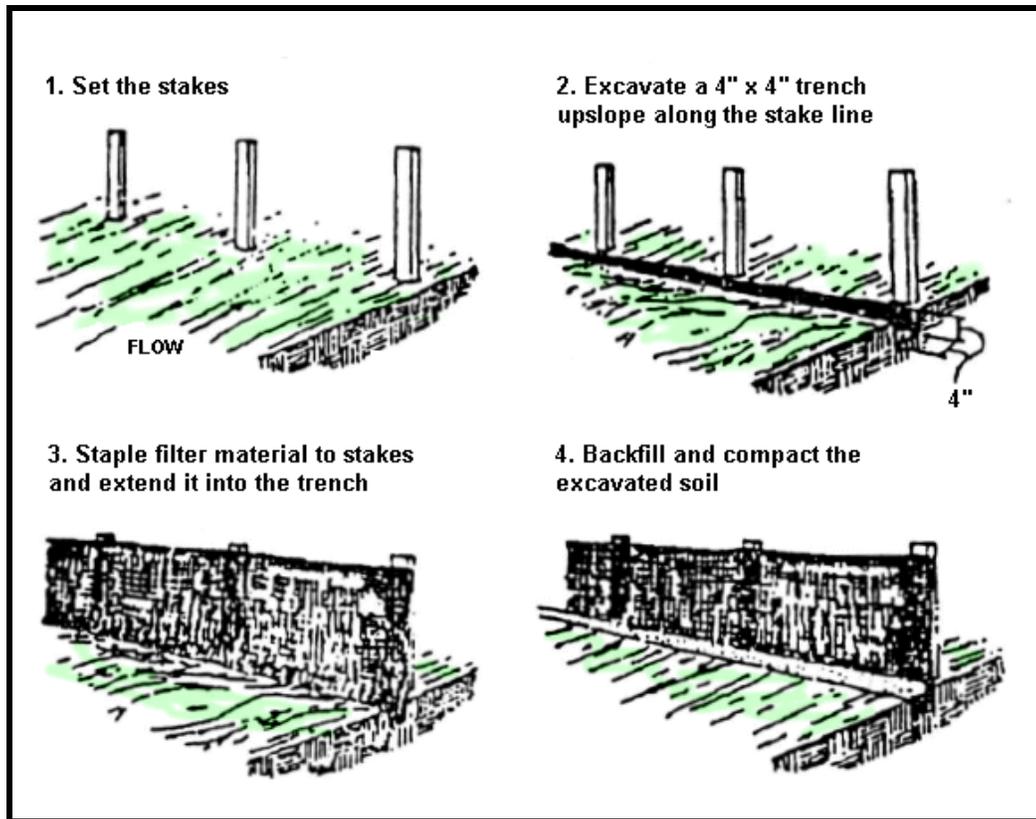


Figure 1

STAKED FILTER BARRIER CONSTRUCTION

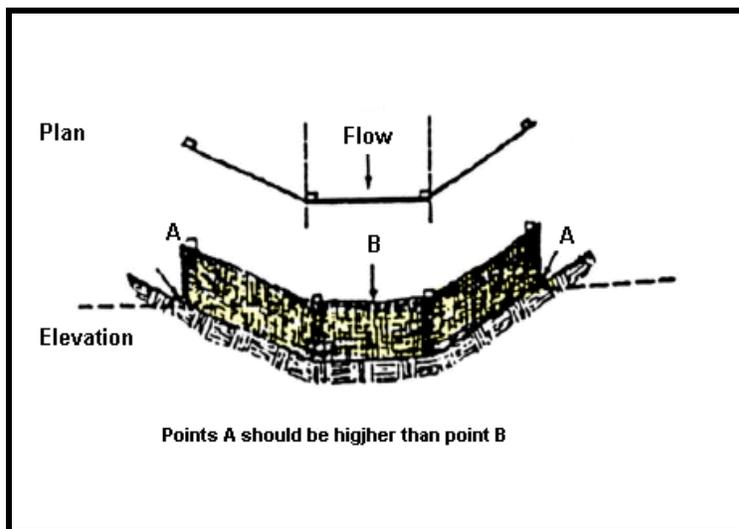


Figure 2

PLACEMENT OF STAKED FILTER BARRIER IN DRAINAGE WAY

FILTER BARRIER PLACEMENT NOTES

I FOR SHEET AND CHANNEL FLOW

1. The height of the filter barrier shall be at least fifteen (15) inches and no greater than eighteen (18) inches.
2. Burlap or standard strength filter fabric shall be purchased in a continuous roll to avoid joints.
3. Stakes for filter barriers shall be one inch by two inch (1" x 2") wood or equivalent metal with a minimum length of three (3) feet.
4. Maximum stake spacing shall be three feet.
5. A four inch by four inch (4" x 4") trench along the line of stakes and upslope from the barrier.
6. The filter material is extended into the trench.
7. The trench shall be backfilled and the soil compacted over the filter material (see Appendix B - Exhibit II, page 1, figure 1).
8. If a filter barrier is to constructed across a ditch line or swale, the barrier shall be of sufficient length to eliminate end flow, and the plan configuration shall resemble an arc or horseshoe (see Appendix II - page 1, figure 2) with the ends oriented upslope.

II MAINTENANCE

1. Filter barriers shall be inspected after each rainfall.
2. Sediment removal shall occur when the deposits reach approximately one-half the height of the barrier.
3. Any sediment deposits remaining in place after the filter barrier is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

SILT FENCE PLACEMENT DETAILS

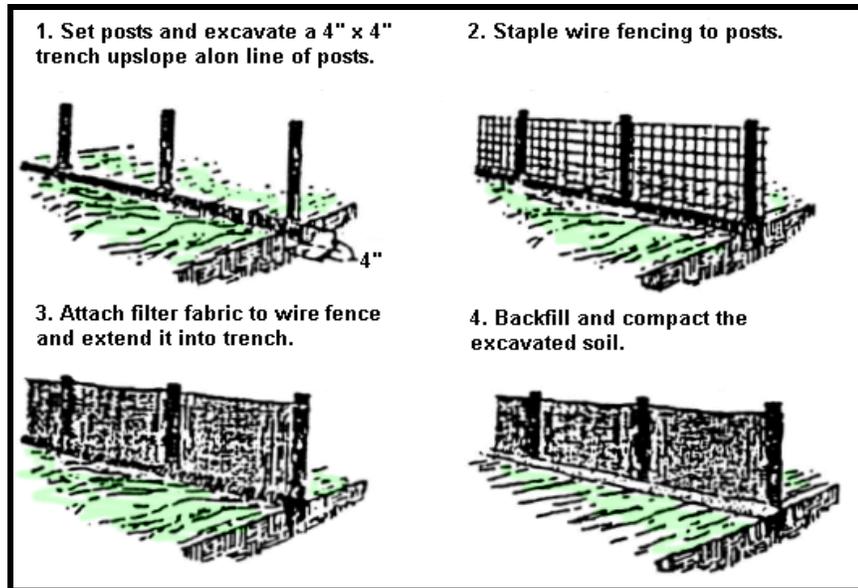


Figure 1

POSTED SILT FENCE CONSTRUCTION

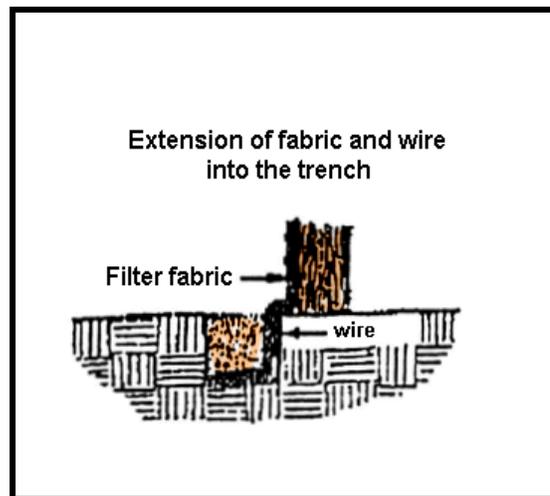


Figure 2

SECTION THROUGH TRENCH

SILT FENCE PLACEMENT NOTES

I FOR SHEET OR OVERLAND FLOW ONLY

1. The height of the silt fence shall not exceed thirty-six (36) inches.
2. Burlap or standard strength filter fabric shall be purchased in a continuous roll to avoid joints. A six inch lap is required at a post for all necessary joints.
3. Stakes for silt fences shall be four (4) inches diameter wood or 1.33 lbs/lin ft. steel with a minimum length of five (5) feet.
4. Maximum post spacing shall be ten (10) feet when wire support fence is used and a maximum of six (6) feet when no wire support is used.
5. A four inch by four inch (4" x 4") trench along the line of stakes and upslope from the barrier.
6. When standard strength fabric is used, with standard post spacing, a wire support fence shall be used and must be extended into the trench a minimum of two (2) inches.
7. When extra-strength fabric is used in conjunction with closer post spacing the fabric can be stapled directly to the posts with eight (8) inches of fabric extending into the trench.
8. The trench shall be backfilled and the soil compacted over the filter material (see Appendix B - Exhibit III, figures 1 and 2).

II MAINTENANCE

1. Silt fences shall be inspected after each rainfall.
2. Sediment removal shall occur when the deposits reach approximately one-half the height of the silt fence.
3. Any sediment deposits remaining in place after the silt fence is no longer required shall be dressed to conform with the existing grade, prepared and seeded.

STORM DRAIN INLET PROTECTION

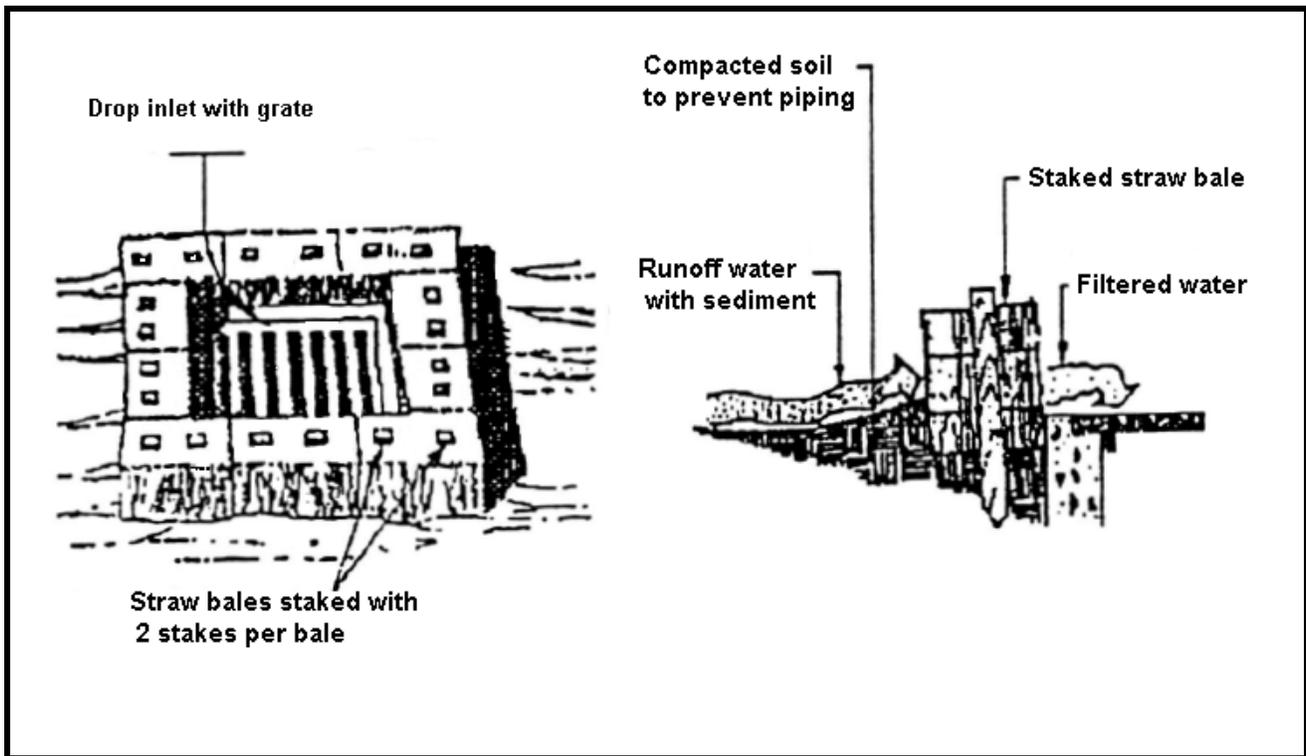


Figure 1

STRAW BALE DROP INLET SEDIMENT FILTER

This method of inlet protection is applicable where the inlet drains a relatively flat area (slopes no greater than five (5) percent) where sheet or overland flows (not exceeding 0.5 cfs) are typical.

STORM DRAIN (STRAW BALE) INLET PROTECTION NOTES

I CONSTRUCTION SPECIFICATIONS

1. Bales shall be either wire bound or string-tied with the bindings oriented around the side rather than over and under the bales.
2. Bales shall be placed lengthwise in a single row surrounding the inlet (see Appendix B - Exhibit IV, figure 1), with the ends of adjacent bales pressed together.
3. The inlet protection shall be entrenched and backfilled. A trench shall be excavated around the inlet the width of a bale to minimum depth of four (4) inches. After the bales are staked, the excavated soil shall be backfilled and compacted against the straw bales.
4. Each bale shall be securely anchored and held in place by at least two stakes or rebar driven through the bale.
5. Loose straw shall be wedged between bales to prevent runoff from entering between bales.

II MAINTENANCE

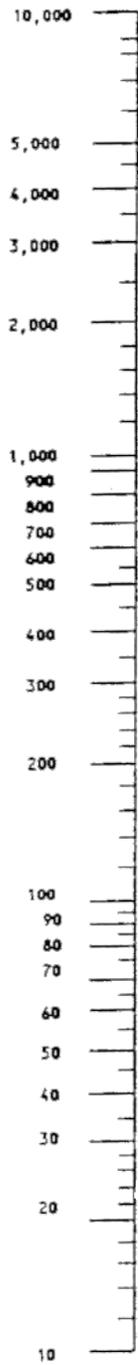
1. The structure shall be inspected after each rain and the necessary repairs made.
2. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one-half the design depth of the trap.
3. Structures shall be removed and the area stabilized when the remaining drainage area has been properly stabilized.

OVERLAND FLOW CHART

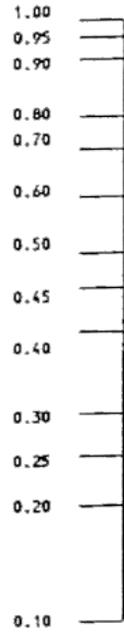
SLOPE LENGTH (FEET)

PIVOT LINE

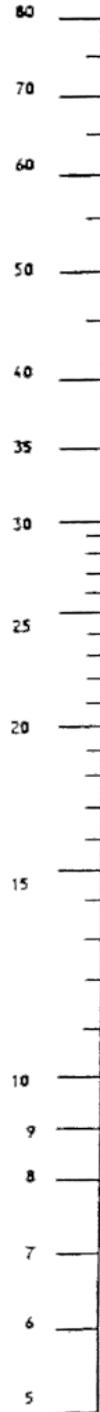
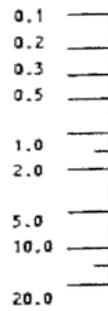
TIME OF CONCENTRATION, t,



RUNOFF COEFFICIENT, C



GRADIENT OF SLOPE
(IN PERCENT)



Worksheet 2: Runoff curve number and runoff

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

1. Runoff curve number (CN)

Soil name and hydrologic group (Appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN <u>1/</u>			Area <input type="checkbox"/> acres <input type="checkbox"/> mi ² <input type="checkbox"/> %	Product of CN % area
		Table 2-2	Fig. 2-3	Fig. 2-4		
<u>1/</u> Use only one CN source per line				Totals =		

CN (weighted) = total product/total area = _____ = _____; Use CN =

2. Runoff

Frequency.....yr
 Rainfall, P (24-hour)in
 Runoff, Qin
 (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)

Storm #1	Storm #2	Storm #3

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

Circle one: T_c T_t _____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (applicable to T_c only)

	Segment ID			
1. Surface description (table 3-1)				
2. Manning's roughness coeff., n (table 3-1).....				
3. Flow length, L (total L ≤ 300 ft)		ft		
4. Two-yr 24-hr rainfall, P ₂		in		
5. Land slope, s		ft/ft		
6. $T_t = 0.007(nL)^{0.8}/P_2^{0.5}S^{0.4}$	Compute T _t ...hr		+	= <input type="text"/>

Shallow concentrated flow

	Segment ID			
7. Surface description. (paved or unpaved)				
8. Flow length, L		ft		
9. Watercourse slope, s		ft/ft		
10. Average velocity V (figure 3-1)		ft/s		
11. $T_t = L/360V$	Compute T _thr		+	= <input type="text"/>

Channel flow

	Segment ID			
12. Cross sectional flow area, a		ft ²		
13. Wetted perimeter, P _w		ft		
14. Hydraulic radius, $r = a/P_w$ Compute r		ft		
15. Channel slope, s		ft/ft		
16. Manning's roughness coeff., n				
17. $V = 1.49 r^{2/3} s^{1/2} / n$	Compute V ..ft/s			
18. Flow length, L		ft		
19. $T_t = L/3600V$	Compute T _t hr		+	= <input type="text"/>
20. Watershed or subarea T _c or T _t (add T _t in steps 6, 11 and 19)				<input type="text"/>

Worksheet 4: Graphical Peak Discharge method

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

1. Data:

Drainage area $A_m =$ _____ mi^2 (acres/640)

Runoff curve number $CN =$ _____ (From worksheet 2)

Time of concentration $T_c =$ _____ hr (From worksheet 3)

Rainfall distribution type = _____ (I, II, III)

Pond and swamp areas spread throughout watershed..... = _____ percent of A_m (____ acres or mi^2 covered)

		Storm #1	Storm #2	Storm #3
2. Frequency	yr			
3. Rainfall, P (24-hour)	in			
4. Initial abstraction, I_a	in			
(Use CN with table 4-1.)				
5. Compute I_a/P				
6. Unit peak discharge, q_u	cs/in			
(Use T_c and I_a/P with exhibit 4 - ____)				
7. Runoff, Q	in			
(From worksheet 2).				
8. Pond and swamp adjustment factor, F_p				
(Use percent pond and swamp area with table 4-2. Factor is 1.0 for zero percent pond and swamp area.)				
9. Peak discharge, q_p	cfs			
(Where $q_p = q_u A_m Q F_p$)				

Worksheet 5b: Tabular hydrograph discharge summary

Project _____ Location _____ By _____ Date _____

Circle one: Present Developed _____ Frequency (yr) _____ Checked _____ Date _____

Subarea name	Basic watershed data used ^{1/}			Select and enter hydrograph times in hours from exhibit 5- ^{2/}															
	Sub-area T _c (hr)	$\sum T_t$ to outlet (hr)	I _a /P	A _m Q (mi ² -in)															
				Discharges at selected hydrograph times ^{3/} ------(cfs)-----															
Composite hydrograph at outlet																			

Appendix C - Exhibit II (D-6 of D-8)

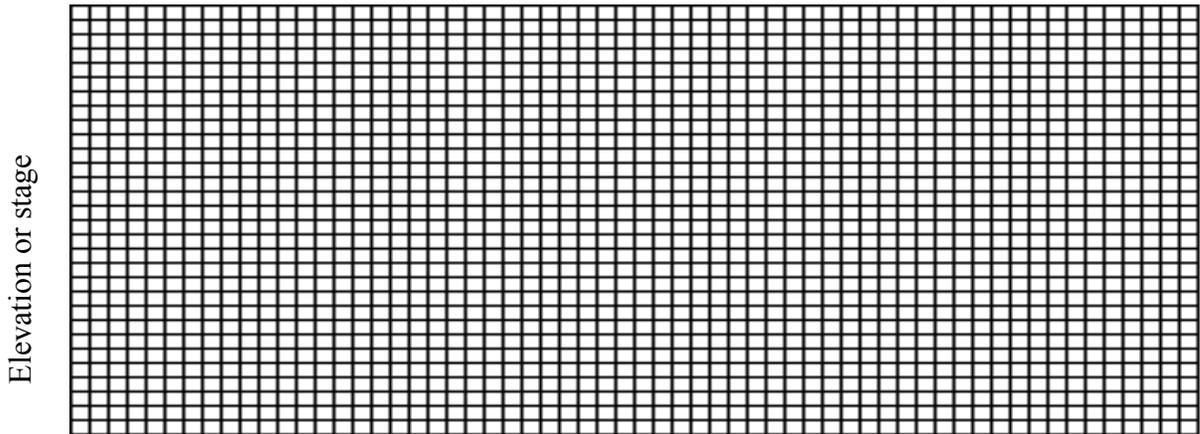
- ^{1/} Worksheet 5a. Rounded as needed for use with exhibit 5.
- ^{2/} Enter rainfall distribution type used.
- ^{3/} Hydrograph discharge for selected times in A_mQ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 6a: Detention basin storage,
peak outflow discharge (q_o) known

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____



Detention basin storage

- | | | | | | | | |
|--|--|--------------------------|--------------------------|---|---|--|--|
| <p>1. Data:
 Drainage area
 Rainfall distribution
 Type (I, IA, II, III)</p> | <p>$A_m =$ _____ mi^2
 = _____</p> <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="padding: 5px;">1st
stage</td> <td style="padding: 5px;">2nd
stage</td> </tr> </table> | 1 st
stage | 2 nd
stage | <p>6. V_s/V_r
 (Use q_o/q_i with figure 6-1)</p> | <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> | | |
| 1 st
stage | 2 nd
stage | | | | | | |
| | | | | | | | |
| <p>2. Frequencyyr</p> | <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="width: 50%; height: 20px;"></td> <td style="width: 50%; height: 20px;"></td> </tr> </table> | | | <p>7. Runoff, Q in
 (From worksheet 2)</p> | <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> | | |
| | | | | | | | |
| | | | | | | | |
| <p>3. Peak inflow discharge
 q_icfs
 (from worksheet 4 or 5b)</p> | <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="width: 50%; height: 20px;"></td> <td style="width: 50%; height: 20px;"></td> </tr> </table> | | | <p>8. Runoff volume,
 V_r ac-ft
 ($V_r = QA_m 53.33$)</p> | <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> | | |
| | | | | | | | |
| | | | | | | | |
| <p>4. Peak outflow discharge,
 q_ocfs</p> | <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="width: 50%; height: 20px;"></td> <td style="width: 50%; height: 20px;"></td> </tr> </table> | | | <p>9. Storage volume,
 V_s ac-ft
 ($V_s = V_r (V_s/V_r)$)</p> | <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> | | |
| | | | | | | | |
| | | | | | | | |
| <p>5. Compute q_o / q_i</p> | <table border="1" style="margin-left: auto; margin-right: auto; text-align: center;"> <tr> <td style="width: 50%; height: 20px;"></td> <td style="width: 50%; height: 20px;"></td> </tr> </table> | | | <p>10. Maximum stage ,
 (From plot)</p> | <table border="1" style="width: 100%; height: 20px;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;"></td> </tr> </table> | | |
| | | | | | | | |
| | | | | | | | |

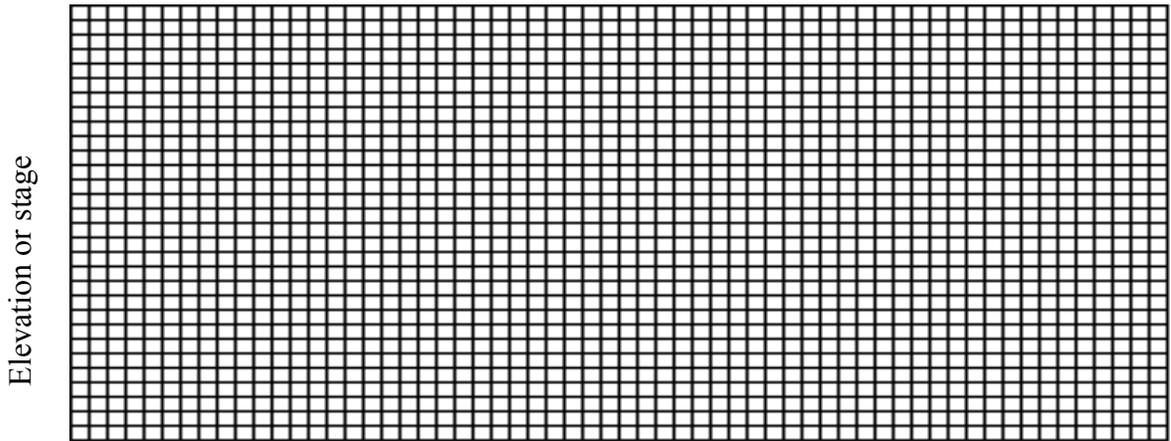
1/ 2nd stage q_o includes 1st stage q_o

Appendix C - Exhibit II (D7 of D8)
 Worksheet 6b: Detention basin, peak outflow,
 storage volume (V_s) known

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____



Detention basin storage

1. Data:
 Drainage area
 Rainfall distribution
 type (I, IA, II, III)

$A_m =$ _____ mi²
 = _____

1 st stage	2 nd stage
--------------------------	--------------------------

2. Frequency..... yr

--	--

3. Storage volume,
 V_s ac ft

--	--

4. Runoff, Q in

--	--

 (From worksheet 2)

5. Runoff volume,
 V_r ac ft

--	--

 ($V_r = QA_m 53.33$)

6. Compute V_s/V_r

--	--

7. q_o/q_i in

--	--

 (Use V_s/V_r and figure 6-1)

8. Peak inflow discharge,
 q_i cfs

--	--

 (From worksheet 4 or 5b)

9. Peak outflow discharge,
 q_o cfs

--	--

 ($q_o = q_i (q_o/q_i)$)

10. Maximum stage,
 (From plot) E_{max}

--	--

1/ 2nd stage q_o includes 1st stage q_o

Appendix C - Exhibit II (D8 of D8)

DETENTION BASIN STORAGE DESIGN

I Calculate the peak flow in cfs due to the two year frequency storm under predeveloped conditions.

$$q_2 = A * C * i \quad (\text{allowable detention basin outflow release rate - stage one})$$

$$\text{Area, "A"} = [\text{_____}] \text{ acres}$$

$$\text{Runoff Coefficient, "C"} = [\text{_____}]$$

$$\text{Intensity, "i"} = a / (t_c + b) = [\text{_____}] \text{ in/hr}$$

$$\text{Where:} \quad a = 106 \text{ (Table IV)}$$

$$b = 17 \text{ (Table IV)}$$

t_c = time of concentration (minutes) as determined from Appendix C - Ex. I or other acceptable means.

$$q_2 = A [\text{_____}] * C [\text{_____}] * i [\text{_____}] = [\text{_____}] \text{ cfs}$$

II Calculation for the two year frequency storm under postdevelopment conditions.

$$Q_2 = A * C * i$$

$$\text{Area, "A"} = [\text{_____}] \text{ acres}$$

$$\text{Runoff Coefficient, "C"} = [\text{_____}]$$

$$\text{Intensity, "i"} = a / (t_c + b) = [\text{_____}] \text{ in/hr}$$

$$\text{Where:} \quad a = 106$$

$$b = 17$$

t_c = time of concentration (in minutes)

$$Q_2 = A [\text{_____}] * C [\text{_____}] * i [\text{_____}] = [\text{_____}] \text{ cfs}$$

III Critical storm calculation.

$$[(Q_2 / q_2) - 1.0] * 100 = PC \quad Pc = [\text{_____}] \text{ (see Table II on page 29)}$$

IV Calculate maximum storm duration, T_{ccr} , for the critical storm frequency (in minutes).

$$T_{\text{ccr}} = \left[\frac{(A * C * a * b)}{(2 * q_2 / 3) - [(q_2^2 * t_c) / (6 * C * A * a)]} \right]^{1/2} - b$$

Appendix C - Exhibit III (1 of 4)

Where: a = determined from Table IV (for critical storm frequency)

b = determined from Table IV (for critical storm frequency)

C = the two year postdeveloped weighted runoff coefficient

A = area in acres

$$T_{cr} = [\text{_____}] \text{ minutes}$$

IV Calculate I_{cr} :

$$I_{cr} = [a / (T_{cr} + b)] = [\text{_____}] \text{ in/hr}$$

V Calculate Q_{cr} , flow at maximum duration for the critical storm frequency:

$$Q_{cr} = A [\text{_____}] * C [\text{_____}] * I_{cr} [\text{_____}] = [\text{_____}] \text{ cfs}$$

VI Calculate the required storage volume due to critical storm criteria, SV_{cr} :

$$SV_{cr} = (60 * Q_{cr} * T_{cr}) - \{ [2 * q_2 * (T_{cr} + t_c) * 60] / 3 \} + [(q_2^2 * t_c * 60) / (6 * Q_{cr})]$$

$$SV_{cr} = [\text{_____}] \text{ ft}^3$$

VII Calculate the peak flow in cfs due to the one-hundred year frequency storm under predeveloped conditions.

$$q_{100} = A * C * i \text{ (allowable detention basin outflow release rate - stages one + two)}$$

$$\text{Area, "A"} = [\text{_____}] \text{ acres}$$

$$\text{Runoff Coefficient, "C"} = [\text{_____}]$$

$$\text{Intensity, "i"} = a / (t_c + b) = [\text{_____}] \text{ in/hr}$$

$$\text{Where: } a = 290 \text{ (Table IV)}$$

$$b = 31 \text{ (Table IV)}$$

t_c = time of concentration (minutes) as determined from Appendix C - Ex. I, for predeveloped

$$q_{100} = A [\text{_____}] * C [\text{_____}] * i [\text{_____}] = [\text{_____}] \text{ cfs}$$

VII Calculate maximum storm duration T_{c100} , for the one-hundred year frequency (in minutes) storm under postdeveloped conditions.

Appendix C - Exhibit III (2 of 4)

$$T_{c100} = \left[\frac{(A * C * a * b)}{(2 * q_{100} / 3) - [(q_{100}^2 * t_c) / (6 * C * A * a)]} \right]^{1/2} - b$$

Where: a = 290

b = 31

c = the one-hundred year postdeveloped weighted runoff coefficient

A = area in acres

T_{c100} = [_____] minutes

VIII Calculate I_{100} :

$$I_{100} = [a / (T_{c100} + b)] = [\text{_____}] \text{ in/hr}$$

IX Calculate Q_{100} ; the flow at maximum duration for the one-hundred year storm frequency.

$$Q_{100} = a [\text{_____}] * C [\text{_____}] * I_{100} [\text{_____}] = [\text{_____}] \text{ cfs}$$

X Calculate SV_{100} ; the storage volume required due to the one-hundred year storm.

$$SV_{100} = (60 * Q_{100} * T_{c100}) - \{ [2 * q_{100} * (T_{c100} + t_c) * 60] / 3 \} + [(q_{100}^2 * t_c * 60 / (6 * Q_{100}))]$$

XI Design Notes:

1. Design as a **two stage** outlet

1. An iterative process is required since the change in elevation head will cause an increase in the outflow of the stage one opening.

2. Two detention areas can be used to eliminate the iterative two stage outlet design process.

3. If a one stage outlet is to be used that cannot detain the 100 year storm and release at the 2 year predeveloped rate, explain reasoning.

2. Emergency overflow must be accounted for via a spillway or other means.

General Notes:

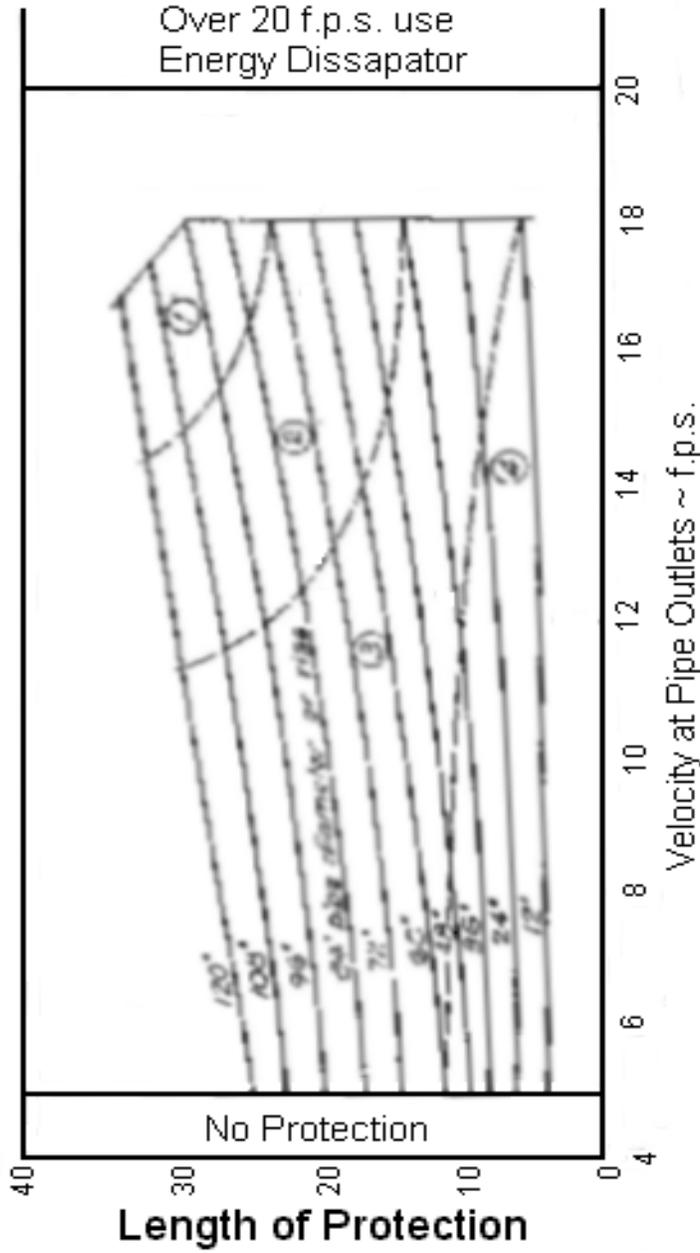
1. The formulas used in calculations III through VI assume an orifice controlled outflow condition.

Appendix C - Exhibit III (3 of 4)

2. Reference pages 98 and 99, Water and Wastes Engineering, "Estimate Detention and Reservoir Storage". By A. S. Paintal, P.E., Ph.D.

RO
K
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Rock Channel Protection at Culvert and Storm Sewer Outlets



Notes

Rock size (6", 12", 18") indicates the square opening on which 85% of the material by weight will be retained.

Minimum width of protection shall be twice the pipe diameter, with 4" being the very minimum.

(Where a stream bed will withstand the calculated velocity without erosion, no rock channel protection will be required.)

Legend	Rock Type
1. 48" of 18" rock	A
2. 36" of 18" rock	A
3. 30" of 12" rock	B
4. 18" of 6" rock	C

R
C
C
O
O
L
Z
C
C

Appendix C - Exhibit IV

CRITICAL AREA PLANTING

1. TEMPORARY AND PERMANENT SEEDING

1.1 SEEDBED PREPARATION

A. Lime (in lieu of a soil test recommendation) on acid soil (ph = 5.5 or less) and subsoil at a rate of 100 pounds per 1000 sq. ft. or two (2) tons per acre of agricultural ground limestone.

B. Fertilizer (in lieu of soil test recommendation) shall be applied at a rate of 12-15 pounds (25 pounds for permanent seeding) per 1000 sq. ft. of 10-10-10 or 12-12-12 analysis or equivalent.

1.2 SEEDING

A. Species Selection

(1) Temporary Seeding Mixture

<u>Seeding Period</u>	<u>Type</u>	<u>Rate (1000 ft²)</u>
Spring and	1. Oats	3 lbs
Summer	2. Peren. Ryegrass	1 lbs
	3. Tall Fescue	1 lbs
Fall	1. Peren. Ryegrass	1 lbs
	2. Rye	3 lbs
	3. Wheat	3 lbs
	4. Tall Fescue	1 lbs

(2) Permanent Seeding Mixture

<u>Seeding Period</u>	<u>Type</u>	<u>Rate (1000 ft²)</u>
Spring,	1. Creeping Red Fescue	0.5 lbs

Summer, and	Domestic Ryegrass	0.25 lbs
Fall	Kentucky Bluegrass	0.25 lbs
	2. Tall Fescue	1 lbs
	3. Dwarf Fescue	1 lbs

Appendix D - Exhibit I (1 of 3)

(2-1) Seedings for Steep Banks or Cuts

Spring,	1. Tall Fescue	1 lbs
Summer, and		
Fall	2. Crownvetch	0.25 lbs
	Tall Fescue	0.50 lbs
	3. Flatpea	0.50 lbs
	Tall Fescue	0.50 lbs

(2-2) Seedings for Waterways and Road Ditches

Spring,	1. Tall Fescue	1 lbs
Summer, and		
Fall		

- B. Apply the seed uniformly with a cyclone seeder, drill, cultipacker seeder, or hydroseeder (slurry may include seed and fertilizer) preferably on a firm, moist seedbed. Seed wheat or rye no deeper than one (1) inch. Seed ryegrass no deeper than one quarter (1/4) of an inch.
- C. When feasible, except where a cultipacker type seeder is used, the seedbed should be firmed following seeding operations with a cultipacker, roller, or light drag. On sloping land seeding operations should be on the contour wherever possible.
- D. Other seed species may be substituted for these mixtures.
- E. These seeding rates need to be increased two to three times if they are to be used as a lawn.

2. DORMANT SEEDING

- A. Temporary Seeding - After November 1, use mulch only.

- B. Permanent Seeding - Seedlings should not be planted from October 1 through November 20. The following methods may be used to make a “dormant seeding”:
- (1) From October 1 through November 20, prepare the seedbed, add the required amounts of lime and fertilizer, then mulch and anchor. After November 20, and before March 15, broadcast the selected seed mixture. Increase the seeding rates by 50 percent for this type of seeding.
 - (2) From November 20 through March 15, when soil conditions, permit, prepare the seedbed, lime and fertilize, apply the selected seed mixture, and

Appendix D - Exhibit I (2 of 3)

mulch and anchor. Increase the seeding rates by 50 percent for this type of seeding.

3. MULCHING

- A. Mulch shall consist of small grain straw (preferably wheat or rye) and shall be applied at the rate of two tons per acre or 100 pounds per 1000 sq. ft.
- B. Spread the mulch uniformly by hand or mechanically so the soil surface is covered.
- C. **Mulch Anchoring Methods**
 - (1) Mechanical - Use a disk, crimper, or similar type tool set straight to punch or anchor the mulch material into the soil.
 - (2) Asphalt Emulsion - Apply at the rate of 160 gallons per acre into the mulch as it is being applied.
 - (3) Mulch Netting - Use according to the manufacturer’s recommendations.

4. IRRIGATION

Supply new seedlings with adequate water for plant growth until they are firmly established.

Appendix D - Exhibit I (3 of 3)
CLERMONT COUNTY

WATER MANAGEMENT and SEDIMENT CONTROL REGULATIONS

APPLICATION FOR VARIANCE

Log No. _____

Project Location: _____
(Street No. and Name) (City)

Variance Requested: _____

Grounds for Request: _____

Supporting Facts: _____

Level of Performance Sought: _____

Attach copies of Description of Project, and Permit Application or Plan Submittal.

Check Appropriate Boxes:

- Individual Landowner (agent is landowner)
- Corporation (agent is principal executive officer)
- Partnership (agent is a general partner)
- Sole Proprietorship (agent is proprietor)
- Governmental Unit

(Signature of agent) (Date) (Signature of Owner) (Date)

Approval Status:

- Approved
- Not Approved
- Conditional Approval (see attached sheets)

Basis: _____

Variations do not become effective until approved as part of or as a revision to a permit.

(Signature of District Administrator) (Date)
Rev 8/90

Appendix E - Exhibit I