

Article IX
DRAINAGE DESIGN STANDARDS

900 PURPOSE

These design standards and supplemental specifications shall serve as the minimum requirements for the handling of surface water and drainage from both on-site and off-site areas. These standards and supplemental specifications shall govern the development of all new and/or modified drainage systems. The development of such drainage systems shall include the conveyance of surface water to an adequate outlet that is capable of carrying the flow. The Professional Engineer's highest design priority shall be to eliminate the possibility of loss of life or any major loss of property.

901 ADEQUATE DRAINAGE OUTLET

Surface water runoff from a development shall be drained offsite in accordance with this article to an adequate outlet(s). The County Engineer shall approve the location of the outlet(s). The outlet(s) may consist of a ditch, stream, storm sewer, retention/detention basin, etc., having sufficient capacity to accommodate the surface water runoff in a reasonable manner. The Owner shall submit with the Preliminary Engineering Plan written evidence indicating the adequacy of the outlet(s) to at least (and through) the first drainage structure offsite of the proposed improvement. The County Engineer shall review and determine the adequacy of the drainage outlet and reserves the right to require the outlet(s) to be cleaned, reconstructed and/or replaced as deemed necessary.

If a ditch, stream, etc. is desired as an outlet, the County Engineer shall require flow line elevations for the stream, ditch, etc. to be taken a minimum of 500 feet downstream of the anticipated outlet point to insure adequate fall/slope is available. This data shall be submitted to the County Engineer with the Preliminary Engineering Plan submittal. A minimum channel slope of 0.24% with a minimum 5 year storm velocity of 2.0 fps is required. A minimum of 12" of freeboard (measured from the outlet pipe flowline to the ditch flow line) is desired at the proposed outlet structure. If a buried structure, pipe, etc. is being proposed as the drainage outlet, it shall be cleaned, video-taped/camera, and mandreled at the discretion of the County Engineer. The County Engineer shall be contacted a minimum of two business days prior to any of this work being done.

An adequate outlet is defined as an outlet functioning as designed (e.g. able to convey the 2-year storm with the 10-year hydraulic grade line not exceeding the top of grate elevation for storm sewers; 10-year storm

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elevation not exceeding the top of bank elevation for open channels), and able to carry the existing flows as well as the proposed flows in the post development condition. Even though the discharge rate is controlled to the two-year storm, these are often concentrated flows.

The lack of not meeting any of the requirements mentioned above shall be cause for disapproval of the plan.

902 DRAINAGE EASEMENT

- A. An adequate easement shall be required along any subsurface drainage tile, detention/retention basin, drainage way, ditch, watercourse, stream, storm sewer, etc. that is not already within the street right-of-way. The easement shall be of sufficient width to allow cleaning, widening, deepening and replacing or otherwise general maintaining of such drainage course.

Easements for flood routes shall be established to one (1) foot above the 100-year storm elevation.

- B. When it is required to convey subsurface drainage or surface water outside the limits of the proposed improved area in order to discharge into an approved adequate outlet, it shall be the responsibility of the Owner to obtain easements or rights-of-way for construction and maintenance of said drainage course. These easements shall be submitted to the County Engineer and recorded prior to approval of the Final Engineering and Construction Plan.
- C. All drainage easements shall be shown on the final plat and the Final Engineering and Construction Plan. The drainage easements shall be recorded for public use, and the maintenance of such drainage courses shall be the responsibility of the property owners receiving direct benefit therefrom, unless otherwise provided (e.g. County Drainage Maintenance Program, See Section 904 G and the Supplemental Specifications to these Standards). For any easement shown on the Final Engineering and Construction Plan that contains a storm sewer, the storm sewer rights are senior to the rights of any other public or private utility or interest utilizing the easement. Should access be granted for a utility, the disturbed area must be restored to its original condition. Any cost associated with the damage, repair, replacement or relocation of

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any buried or above ground facility or structure that is necessary to allow the maintenance, repair or replacement of the storm sewer, will be the responsibility of the owner of said utility, facility, or structure. When maintenance, repair or replacement of a storm sewer causes the removal of any trees, plantings, landscaping, fence or decorative feature located within the easement, the replacement and cost of said items shall be responsibility of the owner of the underlying property or homeowner's association if applicable. Drainage easement widths shall conform to the Supplement Specifications of these Standards.

- D. Where no direct access is provided to a drainage feature, an adequate access easement shall also be provided. The minimum width of any such access easement shall be 15 feet. Final easement widths are subject to the approval of the County Engineer.

903 GENERAL DESIGN CRITERIA

A. Acceptable Methods of Calculation

The methods of calculation as listed in the Supplemental Specifications shall be used unless otherwise approved in writing by the County Engineer.

B. Design Storms

1. Appropriate standard rainfall intensity and runoff charts are to be used. Runoff numbers and CN factors used in Delaware County are provided in the Supplemental Specifications.
2. Major Storm must be based on a return period of not less than one hundred (100) years.

C. Drainage Area Determination

The drainage area(s) (watershed area) shall be determined by a review of, but not limited to, the sources listed below. The sources listed are in order of preference.

- Field Investigation
- Delaware County topographic maps generated by the Delaware County Auditor's GIS system

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- Contour Map: U.S. Geological Survey quadrangle (7.5 minute series) maps or other topographic contour map
- Soil Survey of Delaware County, Ohio, USDA

Watershed area(s) are subject to the approval of the County Engineer. Existing watershed boundaries shall be maintained. Storm Water Tributary Maps (watershed areas) for the pre- and post-developed conditions shall be submitted with the Preliminary Engineering Plan Submittal and shall also identify all offsite watersheds flowing through the site. These maps must identify the individual watersheds (using a letter designation, e.g., A, B, C, etc.) and respective release points for the pre- and post-developed condition. These release points must be maintained for each individual watershed for the post-developed condition. See the Supplemental Specifications of these Standards for additional Storm Water Tributary Map Requirements. Detention/retention ponds provided in the post-developed condition must use the same letter designation (e.g., A, B, C, etc.) used for the individual watersheds as mentioned previously. The acreages for both pre and post-developed subareas shall be shown. The overall total of pre and post-developed acreages must be equal. A Stormwater Management Summary Table shall be included in the calculations. A sample table is included in the Supplemental Specifications of these Standards. More complex sites with multiple ponds may require a more detailed table.

D. Flood Routing Path

1. Capacity: The flood routing path is that part of the major storm drainage system that carries the runoff that exceeds the capacity of the designed drainage facilities. The major storm drainage system shall have the capacity to carry runoff from a storm with a return period of not less than one hundred (100) years.
2. Surface Flood Routing Paths: Generally, it is not economically feasible to size a storm sewer system to collect and convey more than the frequent storm runoff. Essentially, the complete drainage system of an urban area contains two (2) separate drainage elements. While

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the storm sewers belong to the initial system, surface drainage-ways must be provided for the major flow from more intense storms.

3. Intent in Providing Flood Routing Paths: The intent of planning for the major drainage element is to insure storm water runoff which exceeds the capacity of the initial drainage system has a route to follow which will not cause a major loss of property or any loss of life. Also, storm sewers can become partially clogged. Therefore, surface routing paths must be clearly defined and detailed.

No alteration/changes to the approved flood routing paths can be made without approval of the County Engineer. Flood routes must be provided for all storm sewers and culverts. In cases where existing subdivisions are located directly downstream along the proposed flood route, see the Supplemental Specifications for additional requirements.

4. Street Rights-of-Way: Street rights-of-way are a common choice for conveying major drainage flows. Such use must be anticipated when the street layout is established. Side and rear lot lines offer one alternative to the street. One problem with this alternative is the possibility of individual property owners encroaching on the major drainage easement. Rarely is the problem recognized until the infrequent rainstorm occurs and the major system fails to operate properly. Where the street is designated as the major drainage-way, the depth of flow shall not exceed twelve (12) inches at the gutter line for all local (residential, commercial and industrial) and minor urban collector streets. The maximum depth of flow shall comply with the ODOT L&D Manual, current edition for all minor rural collectors, major collectors, and major and minor arterial streets. The same maximum depth criteria will apply where a major drainage way crosses the street, except for culvert pipes (pipe open at each end). In an area where a major drainage way crosses the curbed street, a variance may be

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requested from the standard typical section to depress the sidewalk and area behind the curb in the flood route to an elevation equal to the top of curb (at the flood route only).

Flood routes shall not cross street R/W for open ditch roads for the 100-year storm. Where a major drainage-way is located outside a street right-of-way, easements shall be provided. Flood routes must be established for all sag areas using a maximum water depth as outlined previously (12" or per ODOT L&D Manual, current edition, based on street classification).

All major storm routing easements shall be shown on the Master Grading Plan. Easements must be determined using the 100-year flood elevation plus 1.0 ft of freeboard. Easement widths must be based upon actual cross sections. Cross sections must be evaluated at the narrowest constriction (maximum depth), and at the point where the lowest possible head (maximum width) is available.

5. Rear Lot Flood Routing Paths: Rear lot flood routing is permitted under these Standards. However, the depth of flood routing in any non right-of-way area shall not exceed a depth of 1.5 feet.
6. Multi-Purpose Flood Routing Paths: In order to protect the integrity of the non-street drainage rights-of-way, the Design Engineer is encouraged to design flood routing paths for multi-purpose functions.
7. Storm Runoff: The storm runoff is routed through the drainage system to determine if the combined capacity of the flood routing path and storm sewer system is sufficient. The capacity of the storm sewer system at any given point is assumed to be the same for the 100-year storm as for the design year storm frequency. The flood route must be designed to accommodate the flow based on the difference between the 100-year storm and the storm sewer design year storm.

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If a storm sewer is designed for above the minimum design storm frequency, credit for up to the 10-year storm will be considered. In no case will pipes less than 12" diameter receive any credit and an overland flood route shall be clearly indicated on the all plans. The Final Engineering and Construction Plan shall include cross section(s) and a profile of all flood routes. The limits of the flood route (from beginning to end) shall be shown.

8. Offsite Water: Flood routing will be required for all offsite water draining through a site. This requirement is applicable for all developed sites (e.g. subdivisions, commercial, industrial, multi-family, CAD, etc.).
9. Flood Route Calculation/Capacity: In general, flood routes must be analyzed as weirs if the path from the source to the mouth is discontinuous. If the path from the source to the mouth is continuous, the flood route must be analyzed as a channel. The height of water in the street must be based on a weir calculation unless a special design is proposed. The special design must be submitted to the County Engineer at the Final Engineering and Construction Plan submittal. Provide calculations for all proposed flood routes in the storm water management report.

904 SPECIFIC DESIGN SPECIFICATIONS

A. Roadway Culverts

1. General Specifications: The size and shape of the culvert should be such that it will carry a predetermined design peak discharge without the depth of water at the entrance or the outlet velocity exceeding allowable limits.
2. Design Procedure: The culvert design procedure as described in the ODOT Location and Design Manual Volume 2, current edition, shall be used.
3. Structure Types: Single span culverts, including concrete four-sided box and three-sided slab top and arched shaped structures shall be required in lieu of multiple cell pipe culverts.

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4. **Drainage Area**: The drainage area (in acres) and the estimated runoff or design discharge (in cubic feet per second) for the design year and 100-year storms shall be shown on the plan for each culvert.
 5. **Inlet Elevation**: The flowline elevation at the culvert inlet should be set deep enough to provide an adequate outlet for future storm sewer and/or channel improvements upstream. The County Engineer shall provide final approval of the proposed flowline elevation(s).
 6. **Design Storm Frequency (Roadway Culverts)**: The minimum storm frequency used shall comply with the Supplemental Specifications to these Standards.
 7. **Design Flow**: For method of calculation, please refer to the ODOT L&D Manual, current edition.
 8. **Minimum Cover to Subgrade**: Twenty-four inches measured from top of pipe to the bottom of subgrade shall be the minimum depth of cover. The cover over each crossing shall be shown in the profiles.
 9. **Minimum Diameter of Roadway Culvert Pipe**: 12 inches
 10. **Plan Sheets**: Culvert plan and profile sheets shall be required for all pipe culverts with spans greater than 36 inches, and all three-sided and four-sided box structures. The plan format shall comply with current ODOT L&D Manual, current edition.
 11. **Headwater elevations**: The design year and 100-year ponding limits (headwater elevations) upstream of all culverts must be shown on a separate plan as part of the drainage report. This plan shall be drawn to scale (1" = 50', maximum), showing proposed contours (1-foot minimum intervals) and the associated headwater pools upstream of the culvert(s). Any structure (buildings, etc.) upstream of the culvert(s) be shown on this plan. These headwater pools (ponding limits) shall be shown on the Master Grading Plan (See Art. IV).
- B. **Storm Sewers**: The following criteria shall be used for designing storm sewer systems:

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1. **Depth:** The sewer must be deep enough to receive the flow from all of its sources within the watershed.
2. **Size:** The size of the storm sewer must be adequate for flowing full based on the design storm.
3. **Design:** All storm sewer systems are to be designed per these Standards and Supplemental Specifications.
4. **Material:** The storm sewer material shall meet the requirements of these Standards (See Art. II, Sect. 203) and the Supplemental Specifications to these Standards. No plastic pipe (707.33, etc.) shall be permitted under the pavement. Where plastic pipe is used, 100% of the pipe will be mandrelled 30 days after installation. At the end of the maintenance period, all plastic pipe shall be mandrelled again. All plastic pipe failing the mandrel test shall be retested and/or replaced per these Standards and Supplemental Specifications.
5. **Flow line:** The flow line of the storm sewer pipes should be set so that the crown of the pipes (at the junctions) is at the same elevation.
6. **Offsite Tributary Acres:** A storm sewer structure shall be located no less than 10 feet from the property line for all offsite tributary areas with drainage areas of 1 acre or more. For areas with ravines this requirement can be waived.
7. **Pipe Junctions:** Sewer pipes shall enter in the front face of the walls for rectangular and square structures. For all curb inlets, sewer pipes shall enter through the front and back of the structure. Sewer pipe shall not be allowed to be located parallel to the curb and gutter and within the zone of influence for the roadway section. The County Engineer will determine if the proposed storm sewer locations will cause potential maintenance issues in the future.
8. **Pipe Separation:** The main storm sewer pipe, if greater than or equal to 24-inches shall be required to be separated from all inlets.
9. **Minimum Design Storm Frequency (Storm Sewers):**

For All Local Streets and Minor Urban Collector Streets:

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Two-year storm (flowing full) – Curb and Gutter Section

Ten-year storm (flowing full) – Open Ditch Section

For All Minor Rural Collectors, Major Collectors, and
Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

If a combination of a storm sewer and open ditch are
used to convey storm flow, see the Supplemental
Specifications to these Standards for related design
criteria.

10. Hydraulic Gradient:

For All Local Streets and Minor Urban Collector Streets:

Based on a five-year storm, the hydraulic grade line shall
not exceed the window or grate elevation for an inlet or
catch basin. For rear lot drainage, the 10-year hydraulic
grade line shall not exceed 1.5 feet. Grade line shall be
based on the tailwater or eight-tenths (0.8) of the pipe
diameter at the outlet or other critical points, whichever
is greater, within the system.

For All Minor Rural Collectors, Major Collectors, and
Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

11. Design Flow:

For method of calculation for storm sewer sizing, refer to
the Supplemental Specifications to these Standards.

For All Local Streets and Minor Urban Collector Streets:

Maximum time of concentration to first structure:

Curb Inlet - - - - - 10 minutes

Ditch Catch Basin- - - - - 15 minutes

Time of concentration used shall be approved by the
County Engineer

For All Minor Rural Collectors, Major Collectors, and
Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

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12. Minimum Diameter of Storm Sewer Pipe: 12- inches
13. Pipe Roughness Coefficient (n):
An “n” of 0.012 is to be used for sewers 60-inch diameter and under, and 0.013 for sewers larger than 60-inches in diameter. The basic “n” for smooth pipe, concrete or vitrified is 0.012. These values do not compensate for minor head losses at catch basins, inlets, and manholes that are encountered in a storm sewer system. If in the opinion of the County Engineer these become significant, then the pipe coefficient shall be increased to 0.015 to account for these losses.
14. Minimum cover to Subgrade:
Reinforced or Concrete Pipe
(Measured from the top of pipe to bottom of subgrade) --
24 inches

The cover over each crossing shall be shown in the profiles.
15. Maximum Cover:
The support strength of the conduit as installed must be in accordance with the Maximum Height of Cover for Pipe found in the Supplemental Specifications to these Standards.
16. Minimum Velocity for Design Flow: 3 fps
17. Maximum length of pipe between structures: 300 feet.

C. Open Watercourses

1. Federal and State Regulations: The requirements for open watercourses that may be affected by a construction project are subject to Federal and State regulations. Both the U.S. Army Corps of Engineers (Corps) and the Ohio Environmental Protection Agency (OEPA) have jurisdiction over the construction activities that occur in and near Waters of the United States and/or Jurisdictional Streams. Both of these agencies have a permit process in

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force (404/401 permits) that address what types of construction activities can be permitted. For sites that contain Waters of the United States and/or Jurisdictional Streams, the open watercourses within the site will not be required to be enclosed with storm sewer pipe. Areas of heavily wooded ravines with large diameter trees and with depth sufficient to receive the flow from storm sewers without disturbing the natural state, will not need to be enclosed with storm sewers. Please refer to Article XII for additional requirements.

2. Drainage (Maintenance) Easements: Access to open watercourses (e.g., drainage ditches, channels, swales, etc.) shall be by means of drainage (maintenance) easements. The easement widths shall be as outlined in the Supplemental Specifications to these Standards.
3. Plan Approval: Approval of the Final Engineering and Construction Plans shall not be granted until the County Engineer has received a copy of all applicable approvals/permits (received from the Army Corps, Ohio EPA, ODNR, etc.).

The requirements for all open watercourses are outlined in the Supplemental Specifications to these Standards.

4. Design Criteria:
 - a) Minimum Design Storm Frequency (new channels/open watercourses):

Ten (10) year (bank-full)

- b) Design Flow:

For method of calculation, refer to the Supplemental Specifications to these Standards.

- c) Allowable Velocities in Existing Channels:

The existing open watercourse (channel) must have the ability to handle the flow of the post development improvements satisfactorily. Calculations for the design year and 100-year channel velocities must be submitted to the County Engineer for review and approval.

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Channel protection must be provided per these Standards and Supplemental Specifications.

d) Minimum Slope:

For New Channels: 0.40% (Desirable); 0.24% (Minimum) with a minimum velocity of 2 fps for the Design Year Storm

e) Side Slopes: 4:1

D. Subsurface Drainage Tile

All existing subsurface tile, including those on the County Drainage Maintenance (Ditch Petition) Program, shall be accounted for in the design of the storm sewer system. Locations of existing drainage maintenance tile systems within Delaware County are available by contacting the County Engineer and the Soil and Water Conservation District. This existing tile system(s) shall not be connected into the proposed storm water management system unless approved as part of the Preliminary Engineering Plan approval.

E. Curb Inlet

a) Maximum width of spread of flow:

For All Local Streets and Minor Urban Collector Streets:

Street Width	Width of Spread
<= 26 feet	8 feet
> 26 feet	9 feet

For All Minor Rural Collectors, Major Collectors, and Major and Minor Arterial Streets:

See ODOT L&D Manual, Current Edition

b) Inlet spacing shall not exceed 400 feet.

c) The spread of flow calculations must include bypass flow from the previous inlet(s), if applicable. Current ODOT spread of water calculation methods (e.g., nomographs) are permitted, provided the parameters used

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to develop the nomographs are adjusted to fit the proposed curb inlet width, gutter pan width and gutter pan cross slope.

F. Driveway Pipes: See Article VIII of these Standards.

G. Retention and Detention Facilities

1. General:

The quantity, location, construction, ownership and maintenance of the detention or retention facility, whether public or private, shall be resolved prior to recording the final subdivision plat and the acceptance of the Final Engineering and Construction Plan. Chapter 6131, ORC, outlines the method of providing maintenance.

The Owner shall petition the County Commissioners for maintenance of the storm water management system and facilities of the proposed development prior to the final approval of the subdivision. The County Commissioners will not sign the plat until this petition has been filed and approved. An outline of the procedure for this petition process is contained in the Supplemental Specifications of these Standards.

All retention and detention basins are to be cleared (including the removal of trees), seeded, top soiled and mulched. The limits of seeding, mulching, clearing, etc. are subject to the approval of the County Engineer.

Standard drawings for detention and retention basins are included in the Supplemental Specifications.

For detention/retention requirements for Conservation Subdivisions, see the Supplemental Specifications.

2. Design Criteria:

a) Acceptable Methods of Calculation:

See the Supplemental Specifications of these Standards.

(1) Release Rates: Release rates shall be provided as outlined in the Supplemental Specification of these Standards.

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(2) Time of Concentration: Times of Concentration for Residential, Multi-Family, Commercial, and Industrial Developments, Road Widening Projects and Mixed Developments shall be provided as outlined in the Supplemental Specification of these Standards.

3. Design Outlets

Submerged outlets will only be permitted at the discretion of the County Engineer. The use of submerged outlets will not be permitted for aesthetic purposes. Where submerged outlets are permitted, the outlet structure (headwall) shall extend one-foot above the 100-year storm elevation or the spillway overflow elevation, whichever controls.

4. Design Specifications

- a) The surface of a detention area and basin volumes shall be constructed as outlined in the Supplemental Specifications to these Standards.
- b) A ditch of adequate size and slope (See Section 904 C) through the detention basin shall be constructed from the inlet pipe to the outlet structure. The maximum depth of the ditch shall be as outlined in the Supplemental Specification to these Standards.
- c) Seeding and other erosion control methods shall be used to protect all slopes. The type and extent of proposed erosion protection shall be as outlined in the Supplemental Specification to these Standards.
- d) The side slopes for a basin shall be as outlined in the Supplemental Specifications to these Standards.
- e) Freeboard:
The minimum freeboard shall be as outlined in the Supplemental Specifications to these Standards.
- f) Outlet velocities at release points:

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The outlet velocities at release point(s) shall be reduced such that erosion to the existing channel is eliminated. Erosion (Rock channel) protection shall be required at all release points to dissipate concentrated flows. The Supplemental Specifications to these Standards contains a method to determine the geometry, thickness, etc. for the erosion protection.

g) Debris-Control Structures

Debris-control structures may be required in some of the detention methods and should be considered as an essential part of the design. The procedure is outlined in the Supplemental Specifications of these Standards. For dams and levies over ten (10) feet in height, refer to Section 1521.062, ORC.

h) Provisions for Upstream Tributary Areas

No storage volume will be required for off-site upstream tributary areas. Flows from off-site areas in excess of the allowable discharge from the on-site area(s) may be routed around or through the detention/retention basin. Provision for excess (off-site) flow through the storage facility shall be included in the design of the emergency spillway.

i) Emergency spillways shall be provided for all retention/detention facilities. The spillway shall be designed for the 100-year storm, with the outlet plugged. The discharge from the spillway shall be directed away from any developed property.

j) The height of water in detention facilities shall not be excessive. The maximum height of water is outlined in the Supplemental Specifications to these Standards.

k) A table of elevations (with corresponding storage volume) shall be provided with the Final Engineering and Construction Plan for all detention and retention basins.

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- 1) Additional construction requirements for all detention and retention ponds are included in the Supplemental Specifications of these Standards.
5. When detention and retention basins are to be used as water quality basins, the basins shall comply with these Standards and the Supplemental Specifications of these Standards. When conflicts between two or more portions of the standards arise, the more restrictive shall apply.
6. Proof surveys are required to be performed by the Owner in order to demonstrate conclusively that the detention/retention facilities are constructed to the capacity, elevations, slopes, grades and sizes shown on the approved plans. Such surveys shall be conducted by an Ohio Registered Professional Surveyor, shall employ standard techniques, and shall produce and furnish field notes to the County Engineer for review and record purposes. Reduction of notes and any plotting necessary to make notes interpretable shall be by the surveyor performing the proof survey. Proof surveys shall be in addition to and separate from other inspections that may be conducted by the County Engineer. All discrepancies revealed in the as-constructed facilities by the proof survey shall be rectified by the Owner, and the proof survey re-performed in order to demonstrate conformance. The proof survey shall be submitted to the County Engineer for all retention/detention facilities, including those used for private commercial, industrial and multi-family sites. The proof survey shall be submitted for review and approval prior to final acceptance of the construction or issuance of individual lot DESC permits.
7. The use of existing ponds as storm water management facilities shall be subject to the approval of the County Engineer. An evaluation of the existing pond(s) is required prior to acceptance by the County Engineer. This evaluation must be completed prior to submittal of the Final Engineering and Construction Plans. Please

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refer to the Supplemental Specifications of these Standards for the requirements of this evaluation.

H. Sump Pumps and Roof Drains:

Provisions for all private drainage systems (sump pumps, roof drains, etc.) shall be included in the storm water management calculations.

Private drainage systems shall not outlet through the curb or discharge into the underdrain/curb tile.

I. Temporary Sediment Basins:

See the Supplemental Specifications for requirements for projects that require temporary sediment basins to be maintained beyond the one-year maintenance period.

905 SEEDING AND MULCHING

All areas disturbed during construction shall be seeded and mulched. Seeding and mulching shall be completed prior to the completion of construction. The seeding and mulching shall be in accordance with these Standards and Supplemental Specifications. The required seed mix design for all local (residential, commercial and industrial) and minor urban collector streets is included in the Supplemental Specifications to these Standards. Seed mix design for minor rural collectors, major collectors and major and minor arterials shall comply with ODOT CMS, current edition. The County Engineer shall determine the final limits of seeding and mulching, and may also require a special mix design where appropriate.