

Division of Sewerage and Drainage Stormwater Drainage Manual

August 2012



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Stormwater Drainage Manual



Introduction

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Introduction

The City of Columbus (City) was founded in 1812 and has served as the state capital since 1816. The City has the largest population in the state of Ohio and a land area of nearly 213 square miles, making it the sixteenth largest city by area in the United States. The City's administrative structure and development regulations related to stormwater have evolved to address the City's growth. The Division of Sewerage and Drainage (DOSD) was created by ordinance in 1950 as a part of the Department of Public Service (renamed Department of Public Utilities in 1991). In 1994, the City created a Stormwater Management Program and established a stormwater utility fee to finance infrastructure improvement projects and implement programs designed to improve stormwater quality.

In 2006, the City adopted the Stormwater Drainage Manual (the Manual). The Manual sets forth the City's standards applicable to new development or redevelopment. Generally speaking, the Manual requires all public and private development to control stormwater leaving the site after construction for both water quality and water quantity.

In 2011, the City convened a committee to review the 2006 Manual and its implementation. The committee consisted of a variety of stakeholders, including developers, design professionals, environmental advocacy organizations and other interested governmental agencies. The committee reviewed the technical standards of the 2006 Manual, as well as the process for obtaining a variance from the Manual requirements. As a result of that review process, the City is reissuing the Manual.

Effective August, 2012, the 2006 Stormwater Drainage Manual is repealed, and the 2012 Manual is in effect.

Purpose

Experience has shown that most of the more serious flooding, erosion, and water quality problems are "created." Usually this occurs from conveying more stormwater to a given area than can be carried away effectively. Ever increasing drainage problems emerge unless well-conceived, cooperative stormwater drainage and flood control programs are undertaken throughout the entire watershed. The stormwater management goals of the City of Columbus, Ohio, are to prevent flooding, streambank erosion, and water quality degradation that may result from stormwater runoff from development and redevelopment projects.

The purpose of the Manual is to protect existing natural stormwater resources, convey and control stormwater in a safe and responsible manner, and meet water quality goals. The Manual is intended to provide information to the general public on the City's stormwater policies and design practices, as well as assist developers, engineers, and City staff in the preparation, review and approval of the Stormwater Management Report and Construction Drawings that must accompany private and public

development proposals. This document is organized to facilitate specific design and submittal activities related to stormwater management infrastructure.

Stormwater management, particularly in the area of stormwater quality management, is an evolving science. The goal of the City is to be responsive to changes in stormwater policy and design brought forth by the natural progression of the industry. As such, the Manual will be updated as necessary to reflect accepted standard practice in stormwater management.

The City also recognizes that there may be instances where alternative stormwater standards may apply to protect sensitive ecological areas (i.e., Hellbranch Run and the Darby Creek watersheds) or to meet the goals of Total Maximum Daily Loads established by Ohio EPA. Where alternative standards conflict with the requirements of the Manual, the more stringent criteria shall apply.

Major Changes from 2006 Manual

As noted above, the 2006 Manual was revised after an extensive review process. Some of the more significant changes include the following:

- De minimis exception: the 2006 Manual did not have any minimum threshold for applicability. This resulted in some very small projects being required to go through a more extensive review process than was warranted. The current Manual exempts projects that disturb less than 10,000 square feet and add less than 2,000 square feet of impervious surface.
- Variance process: the 2006 Manual had very little detail regarding how an applicant could obtain a variance from the Manual. The current Manual sets forth greater detail regarding when a variance may be granted and the procedure for obtaining one. This will provide more predictability for developers.
- Downtown development: the City encourages downtown redevelopment, and the Manual has been revised to reflect this priority. First, the Manual does not require a development that is discharging to a combined sewer to control for water quality. Second, the Manual has a variance only applicable to the downtown area which requires less justification for obtaining the variance.
- Green Infrastructure: The City wants to encourage the use of green infrastructure to control stormwater. To accomplish this, the following changes have been made. First, the manual will have more green BMPs listed, including pervious pavement. Second, there is a green infrastructure credit in the stormwater credit rule being issued simultaneously with the Manual. Third, the requirement that green roofs have monitoring performed has been eliminated.

Applicability

The Manual is being adopted as a rule of the Director of Public Utilities pursuant to the authority provided in Columbus City Code 1145.11, 1145.71 and 1149.04. Unless otherwise exempted, the Manual shall be used for all land-disturbing public and private projects that change existing stormwater flow, conveyance system and/or stormwater pollutant discharges from applicable premises within the City of Columbus.

Unless otherwise exempt, any new development or redevelopment involving the following shall be subject to the Manual:

1. Construction of commercial, industrial, institutional, residential or multi-family residential facilities that disturbs more than 10,000 square feet, and/or creates more than 2,000 square feet of impervious surface.
2. Expansion of commercial, industrial, institutional, residential or multi-family residential facilities if the expansion will disturb more than 10,000 square feet, and/or add more than 2,000 square feet of impervious surface.
3. Redevelopment of commercial, industrial, institutional, residential or multi-family residential facilities if the expansion will disturb more than 10,000 square feet, and/or add more than 2,000 square feet of impervious surface.
4. Construction, reconstruction, improvement and/or modification of all private and public transportation and transit facilities when the project disturbs more than 10,000 square feet, adds impervious surface or alters existing drainage patterns. Routine maintenance of these facilities is excluded.

For purposes of determining whether an expansion will add more than 2,000 square feet of impervious surface, if there is a common plan of development or sale for the site that will eventually exceed 2,000 square feet this exception does not apply. USEPA describes a "larger common plan of development or sale" for purposes of the general construction permit as follows:

a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan." For example, if a developer buys a 20-acre lot and builds roads, installs pipes, and runs electricity with the intention of constructing homes or other structures sometime in the future, this would be considered a larger common plan of development or sale. If the land is parceled off or sold, and construction occurs on plots that are less than one acre by separate, independent builders, this activity still would be subject to stormwater permitting requirements if the smaller plots were included on the original site plan. The larger common plan of development or sale also applies to other types of land

development such as industrial parks or well fields. A permit is required if 1 or more acres of land will be disturbed, regardless of the size of any of the individually-owned or developed sites.

See: USEPA, NPDES Home, Stormwater: FAQ
http://cfpub1.epa.gov/npdes/faqs.cfm?program_id=6#305)

The Manual is not applicable to the expansion, construction, or reconstruction of one single-family dwelling or one two-family dwelling on a single parcel.

This manual will be effective on August, 2012. Any development that occurs after this date must comply with the Manual, unless a variance has been granted.

Organization

To simplify the use of the Manual, it is organized into two parts. Part I of the Manual supports the layout, design, and maintenance of stormwater management facilities. Four sections make up this part of the Manual:

1. Preservation and Protection (Section 1) defines how to site the project in relation to any streams, floodplains, steep slopes, and wetlands within the project site.
2. Stormwater Conveyance (Section 2) provides design requirements for storm sewers, open watercourses, stream crossings, and other facilities intended to convey stormwater from the site.
3. Stormwater Controls (Section 3) provides design requirements for detention basins and stormwater quality control devices intended to control the rate, volume, and/or pollutant load in stormwater runoff.
4. Operation and Maintenance of Stormwater Controls (Section 4) defines maintenance responsibilities for stormwater controls and provides easement, access, inspection and reporting requirements.

Part II describes the City's submittal requirements related to stormwater management:

1. Private and Public Development Review Processes (Section 5) provides guidance on the review process for public and private development which propose to construct stormwater infrastructure within the City limits.
2. Stormwater Management Report submittal requirements (Section 6) are summarized in this section. The design for proposed stormwater management systems shall be submitted to the City for review and approval in accordance with this section.
3. Stormwater Management Report Submittal Approval Process (Section 7) provides guidance on the information required for plan approval and presents plan details

(including title, plan, profile, and cross section sheets) which shall be included in the construction plans.

Construction Requirements

The City's Construction and Materials Specifications (CMSC), current edition, and the Standard Construction Drawings maintained by the City shall govern the construction of stormwater facilities described in the Manual. All construction activity within the City must also comply with the requirements stipulated by the OEPA and the City's Erosion and Sediment Control Regulations, whichever is more restrictive. Copies of the current CMSC and Standard Construction Drawings are available at the Department of Public Utilities, Utility Permits Desk, 3rd Floor, 910 Dublin Road, Columbus, Ohio, or online at: utilities.columbus.gov.

The City's Erosion and Sediment Control Regulation, outlined in Section 3.5, is included in **Appendix A**.

Variances

The City recognizes that there may be individual projects involving special or unusual design challenges such that strict adherence to the Manual will result in substantial hardship. An applicant may apply for a variance with regard to any requirement of this manual pursuant to the following terms.

1. Standard for granting a variance.

All applicants must make a good faith effort to comply with the Manual. The good faith effort requires, at a minimum, developing a site plan that is in compliance with the Manual. The City recognizes that there are special circumstances, related to individual site conditions that may make compliance with the Manual an undue hardship. If such conditions exist, the applicant may pursue one or more of the following types of variances. As part of the variance process, the applicant may provide and the City may consider evidence of the economic impact of the Manual on the project. Please note, however, that a modest increase in the cost of the project or on the estimated rate of return does not justify a variance.

- a) **Downtown:** Type I variances are only applicable for redevelopment projects that occur in the Downtown Zoning District as defined in City Code 3359.03. See **Figure 1-1**. A Type I variance may be granted if an applicant demonstrates that full compliance with the Stormwater Drainage Manual is impracticable because of specific site conditions.
- b) **Non Stream Protection:** Type II variances are applicable to requests for a variance from anything in the Manual other than the stream protection issues.

Examples include a request for a variance from the detention requirements or floodplain fill compensation of the Manual. A Type II variance may be granted if there are unique circumstances applicable to the site such that strict adherence to the requirements of the Manual will deprive the applicant of reasonable use of the land or result in substantial hardship to applicant.

- c) Stream Protection: Type III variances are applicable to requests for variances from the Manual's prohibitions on stream relocation or enclosure, and/or from the Manual's Stream Corridor Protection Zone ("SCPZ") requirements. As set forth in more detail in Section 1 of the Manual, the SCPZ is necessary to enhance and maintain water quality, protect the stream channel, conserve and protect habitat and prevent damage to structures from erosion. A Type III variance may be granted if an applicant demonstrates both of the following:
 - i) there are unique circumstances applicable to the site such that strict adherence to the Manual will deprive the applicant of reasonable use of the land or result in substantial hardship to applicant; and
 - ii) the applicant has provided for sufficient mitigation to any impacts on the stream or Stream Corridor Protection Zone.

2. Variance Applications.

Type I Variance Application (Downtown): To obtain a Type I variance, applicant must submit an application meeting the standard set forth above.

A Type I variance application must include two site development plans: one that demonstrates full compliance, and one that is the preferred alternative. The application should support determining that the full compliance alternative is impracticable. Such information can include but is not limited to technical challenges of meeting the requirements of the Manual and projected loss of revenue. The Type I variance should also include the information required by the Variance Guidance Policy, which can be found online at utilities.columbus.gov

Type II Variance Applications (NonStream Protection): To obtain a Type II variance, applicant must submit an application meeting the standard set forth above.

A Type II variance application must include three site development plans: full compliance, minimal impact and preferred alternative. The application should provide supporting information explaining why the full compliance alternative is impracticable. Such information can include but is not limited to technical challenges of meeting the requirements of the Manual and projected loss of revenue. In addition, the application should include the information required by the Variance Guidance Policy, which can be found online at utilities.columbus.gov

Type III Variance Application (Stream Protection): To obtain a Type III variance, applicant must submit an application meeting the standard set forth above.

A Type III variance application must include three site development plans: full compliance, minimal impact and preferred alternative. The application should provide supporting information explaining why the full compliance alternative is impracticable. Such information can include but is not limited to technical challenges of meeting the requirements of the Manual and projected loss of revenue. In addition, an application for a Type III variance shall demonstrate sufficient mitigation for any impacts on the Stream Corridor Protection Zone or the stream. Mitigation shall be considered sufficient if it meets one of the following criteria.

- a) If the impact is directly to the stream, the applicant must demonstrate that the predicted post-construction QHEI/HHEI will meet or exceed the existing QHEI/HHEI. How such scores are calculated is set forth in the Variance Guidance Policy.
- b) If the impact is solely to the SCPZ, and not directly into the stream, mitigation shall be considered sufficient if additional equivalent SCPZ is created at the following ratios:

- On site: 1 to 1
- Adjacent site: 1 to 1.5
- Same watershed assessment unit: 1 to 2
- Same County: 1 to 3
- Contiguous County: 1 to 5

Generally, mitigation SPCZ will be considered equivalent if it performs the same function as the disturbed SPCZ; for instance, if the disturbed SPCZ includes trees, the mitigation SPCZ should include at least an equivalent number of trees.

A Type III variance application should include the information required by the Variance Guidance Policy, which can be found online at utilities.columbus.gov.

3. Review Process for Variances

An applicant may request a preliminary meeting to discuss proposal and submittal content. Please contact One Stop Shop, at 614-645-6315 or Private Development Section Manager at 645-3702. An applicant may also request that City personnel participate in meetings with other regulatory agencies, such as Ohio EPA, regarding the development. The City may not be able to attend every such meeting, but will work with the applicant to make the approval process as smooth as possible.

Once the application is received, the City will check it for completeness.

If the application is complete, it will be reviewed by the Private Development Section Manager. The Manager may recommend an application be approved, and forward that recommendation to the Administrator. If the Manager does not immediately approve the application after initial review, the Manager may ask for additional information or forward the application to the Variance Review Committee for additional consideration.

The Variance Review Committee (VRC) typically meets once each month to discuss pending variance requests. Generally, the VRC will review the variance application at the meeting following receipt of the application. The VRC will take action on the application at that time, and the VRC will communicate with the applicant the results of the meeting. At the meeting, the VRC will do one of the following:

- a) Recommend that the Administrator approve the variance request.
- b) Request additional information from the applicant. Such a request shall be specific regarding what additional information is needed and why. The request may be communicated by email. The VRC will consider the additional information at the next scheduled VRC meeting.
- c). The VRC will not request more information from an applicant more than twice. If, after the Committee has sought additional information from the Applicant two times, the Committee still believes that the Variance request is incomplete or otherwise unacceptable, it may recommend that the Administrator deny the variance request.

The Administrator shall act on the recommendation of the VRC Committee within 7 days of receiving it. Any person adversely affected by the action of the Administrator may appeal the decision pursuant to and in accordance with Section 1145.82 of the Columbus City Code.

If an application is resubmitted for the same project after it has been issued a proposed or final denial, the applicant shall pay a resubmittal fee of \$5,000.

Definitions

For the purpose of the Manual, the following terms, phrases, and definitions shall apply and are provided here for quick reference and convenience. Words used in the singular shall include the plural, and the plural - the singular. Words used in the present tense shall include the future tense. The word SHALL is mandatory and not discretionary.

Administrator — The Administrator of the Division of Sewerage and Drainage, or his/her designee.

Agricultural Lands — Those lands in any agricultural use, including forestry.

Applicant — Any person or duly designated representative applying for a permit or other type of city, federal, or state regulatory approval to proceed with a project.

Best Management Practice (BMP) — Schedules of activities, programs, technology, processes, siting criteria, operating methods, measures, devices, prohibitions of practices, maintenance procedures, and other management practices used to prevent, control, remove or reduce the pollution of waters of the United States. BMPs also include, but are not limited to, treatment requirements, operating procedures, practices to control site runoff, spillage or leaks, waste disposal, or drainage from raw material. BMPs may include structural or nonstructural practices.

CC Drawings — Plans for stormwater infrastructure that are privately owned, capital projects or public sanitary sewer projects.

Check Storm — A lesser frequency event used to assess the hydraulic grade line, pavement spread, flood routing and hazard analysis, and critical locations where water can pond to appreciable depths.

City — The City of Columbus, Ohio.

Commercial Activity Areas — Outdoor areas within non-residential properties where pollutants are or may become more concentrated than typical urban runoff as characterized by the USEPA National Urban Runoff Program (NURP). Commercial/industrial activity areas are as listed below or otherwise defined by the City:

1. Material and waste handling and storage areas, including but not limited to loading docks, fuel and other liquid storage/dispensing facilities, material bins, containers, stockpiles, and other storage containers, waste dumpsters, bins, cans, tanks, stockpiles, and other waste containers,
2. Processing, manufacturing, fabrication, cleaning, or other permanent outdoor equipment or work areas, and

3. Areas where vehicles and equipment are repaired, maintained, stored, disassembled, or disposed.

Compensatory Floodplain Storage — Equivalent floodplain storage provided to counterbalance floodplain filling within designated FEMA floodplain boundaries.

Constructed Open Watercourses — Constructed drainage courses that confine and conduct a periodic flow of water in such a way that concentrates flow. For the purposes of the Manual, constructed open watercourses include swales or ditches that are constructed to convey stormwater runoff within development sites and along public and private roadway systems.

Construction — The building, assembling, expansion, modification or alteration of the existing contours of the site, the erection of buildings or other structures, or any part thereof, or land clearing.

Culvert or Stream Crossing — A closed conveyance structure with open ends, designed to carry water through a roadway embankment.

Detention or to Detain — To retard or slow the discharge, directly or indirectly, of a given volume of stormwater runoff into surface waters or downstream system.

Development or Development Activity — The alteration, construction, installation, demolition or removal of a structure, impervious surface or drainage facility; or clearing, scraping, grubbing, killing or otherwise removing the vegetation from a site; or adding, removing, exposing, excavating, leveling, grading, digging, burrowing, dumping, piling, dredging or otherwise significantly disturbing the soil, mud, sand or rock of a site.

Discharge — The outflow of stormwater runoff from a project, site, aquifer, drainage basin or facility.

Division — Division of Sewerage and Drainage.

Drainage Facility — Any component of the drainage system.

Drainage System — All facilities used for the movement of stormwater through and from a drainage area, including, but not limited to, any and all of the following conduits and appurtenant features: channels, ditches, flumes, culverts, storm sewers, curb inlets, catch basins, headwalls, detention basins, etc., as well as all watercourses, waterbodies and wetlands.

Drawer D — Plans for new or improved infrastructure associated with a private development project that is to be publicly owned and operated within a public right-of-way or in publicly owned easements, formatted to fit onto a “D” size drawing sheet.

Drawer E — Plans for new or improved infrastructure associated with a private development project that is to be publicly owned and operated within a public right-of-way or in publicly owned easements, formatted to fit onto an “E” size drawing sheet.

Easement — A grant by a Property Owner for the use of a specified portion of land for a specified purpose.

Erosion — The wearing or washing away of soil by the action of water due to either natural or manmade causes.

FEMA 100-year Floodplain — Any land area recognized by FEMA as susceptible to being inundated by flood waters with a one percent chance of annual recurrence, as defined on the FIS and FIRM for Franklin County and incorporated areas.

FEMA 100-year Floodway — The place in which water is likely to be the deepest and fastest; the area of the floodplain which should be reserved to allow floodwaters to move downstream without causing the 100-year peak flood water surface elevation to raise more than one foot, as defined on the FIS and FIRM for Franklin County and incorporated areas. (The maximum allowable surcharge for the City of Columbus is 0.5 feet.)

Forebays — Areas at detention basin inlets that are designed to trap coarse sediment particles and trash by separating a specified volume from the remainder of the basin with a lateral sill, rock-filled gabions, a retaining wall, or horizontal rock filters.

Groundwater — Water below the surface of the ground, whether or not flowing through known or defined channels.

Hydrograph — A graph of discharge rate versus time for a selected point in the drainage system.

Illicit Discharges — Any natural or man-made conveyance or drainage system, pipeline, conduit, inlet, or outlet (including natural surface flow patterns, depressions or channels traversing one or more properties) through which the discharge of any pollutant to the stormwater drainage system occurs or may occur unless the connection is authorized under a discharge permit issued by the Ohio EPA. This definition shall be consistent with the City’s existing NPDES permit for stormwater discharges from its municipal separate storm sewer system.

Impervious Surface — A surface which has been covered with a layer of material so that it is resistant to infiltration by water. Impervious surfaces include conventionally surfaced streets, roofs, sidewalks, paved parking lots, and other similar surfaces.

Maintenance — The action taken to restore or preserve the design functionality of any facility or system.

Major Outfall — A municipal separate storm sewer system (MS4) outfall that discharges from a single pipe with an inside diameter of 36 inches or more or its equivalent (discharge from a single conveyance other than circular pipe which is associated with a drainage area of more than 50 acres); or for MS4s that receive stormwater from lands zoned for industrial activity (based on comprehensive zoning plans or the equivalent), an outfall that discharges from a single pipe with an inside diameter of 12 inches or more or from its equivalent (discharge from other than a circular pipe associated with a drainage area of 2 acres or more).

Major Stormwater Routing Systems — An above ground conveyance system which routes stormwater from larger runoff events. This is often the portion of the total drainage system which collects, stores, and conveys runoff that exceeds the capacity of the minor system. It is usually less controlled than the minor system and will function regardless of whether or not it has been deliberately designed and/or protected against encroachment, including when the minor system is blocked or otherwise inoperable.

Minor Drainage Systems — Portions of a stormwater conveyance system within the urban environment including things such as catch basins, detention basins, and storm sewer pipes. The portion of the drainage system that collects, stores and conveys frequently occurring runoff, and provides relief from nuisance and inconvenience. This system has been traditionally planned and constructed, and normally represents the major portion of the urban drainage infrastructure investment. Minor systems include curbs, gutters, ditches, inlets, access holes, pipes and other conduits, open channels, pumps, detention basins, water quality control facilities, etc.

ODOT L&D Manual — ODOT Design Manual in effect as of the date of the effective date of the SWDM or any applicable revisions or amendments.

Offsite — Taking place or located away from the site.

Onsite — Taking place or located within the site.

Ordinary High-Water Mark — The point on one or both banks of a stream to which the presence and action of surface water is so continuous as to leave a distinctive mark by erosion, destruction, or prevention of terrestrial vegetation, predominance of aquatic vegetation, or other easily recognized characteristics. Where the bank or shore of any particular place is of such character that it is difficult or impossible to ascertain where the point of ordinary high-water mark is, it shall be established at the elevation of the ordinary high-water mark on the opposite bank.

Outfall — A point source where an MS4 discharges to Waters of the State and does not include open conveyances connecting two municipal separate storm sewers, or pipes, tunnels, or other conveyances which connect segments of the same stream or other Waters of the United States and are used to convey Waters of the State.

Parcel or Parcel of Land — A contiguous quantity of land in possession or owned by, or recorded as property of the same claimant person.

Person — Any individual, firm, corporation, governmental agency, business trust, estate, trust, partnership, association, two or more persons having a joint or common business interest, or any other legal entity.

Post-development or Post-construction — Site conditions at the completion of construction that pertains to the management of stormwater from a site.

Pre-development — The hydrologic and hydraulic condition of the project site immediately before development or construction begins.

Private Facility — Property or facility which is not owned by the City of Columbus.

Professional Engineer — A professional engineer licensed by the State of Ohio skilled in the practice of civil engineering and the engineer of record for the project under consideration.

Professional Landscape Architect — A person licensed by the State of Ohio to practice landscape architecture.

Public Facility — Property or facility which is owned by the City of Columbus.

Redevelopment — A change to previously existing, improved real estate, including but not limited to the demolition or building of structures, filling, grading, paving, or excavating.

Riparian — Situated or dwelling on the bank of a stream or other body of water.

Roadside Ditch — An artificial watercourse designed to convey stormwater runoff generated from the roadway surface.

Runoff — Precipitation, snow melt, or irrigation water not absorbed by soil.

Sediment — Solid material, whether mineral or organic, that is in suspension, is being transported, or has been moved from its site of origin by water.

Site — Any tract, lot, or parcel of land or combination of tracts, lots, or parcels of land which is in one ownership, or contiguous and in diverse ownership where development is to be performed as part of a unit, subdivision, or project.

Storm Event — The storm of a specific duration, intensity, and frequency.

Stormwater — Discharges to surface waters that originate from precipitation events.

Stormwater Management Report — Refers to the approved detailed analysis and supporting documentation for the design of the stormwater management system required for all construction.

Stormwater Management System — All natural and constructed facilities used for the conveyance and storage of stormwater through and from a drainage area, including, but not limited to, any and all of the following: channels, ditches, swales, flumes, culverts, streets, streams, watercourses, waterbodies, wetlands, detention/retention facilities, and treatment devices.

Stormwater Pollutants — Any liquid, solid, or semi-solid substance, or combination thereof, that enters stormwater runoff in concentrations or quantities large enough to contribute to the degradation of the beneficial uses of the body of water receiving the discharge or are prohibited by state law.

Stream — Streams shown on USGS 7.5 minute Quad maps as solid or dashed blue lines or a surface watercourse with a well-defined bed and bank, either natural or artificial, which confines and conducts continuous or periodic flowing water.

Stream Corridor Protection Zone — A zone that allows for the natural, lateral movement of open watercourses and prevents structures from being impacted by natural streambank erosion. A corridor with natural vegetation is left in its natural state, typically vegetated to provide stream stabilization and water quality benefits through infiltration.

Streambank Erosion — The removal of streambanks by flowing water below the ordinary high water mark.

Streambed — The portion of a stream below the ordinary high-water mark where the erosion and deposition of sediments occur.

Substantially Affect Stormwater Drainage — Any change to the site drainage characteristics including, but not limited to, removal of existing or installation of new collection and conveyance features such as inlets, curb and gutter, underdrains, or the alteration of existing site grading that changes drainage direction or volume.

Swale — An artificial watercourse that may contain contiguous areas of standing or flowing water only following a rainfall event, or is planted with or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake, or is designed to take into account the soil erodibility, soil percolation, slope, slope length, and contributing area so as to prevent erosion and reduce the pollutant concentration of a given volume.

Terrestrial Vegetation — Upland vegetation and facultative upland vegetation, as defined in the City's Approved Native Plant Species for Stormwater Quality Best Management Practices, found in **Appendix B**.

Watershed — A region draining into a river, river system, or body of water.

Wetland Vegetation — Obligate hydrophyte, facultative wetland and facultative vegetation as defined in the Native Plant Species list. (Reference **Appendix B** for the City’s list of approved native plant species.)

Wetlands — Those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Acronyms

BDF	Basin Development Factor
BMP	Best Management Practice
CC	City of Columbus
CMSC	City of Columbus Construction and Materials Specifications
CN	Curve Number
Corps	Army Corps of Engineers
DOSD	Division of Sewerage and Drainage
ESC	Erosion and Sediment Control
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
HGL	Hydraulic Grade Line
HSG	Hydrologic Soil Group
IDF	Intensity-Duration-Frequency
L & D Manual	ODOT Location and Design Manual, Volume 2, Drainage Design
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service (formerly the SCS)
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
ORC	Ohio Revised Code

TND	Traditional Neighborhood Development
WQv	Water Quality Volume
SCS	The United States Department of Agriculture Soil Conservation Service (which is now the NRCS)
SWPPP/SWP3	Stormwater Pollution Prevention Plan
USGS	United States Geologic Survey

Stormwater Drainage Manual



Part I Introduction

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Part I – Stormwater Policy and Facility Design Criteria

Part I of the Manual supports the layout and design of stormwater management facilities. The City's Division of Sewerage and Drainage (part of the Department of Public Utilities) was granted the authority to generate design standards and to enforce rules governing stormwater management under Title 2 Administrative Codes, Section 221.05 of the Columbus City Code. Columbus City Code Title 11, Section 1145.11 grants the Director authority to adopt rules and regulations as necessary for administration of this chapter, Regulation of Sewer Use. In addition, Section 1145.71 authorizes the Director to adopt regulations governing the quantity and quality of stormwater discharges from premises within the City, and from premises outside of the City which are tributary to the City's sewer system. Furthermore, Section 1149.04 authorizes the Director to promulgate rules as are necessary for the safe, economical, and efficient management and protection of the stormwater system. The City has determined that the stormwater management requirements set forth in the Manual are necessary to govern stormwater quantity and quality, and for the safe and efficient management of the stormwater system. This section provides the City's requirements for successfully designing the stormwater management facilities and the layout requirements that must accompany acceptable projects altering land use. These requirements are organized in three sections containing subsections for each pertinent element of the stormwater management system.

Section 1 Preservation and Protection

- Stream Protection Policy Statement
- Stream Identification
- Stream Corridor Protection Zone
- Floodplain Preservation and Developments within Special Flood Hazard Areas
- Wetland Policy

Section 2 Stormwater Conveyance

- General Criteria
 - Offsite Tributary Area
 - Onsite Stormwater Conveyance
 - Downstream Analysis
 - Agricultural Field Tiles
 - Stormwater System Diversions
- Hydrology Requirements
- Design of Minor Stormwater Conveyance Systems
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- End Treatments
- Outlet Channel Protection
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- Open Watercourses
- Design of Major Stormwater Routing Systems

Section 3 Stormwater Controls

- General Criteria
- Stormwater Quantity Controls
 - Stormwater Quantity Control Exemptions
 - Hydrologic Requirements
 - Acceptable Methods and Criteria
 - Dry and Wet Detention Basins (general criteria)
 - Parking Lot Storage
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 - Stormwater Quality Control - Acceptable Methods and Criteria
 - Group 1 – Stormwater Basins
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 - Group 3 – Swales and Filter Strips
 - Group 4 – Water Quality Controls for Commercial Activity Areas
 - Applicant-Proposed Stormwater Controls
- As-built Surveys
- Construction Stormwater Quality Controls
 - Additional Requirements

Section 4 Operation, Maintenance, and Monitoring of Stormwater Controls

- Stormwater Control Facility Maintenance Responsibilities
 - Stormwater Control Facility Easement and Access Requirements
 - Stormwater Control Facility Maintenance Plan
 - Maintenance Inspection and Reporting Requirements
 - Stormwater Control Facility Monitoring Requirements

Stormwater Drainage Manual



Part I Section 1

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Section 1

Preservation and Protection

The City has determined that establishing a Stream Corridor Protection Zone along streams is necessary to protect structures from damage caused by natural erosion. A Stream Corridor Protection Zone may provide the following benefits:

- Reduce stream bank erosion and thereby protect structures;
- Add to the natural character and provide viewsheds within the community;
- Prevent or reduce flood related damage;
- Remove sediment, nutrients, and pollutants from the stormwater entering the stream;
- Provide shade that maintains cooler water temperatures;
- Maintain biological diversity;
- Maintain adequate flows of water to underground aquifers; and
- Provide greenway corridors for wildlife and to provide other environmental and aesthetic values.

Unless otherwise exempt, all development and redevelopment projects that include a portion of the Stream Corridor Protection Zone must minimize alterations of the stream, keep new structures out of the Stream Corridor Protection Zone, and maintain a riparian corridor along the stream to minimize streambank erosion and to protect stream habitat. Section 1 of the Manual provides stream protection standards for all development and redevelopment projects in the City.

1.1 Stream Protection Policy Statement

With the exception of roadside ditches and approved roadway crossings, all streams identified on the United States Geologic Survey (USGS) quad maps with solid or blue dashed lines and all watercourses having a defined bed and bank shall remain open and shall not be enclosed within a storm sewer or other engineered structure. A Stream Corridor Protection Zone shall be established that provides for adequate conveyance, water quality benefit and allows for the natural, lateral movement of streams to prevent structures from being impacted by natural streambank erosion. Streams may not be realigned or relocated.

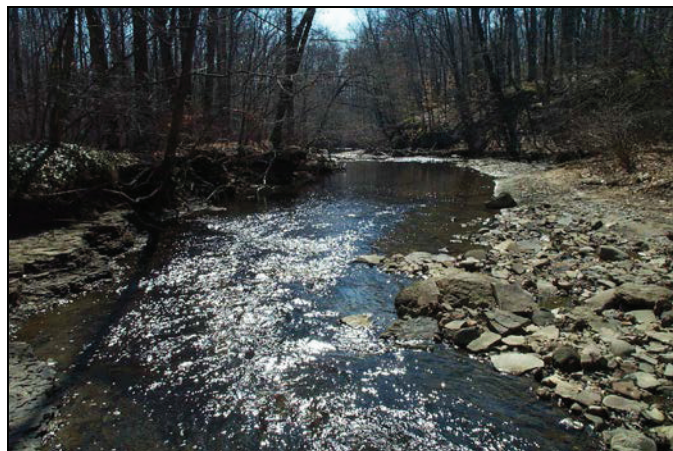
1.2 Stream Identification

A stream is a surface watercourse with a well-defined bed and bank, either natural or artificial, which confines and conducts continuous or periodic flowing water. The Applicant shall identify and label all streams within the project site and/or streams receiving stormwater discharges from the project site on the master drainage plan (Section 6) submitted as part of the Stormwater Management Report. The Applicant shall provide information that supports the classification of streams with the Stormwater Management Report. Such information may include, but not be limited to, copies from USGS Quad sheets, photographs, FEMA maps, or soils maps showing the location of a stream and delineation of the upstream tributary area.

If the City determines that the submitted evidence is inconclusive, then they may require a site inspection and input from other sources of information including, but not limited to, the U.S. Army Corps of Engineers, Ohio EPA, ODNR, or the appropriate County Soil and Water Conservation District. Final determination regarding whether the watercourse or channel meets the classification of a stream for the purposes of the Manual shall be at the discretion of the Director or designee. Photographs of a stream and a constructed open channel, which is not considered to be a stream, are on the following page. Stream Corridor Protection Zones are not required along constructed open channels that are not classified as streams.

If the applicant has already received an approved stream and wetland delineation from the U.S. Army Corps of Engineers, the City will accept that delineation. The applicant may submit to the City its pending application with the Corps; however, an application that is pending and has not been approved by the Corps will not automatically be approved by the City.

Example of a Stream



Example of a Swale/Open Channel that is not classified as a stream



1.3 Stream Corridor Protection Zone

A Stream Corridor Protection Zone consists of the stream and the riparian area along the stream. Its purpose is to allow the natural, lateral movement of open water courses, provide sufficient area for flood conveyance, protect water quality and prevent structures from being impacted by natural streambank erosion.

1.3.1 Stream Corridor Protection Zone Delineation

The total width of the Stream Corridor Protection Zone for streams shall be established using the following criteria, whichever is greater:

1. The Federal Emergency Management Agency (FEMA) designated 100-year floodway, or
2. Using the equation below with a minimum of 50 feet to a maximum of 250 feet. The zone shall be centered on the stream valley generally located at the point where both zone boundaries intersect equal elevations on either side of the stream. Where topography is flat the zone shall be centered on centerline of the stream:

$$\text{Stream Corridor Protection Zone, in feet of width}^1 = 147(\text{DA})^{0.38}$$

Where DA = drainage area of the stream in square miles, or

3. 50 feet from the top of each bank for fourth order streams or larger.

¹Equation is from the Rainwater and Development Manual by the Ohio Department of Natural Resources (ODNR) based on regional curve analysis for various watercourses measured in the eastern United States region.

In most instances the Stream Corridor Protection Zone is located by placing its centerline over the centerline of the watercourse. However, individual site conditions including, but not limited to, topography and slope must be considered when determining the precise location of the Stream Corridor Protection Zone.

The width of the Stream Corridor Protection Zone shall be extended to include slopes that are greater than 15 percent and begin at a point within the Stream Corridor Protection Zone. The maximum width of the Stream Corridor Protection Zone extension shall be to the top of the slope or to a point up-slope, as measured horizontally, where the width of the Stream Corridor Protection Zone is doubled, whichever is less. Slope protection widths may be extended beyond these limits at the City's discretion on a case-by-case basis.

Where wetlands protected under federal or state law are located partially within the Stream Corridor Protection Zone, the Stream Corridor Protection Zone shall be extended to include the full extent of the wetland area.

1.3.2 Permanent Protection of the Stream Corridor

The Stream Corridor Protection Zone shall be kept in as natural state as possible so that it can perform its inherent function of erosion protection, flood storage, and water quality protection. In order to ensure the permanent protection of the zone, the developer shall provide for the permanent protection of the zone.

The developer shall identify on the plat or plan and visibly delineate on the site the Stream Corridor Protection Zone prior to any construction on the site to prevent excursions onto the zone during construction. Such delineation must be submitted to the Director of Public Utilities or the Director's designee for review and approval prior to construction.

No later than the conclusion of construction, the developer shall permanently delineate the Stream Corridor Protection Zone in an aesthetically harmonious manner, approved by the director, such that the location of the zone is apparent to casual observers and permits access to the zone.

Language preventing Property Owners from constructing facilities and performing activities that are prohibited within the Stream Corridor Protection Zone, as described in Section 1.3.3, shall be shown on the plat and reflected on all deeds. Land designated as a Stream Corridor Protection Zone may, at the option of the land owner, be deeded in fee simple to the City of Columbus or placed in a Preservation Easement.

That portion of a lot or parcel reserved as the Stream Corridor Protection Zone may be included in the total area for computing the density permitted by the particular underlying zoning district for that parcel, even if ownership of the Stream Corridor Protection Zone is subsequently transferred. The resulting increase in net density permitted on that portion of the lot or parcel located outside of the Stream Corridor

Protection Zone is acceptable to the extent that the gross density for the total area does not exceed the density prescribed by the underlying zoning district.

1.3.3 Prohibited Uses in the Stream Corridor Protection Zone

Table 1-1 lists facilities/activities that are prohibited within the Stream Corridor Protection Zone. Where feasible and elevations permit, stormwater pipe outfalls shall be located outside the Stream Corridor Protection Zone and discharged into either a structural level spreader or a constructed open channel with appropriate protection from erosion.

Table 1-1

Facilities and Activities Prohibited in the Stream Corridor Protection Zone

Prohibited Facilities	Prohibited Activities*
<ul style="list-style-type: none"> ▪ Buildings/structures (except bridges) ▪ Swimming pools ▪ Signs ▪ Billboards ▪ Fences ▪ Parking lots ▪ Electric lines that run parallel to the stream (with the exception of transmission lines) ▪ Utility lines or pipes that run parallel to the stream (except for necessary public sanitary, water, stormwater [see above] and public utility transmission lines as approved by the City) ▪ Telecommunications lines that run parallel to the stream (with the exception of transmission lines) ▪ Cable TV lines that run parallel to the stream ▪ Other improvements deemed unacceptable to the City 	<ul style="list-style-type: none"> ▪ Agriculture ▪ Industry/ commercial business ▪ Filling ▪ Excavation ▪ Ditching/diking ▪ Removal of topsoil, sand, gravel, rock, oil, gas ▪ Any other change in topography other than what is caused by natural forces ▪ Herbicides/pesticides ▪ Removal of native trees /vegetation except as approved by the City

* Unless designated a permitted use by the City

1.3.4 Permitted Uses in the Stream Corridor Protection Zone

Uses permitted within the Stream Corridor Protection Zone include, but are not limited to, the following:

1. Passive uses including hiking, fishing, picnicking, and similar uses. Construction of paved trails to further such passive recreation uses is permitted; however, trails that become damaged due to natural erosion should not be repaired but should be moved upland or removed altogether,
2. Vegetation removal on existing levees and dikes,
3. Activities by City personnel that are necessary to maintain the function of any open watercourse and the West Columbus Local Protection Project (floodwall),

4. Removal of damaged or diseased trees.
5. Revegetation and/or reforestation with plantings of native species,
6. Public utility crossings (Those utilities owned by the City, suburb or any entity contracting with the City as defined by Title 11 of the City Code.),
7. Street crossings,
8. Excavation for providing compensatory floodplain volume immediately adjacent to the channel,
9. Construction activities associated with properly permitted stream restoration projects,
10. Disturbances resulting from permitted stream and/or wetland mitigation projects provided the mitigation is to offset impacts to local protected wetlands (see Section 1.5), and
11. Activities related to enhancement of existing wetlands.

Disturbances within the Stream Corridor Protection Zone as a result of a permitted use must be mitigated through revegetation/reforestation, with the exception of vegetation removal for floodwall and dike/berm maintenance and inspection.

1.3.5 Applicability of Stream Corridor Protection Zones

A Stream Corridor Protection Zone is required for all projects subject to the Manual, except as follows:

Exemption 1 — Stream Corridor Protection Zones will not be required along existing streams located within the Downtown Zoning District as defined in City Code 3359.03 (See **Figure 1-1** at the end of this section).

Exemption 2 — Where the Stream Corridor Protection Zone for the Scioto River falls beyond the limits of the existing West Columbus Local Protection Project (floodwall), the limits of the Stream Corridor Protection Zone for the Scioto River shall end at the river side face of the floodwall or floodwall easement. Streams tributary to the Scioto River, however, that are not located within the downtown zoning district, will have a Stream Corridor Protection Zone based on their respective tributary area or floodway width as specified in Section 1.3.

1.4 Floodplain Preservation and Developments within Special Flood Hazard Areas

All development within FEMA designated Special Flood Hazard Areas is subject to conditions of the City of Columbus' Title 11 Water Sewer and Electric Code, Chapter

1150 Flood Plain Management. The process for approving and administering floodplain fill permits is administered by the Columbus Development Department.

The Division of Sewerage and Drainage prohibits the filling of FEMA designated floodplains without compensation due to potential for problems associated with flooding, erosion, and environmental impact. With the exception of fills associated with widening an existing public roadway within a FEMA designated Flood Hazard Area, fill within the FEMA delineated 100-year floodplain outside of the Stream Corridor Protection Zone must be compensated by removing an equivalent volume of material or greater. (Information on FEMA's 100-year floodplains can be obtained through ODNR's Geographic Information Management Systems metadata or directly through FEMA.) The amount of compensatory storage shall be determined by the volume of material removed above the ordinary high-water mark of the stream and below the 100-year flood elevation established for the area. The compensation area must have an unrestricted hydraulic connection to the affected stream and provide the same rate of flood storage capture and discharge over the course of the flood event as in pre-project conditions. First consideration shall be given to expanding the stream's existing floodplain next to the existing channel and within the limits of the development site. In instances where compensatory storage within the limits of the development site is proven to be impractical, the City will consider offsite compensatory storage as long as:

1. First consideration is given to performing compensatory storage by expanding the stream's existing floodplain next to the channel.
2. The mitigation is performed as close to the proposed fill area as possible.
3. The mitigation occurs within the same hydraulic reach of the same stream in which filling is proposed to occur.
4. Where the Applicant proposes to provide compensatory storage on property owned by others, the Applicant must submit a written agreement between such landowner and the Applicant wherein the landowner agrees to convey an easement or other property interest or right to the Applicant allowing compensatory storage, and to permanently maintain such area for flood storage purposes in the event that the City approves the Applicant's proposed project.

The same hydraulic reach is defined as the reach of a stream between the nearest features controlling the flood water elevations upstream and downstream from the proposed fill area.

Disturbances created within the Stream Corridor Protection Zone for the purpose of providing compensatory floodplain storage adjacent to the stream are permitted; however, all disturbances must be mitigated through reforestation and revegetation. A streambank restoration plan that incorporates bioengineering techniques shall be prepared for compensatory floodplain fill work that occurs immediately adjacent to the streambank. The streambank restoration plan shall be submitted as part of the Stormwater Management Report and Construction Plan submission (Part II) for the project. The means and methods for stream restoration work, including non-vegetative and vegetative materials, shall be shown in the plan. Streambank restoration plans

shall be designed and constructed based on the bankfull discharge and able to withstand the inundation, stream velocities, and channel stresses associated with the 100-year flood event without structural failure once vegetative cover is established. Streambank restoration plans shall be submitted with the construction plans. Guidance and further references for streambank stabilization techniques are provided under USDA's *Stream Corridor Restoration: Principles, Practices and Processes and Engineering Handbook*.

Embankment slopes proposed in compensatory storage areas must reasonably conform to the natural slopes adjacent to the disturbed area. The use of vertical retaining structures constructed of concrete, brick, block or other like-material is specifically prohibited. The use of crib walls with bioengineered fascines may be approved on a case-by-case basis.

1.5 Wetland Policy

The City of Columbus supports the preservation of existing wetlands and values the stormwater benefits that they provide. Wetlands have been determined to provide flood and storm control by the hydrologic absorption and storage capacity; pollution treatment by nutrient uptake from wetland plants and the filtering of silt and organic matter by settlement; protection of subsurface water resources by recharging ground water supplies; and wildlife habitat in nesting areas, feeding grounds, and cover for many species including migratory waterfowl, rare, threatened, or endangered wildlife species.

Jurisdictional and isolated wetlands on development sites shall be delineated by a qualified professional as required by the U.S. Army Corps of Engineers (Corps) and the Ohio Environmental Protection Agency (OEPA). Wetland boundaries shall be mapped in an acceptable electronic format and submitted to the Division of Sewerage and Drainage. Copies of all permit applications and any associated wetland mitigation plans shall also be submitted to the Division of Sewerage and Drainage with the Stormwater Management Report. The City may not approve stormwater management reports or plans prior to receipt of copies of approved Federal (404) and State (401) permits if the permits are required.

Where wetlands protected under federal or state law are located partially within the Stream Corridor Protection Zone, the Stream Corridor Protection Zone shall be extended to include the full extent of the wetland area plus any setback from the wetland required by a Section 404 permit.

For impacted wetlands that fall outside the Stream Corridor Protection Zone, the City encourages the mitigation of proposed impacts to occur within the limits of the development site but not outside the HUC-14 subwatershed. To encourage onsite/intra-watershed wetland mitigation, the City will consider the location of mitigation projects within the Stream Corridor Protection Zones of properties that are located adjacent to a tributary stream provided that:

1. Impacts to isolated wetlands and associated mitigation plans are approved/permitted by the Corps and/or OEPA, and
2. Wetlands constructed for Section 404/401 mitigation purposes are not used to serve as a stormwater Best Management Practice (BMP) to treat onsite stormwater runoff.

The stormwater system design for the project shall provide that the predevelopment quantity and quality of stormwater flows directed to any protected wetlands is maintained. Constructed wetlands (including bio-retention basins) shall not be considered subject to these requirements. Existing wetlands shall not be used for stormwater management or stormwater runoff quality treatment of the development site.

Figure 1-1
Downtown District Boundary per City Code 3359.03

