Chapter 100. Policy and Procedures

Section 101. Introduction

101.01 Purpose

This Manual provides guidelines on the engineering design and construction standards for proper stormwater management for engineers**,** builders, contractors, land planners, and property owners undertaking land alteration within the City of Indianapolis, Marion County, Indiana (the "City"). Interlocal agreements may extend the jurisdiction of this manual to excluded cities within Marion County.

The contents of this Manual have been adopted by the Board of Public Works (the "Board") in conformance with standard promulgation procedures listed in Section 561–321, Authorization to promulgate regulations, of the Marion County Code of Ordinances (the "City Code"), to accomplish the following objectives:

- Provide for consistent, high quality project evaluation and design by consolidating current departmental standards within a single, well organized, and easily referenced document.
- Provide a clear explanation of what is required for approval of stormwater management plan submittals.
- Improve the quality and consistency of installation of stormwater facilities, with a high level of workmanship, according to the approved stormwater management plan.
- Meet community needs for minimizing the impacts of new development and redevelopment projects on existing stormwater management facilities.

This Manual was developed with the assumption that its user will possess a basic understanding in the area of civil engineering design, construction, and / or land alteration. Readers of this Manual which are not qualified by education and/or experience in the field of construction, engineering, and / or land alteration should consult with a more qualified person or persons possessing professional expertise in one or more of these fields prior to application of the requirements set forth herein.

This Manual, together with all future revisions, shall be referred to as the "City of Indianapolis Stormwater Design and Construction Specifications."

101.02 Applicability

This Manual applies to all projects as stated and defined in Section 561–103, Land alterations to be accomplished in accordance with drainage requirements, and Section 561–109, Land alteration defined, of the City Code. These sections of the City Code state that any land alteration must be accomplished in conformity with stormwater requirements where the definition of land alterations shall mean any on-site or off-site action taken relative to land which either:

1. Changes the contour;
2. Changes the runoff rate or volume (e.g. the rate at which water is absorbed);
3. Changes the elevation;
4. Changes the drainage pattern;
5. Creates or changes a stormwater facility;
6. Involves construction, enlargement or location of any building on a permanent foundation;
7. Changes the delivery of point and/or non-point source pollution to streams; or
8. Creates an impoundment.

Each approved phase of a multi-phased project is considered a single project for the purposes of complying with this Manual. Master plan approval does not constitute automatic plan approval for each phase. Each phase shall comply with current requirements at the time of approval.

This Manual should be used in conjunction with Chapter 561 of the City Code. Additional requirements related

to land alteration may be found in Chapters 740, 741, 742, 743 and 744 of the City Code, which are collectively known as the Zoning Ordinance for Marion County, Indiana. Exceptions to the provisions of this Manual are provided in Section 561–221(b), When drainage permits required; enforcement; exceptions, of the City Code.

101.03 Stormwater Manual Organization

The Manual is organized to present the technical and engineering procedures and criteria needed to comply with the City of Indianapolis' stormwater regulations and the Zoning Ordinance for Marion County, Indiana found in the City Code. In addition, general design policy and procedures are presented.

Each chapter contains an initial section that presents the policies and procedures that must be met for approval. These policies and procedures shall be considered as design criteria that are unique for approval within the City.

101.04 Updating

The process of updating this Manual will be in accordance with Section 561–321, Authorization to promulgate regulations, of the City Code. This Manual will be updated and revised, as necessary, to reflect up-to-date engineering practices and information applicable to the City of Indianapolis' jurisdiction. Changes to the Manual will be posted on the City's website as they are produced.

Notwithstanding Section 141-208(b) of the City Code, this Manual shall remain in effect until repealed or amended by the Board of Public Works pursuant to Chapter 141 of the City Code.

101.05 Abbreviations and Definitions

Whenever in these Standards or in any documents or instruments where the Standards govern, the following terms, abbreviations, or definitions are used, the intent and meaning will be interpreted as follows:

Abbreviations	Definitions
AEP	Annual Exceedance Probability
ASTM	American Society of Testing and Materials
AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
BMP	Best Management Practice
BNS	Department of Business and Neighborhood Services
BOD	Biochemical Oxygen Demand
CADD	Computer Aided Design and Drafting
CCTV	Closed Circuit Television
CEG	Citizens Energy Group
CFS	Cubic Feet per Second
CMP	Corrugated Metal Pipe
DDSS	Digital Data Submission Standards
DMD	Department of Metropolitan Development
DPW	Department of Public Works
ESCP	Erosion and Sediment Control Plan
EPA	Environmental Protection Agency

ft	Feet
GIS	Geographic Information System
HDPE	High Density Polyethylene
IAC	Indiana Administrative Code
IC	Indiana Code
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
INDOT	Indiana Department of Transportation
IndyGIS	Indianapolis Graphic Information System
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O&M	Operations and Maintenance
PVC	Polyvinyl Chloride
RCP	Reinforced Concrete Pipe
SWCD	Soil and Water Conservation District
SQU	Stormwater Quality Unit
SWPPP	Stormwater Pollution Prevention Plan
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids

ACCEPTANCE: The formal written acceptance by the Division or Department of an entire project which has been completed in all respects in accordance with the approved plans, specifications, and this Manual including any previously approved modifications thereof.

ADMINISTRATOR: Administrator of the Department of Business and Neighborhood Services (BNS), or their authorized representative.

ANTECEDENT SOIL MOISTURE CONDITIONS: Soil moisture conditions of the watershed at the beginning of a storm. These conditions affect the volume of runoff generated by a particular storm event. Notably they affect the peak discharge only in the lower range of flood magnitudes. As the frequency of a flood event increases, antecedent moisture has a rapidly decreasing influence on runoff.

APPLICANT: The property owner and/or their agent who requests and fills out an application for any type of permit or agreement required by this Manual.

APPROVAL: Decision that allows the applicant to proceed to the next step of the permitting process set out in this Manual.

BACKFILL: Material used to replace material removed from trenches during construction which is above the bedding. The initial backfill (the fill from above the bedding to 12” above the pipe) may vary from structural fill to native soil depending on the pipe material and distance from the edge of pavement. (See Figures 501.03 through 501.12 in Appendix 500: Standard Details).

BEDDING: The material used in the trench to a minimum depth below the bell/barrel of the pipe for the purpose of properly supporting the pipe (See Figures 501.03 through 501.12 in Appendix 500: Standard Details).

BMP OWNER: The property owner.

BMP, GENERAL: Best management practice can refer to a structural stormwater management

measure (e.g. wetland, pond, hydrodynamic separators, sand filter, etc.) or non-structural stormwater measure (e.g. restrictive zoning, reduced impervious areas, etc.). BMPs are designed for the benefit of water quality and quantity control.

BMP, MANUFACTURED: Manufactured BMPs are wholly or partially prefabricated and delivered to a construction site for incorporation into the drainage system. Hydrodynamic separators are examples of manufactured BMPs.

BMP, NATURAL: Natural BMPs are practices that utilize the infiltration and filtering processes of water flowing through vegetation, sand, soil, or other vegetated media to remove suspended and/or dissolved pollutants from runoff. Examples include biofilters, rain gardens, and vegetated swales.

BMP, NON-STRUCTURAL: Non-structural BMPs are comprised of a wide range of activities and/or practices that control or reduce pollutants at their sources. Practices can include the use of natural processes, such as increased infiltration and bio-filtration, good housekeeping practices such as street sweeping or catch basin cleaning, or reduction of directly connected impervious areas. Activity based BMPs include public education, outreach, and involvement activities, such as drain marking and creek clean ups.

BMP, STRUCTURAL: Structural BMP, for the purposes of this manual, are BMPs that are constructed on site. Detention ponds, artificial wetlands, sand filters, and bio-filters are examples of structural BMPs.

BNS: The Department of Business and Neighborhood Services – City of Indianapolis.

BOARD: The Board of Public Works – City of Indianapolis.

BRIDGE: A conveyance structure that is hydraulically short and twenty (20) feet or larger in total span length is considered a bridge.

CITY: The City of Indianapolis.

CLEAN FILL: Uncontaminated non-water-soluble, non-decomposable, inert solid, such as rock, soil, gravel, concrete, and/or clay products. Clean fill shall not mean processed or unprocessed mixed construction and demolition debris, including, but not limited to, wallboard, plastic, wood or metal. The non-water soluble, non-decomposable inert products generated from an approved Class B recycling facility are considered clean fill. Clean fill cannot include any hazardous material and must comply with environmental regulations.

CLEARING AND GRUBBING: The removal and disposal of trees, stumps, roots, logs, shrubs, grass, weeds, fallen timber and other undesirable surface materials.

CITY CODE: Municipal Code of the City of Indianapolis

COMBINED SEWER: A sewer which has been designed or intended to receive both surface runoff and sanitary sewage.

COMMON LATERAL: A lateral which serves more than one building or residential unit.

CONTRACTOR: Any Contractor who meets DPW's requirements and is licensed by BNS to enter into contracts for and to perform the work of installing storm sewers.

CONTRIBUTING DRAINAGE AREA: The total area that contributes runoff upstream of a point of interest, such as a development site.

COUNTY: The county of Marion, State of Indiana.

CRITICAL DEPTH: The depth of flow at which the specific energy is a minimum. An example of critical depth is the depth at which water flows over a weir when no other backwater forces are involved. For

a given discharge and prismatic cross-section geometry there is only one critical depth.

CULVERT: A structure that conveys any flow collected in an open-ended pipe (i.e., headwall, flared end section, mitered end on both ends); a cross-drain. Typically, this is through a roadway embankment or past some other type of flow obstruction.

DEDICATION: The offering and acceptance of a storm sewer facility for public ownership, operation, and maintenance. Inspection, and if necessary, the rehabilitation of an existing storm sewer facility may be required.

DEPARTMENT: Department of Public Works, City of Indianapolis.

DEPRESSION STORAGE: The natural depressions within a watershed which store runoff. Generally, after the depression storage is filled runoff will commence.

DETENTION: Any process or facility that temporarily detains stormwater runoff, reducing the peak flow rate from the drainage area. Frequently, a detention facility will prolong the duration of the runoff event hydrograph.

DIGITAL DATA SUBMISSION STANDARDS (DDSS): Standards in which the City of Indianapolis can integrate CAD drawings into the GIS environment thus maintaining the integrity and positional accuracy of the data.

DIRECTOR: Director of the Department of Public Works, City of Indianapolis, or their authorized representative.

DIVISION: Division of Construction and Business Services of the Department of Business and Neighborhood Services, City of Indianapolis.

DRAINAGE FACILITIES: See STORMWATER FACILITIES

EASEMENT: Areas along the line of drainage facilities which are outside the road easements or rights-of-way and are recorded and dedicated to the Department granting rights along the line of the drainage facility.

EFFECTIVE DRAINAGE AREA: The drainage area from a specific site, excluding offsite drainage, where offsite drainage either does not exist or bypasses the site through culverts or other means.

ENGINEER: The Engineer for the Owner.

EXISTING CONDITIONS: The site conditions that existed on the property 12 months prior to the date of application for a drainage permit. Pre-developed conditions may include conditions prior to any development.

FIELD TILE/SUBSURFACE DRAIN: Under drain systems in fields that have been installed for the purpose of dewatering fields that are subject to seasonably high-water tables. Subsurface drains may also be employed in non-agricultural areas.

FINAL BACKFILL: Material used to replace material removed from trenches during construction which is above the structural backfill (See Figures 501.03 through 501.12 in Appendix 500: Standard Details).

FIRST FLUSH: The onset of the rainfall/runoff process wherein most loose, unattached pollutants on the land or street surface are readily entrained into the stormwater runoff and wash off the surface into the drainage system. For many pollutants, the highest concentrations during the runoff event will occur during the first flush. The first flush may be considered the runoff from rainfall up to a specified depth such as a one (1) inch of rainfall

FLOATING DEBRIS (FLOATABLES): Any material that, due to its physical properties, will float on the

surface of water. For the purposes of this manual, the term does not include naturally occurring floatables, such as, but not limited to, leaves or tree limbs.

FOUNDATION DRAINS: Any network of pipes, pumps or drainage mechanisms located at, near, or under a footing, foundation or floor slab of any building or structure that intentionally or unintentionally conveys groundwater away from a building or structure.

FREE OUTLETS: Outlets where the tailwater is equal to or lower than critical depth. For culverts and storm drains having free outlets, lowering of the tailwater has no effect on the discharge or the backwater profile upstream of the tailwater.

FREEBOARD: An additional elevation regarded as a safety factor, above the peak design water elevation.

FREQUENCY: The average time interval between equal magnitude floods or rainfall events. For example, a twenty-five (25) -year flood has a four (4) percent chance of occurrence in any given year.

HAUNCHING: The area in the trench from the top of the bedding to the springline of the pipe. (See Figure 501.04 in Appendix 500: Standard Details).

HYDRAULIC ROUGHNESS: A composite of the physical characteristics that influence the flow of water across a surface, whether a natural, a channelized surface or an enclosed conveyance such as a pipe. It affects both the travel time of a watershed and drainage conveyance.

HYDROGRAPH: Graph of time vs. flow of runoff at a point.

HYETOGRAPH: Graph of time vs. rainfall.

IMPERVIOUS AREA: Areas where the land surface has been altered in a matter that decreases the amount of rainwater infiltration. Impervious surfaces include rooftops, roads, parking areas, patios, and other surfaces that retard the infiltration of rainwater or snowmelt into the ground.

INFILTRATION: The complex process of rainfall or runoff penetrating the ground surface and flowing through the upper soil surface. The infiltration curve is a graph of the time vs. infiltration.

INITIAL BACKFILL: Material used in the trench above the haunching. (See Figure 501.04 in Appendix 500: Standard Details).

INNOVATIVE BMP: Innovative BMPs, for the purposes of this manual, are any BMPs that are not on the list of traditional structural BMPs identified in Section 702 of this Manual. Innovative BMPs are primarily, though not exclusively, manufactured stormwater quality units.

INSPECTION CONSULTANT: Firm contracted in a Professional Services Agreement with the City for the inspection of a public or private project.

INTERCEPTION: Storage or retention of rainfall on foliage and other intercepting surfaces during a rainfall event.

INVERT: Flowline of a culvert or pipe (inside bottom).

LAG TIME (T_l): The time from the centroid of the excess rainfall to the peak of the runoff hydrograph.

LAND DISTURBANCE: Any manmade change of the land surface, including: removal of vegetative cover that exposes the underlying soil, excavating, filling, transporting, and grading.

LAND SURVEYOR: A person registered as a land surveyor by the Indiana State Board of Registration as provided by Indiana Code (IC) 25-21.5.

MAINTENANCE: Maintenance activities include cleaning, spraying, removing obstructions from, cutting vegetation from, performing task in the Operations and Maintenance Manual, and making repairs in a drainage facility so that it will perform the function for which it was designed and constructed. Maintenance activities do not require a drainage permit as defined in Section 561-221 of the City Code.

MANHOLE: A structure used in a sewer system to provide access for maintenance.

MANUAL: The City of Indianapolis Department of Public Works Stormwater Specifications and Design Standards.

MANUFACTURER: The producer of those materials required by this Manual having direct responsibility and authority for the satisfaction of those minimum material specifications set forth herein.

MILD SLOPE CULVERT OPERATION: Operation where critical depth is less than uniform depth.

NEW CONNECTION: A connection to the drainage system, or a repair, replacement or modification to an existing drainage system element that increases the flow to the system.

OFFLINE STRUCTURE: BMPs that treat only a fraction of the site stormwater runoff for water quality purposes by diversion from another structure. Flows not treated by the BMP bypass the structure and re-enter the watercourse below the BMP.

OWNER: Any individual, partnership, firm, corporation or other entity who, as property owner, is initiating the Work.

PARTIALLY SUBMERGED OUTLET: An outlet whose tailwater is higher than critical depth and lower than the height of the culvert.

PEAK DISCHARGE (Q_p): The maximum rate of flow of water passing a given point during or after a rainfall event. Also called the Peak Flow.

PERMIT: Clearance to perform specific work under specific conditions at specific locations.

PLANS: Construction plans which show the location, character, dimensions, and details of the work to be done.

PROFESSIONAL ENGINEER: A person registered as a professional engineer by the Indiana State Board of Registration for Professional Engineers under IC 25-31.

RAINFALL EXCESS: Excess water available to runoff after interception, depression storage, and infiltration have been satisfied.

RECONSTRUCTION/REHABILITATION: Any material change to the original design and construction of a drainage feature, including its capacity. Reconstruction/rehabilitation activities require a drainage permit.

RECORD DRAWINGS (AS-BUILTS): Plans certified, signed and dated by a professional engineer or land surveyor registered in the State of Indiana, indicating the Plans have been reviewed and revised, if necessary, to accurately show all as-built construction and installation details including, but not limited to, key elevations, locations and distances. Record Drawings shall comply with the DDSS and be inclusive of all submittal requirement within the DDSS and will include Record Digital GIS Data, Record Digital Plan Data, Record Reproducible Plans, and attribute tables.

REDEVELOPMENT: Any construction, land alteration, or improvement where structures are removed, expanded and/or replaced.

REGIONAL DETENTION/RETENTION: Regional facility which provides stormwater quality and/or quantity benefit for an area upstream of the property.

RETENTION: A practice or structure whose primary focus is to retain stormwater on-site through evapotranspiration or infiltration.

RIGHT-OF-WAY: All land or interest therein which by deed, conveyance, agreement, easement, dedication or process of law is reserved for or dedicated to the use of the general public, within which the Department shall have the right to install and maintain drainage facilities.

SEWER: A pipe for carrying wastewater (sanitary sewer), stormwater (storm sewer) or a combination of both (combined sewer). Wherever in this Manual the word “sewer” is used without distinguishing type, “sewer” shall mean storm sewer.

SPECIFIC ENERGY: The sum of the depth and velocity head of the flow. Sometimes called "specific head."

STAGE: The elevation of the water surface above a specified elevation datum.

STANDARD DRAWINGS (DETAILS): The drawing of structures, storm sewer lines or devices commonly used and referred to on the Plans and in this Manual.

STANDARDS: The City of Indianapolis Department of Public Works Stormwater Design and Construction Specifications Standards, also known as the Manual. The requirements for the design and construction of drainage facilities within the City of Indianapolis as contained herein and all subsequent additions, deletions or revisions.

STEEP SLOPE CULVERT OPERATION: Condition where the computed critical depth is greater than the computed uniform depth.

STOP WORK ORDER: An order requiring the suspension of the pertinent construction activity for any construction project within the City.

STORM DRAIN: Underground pipe system designed to intercept and convey stormwater runoff to an adequate outlet.

STORMWATER FACILITIES: Ditches, bioswales, channels, conduits, culverts, forebays, hydrodynamic separators, pervious/permeable pavements, pipes, retention or detention systems, tiles, swales, and other natural or artificial means of conveying, controlling or removing pollutants from stormwater.

STORMWATER QUALITY MANAGEMENT: A system of vegetative, structural, and other measures that reduce or eliminate pollutants that might otherwise be carried by surface runoff.

STORMWATER: Any flow occurring during or following any form of natural precipitation and resulting therefrom.

STRUCTURE: See Section 740-202 of the City Code.

SUBMERGED INLET: An inlet having a headwater greater than 1.5D.

SUBMERGED OUTLET: An outlet having a tailwater elevation higher than the crown of the culvert.

TAILWATER: Standing or running water, and specifically its elevation, outside the downstream or outlet end of a culvert or storm drain system.

TIME OF CONCENTRATION (t_c): The time required for water from the most remote point of the drainage basin to enter into the stormwater facilities being analyzed. Thus, the time of concentration is the maximum time for water to travel through the watershed, which is not always the maximum distance from the outlet to any point in the watershed.

TREATMENT TRAIN: A treatment train consists of more than one BMP in series treating stormwater runoff. Such configurations are necessary when BMPs individually cannot meet either the 80% TSS reduction and/or floatable control goals.

UNIFORM FLOW: Flow in a conveyance of constant cross section having a constant discharge, velocity and depth of flow throughout the reach. In uniform flow, it is assumed that the depth of flow is the same at every section of the conveyance.

UNIT HYDROGRAPH: The direct runoff hydrograph resulting from a rainfall event which has a specific temporal and spatial distribution and which lasts for a specific duration of time (thus there could be a 5-, 10-, 15-minute, etc. unit hydrograph for the same drainage area). The ordinates of the unit hydrograph are such that the volume of direct runoff represented by the area under the hydrograph is equal to one inch of runoff from the drainage area.

WATERBODY: Any area that in a normal year has water flowing or standing above ground to the extent that evidence of an ordinary high-water mark is established.

WATERSHED: A drainage area or region consisting of all the land from an identified, delineated or circumscribed drainage divide draining to a single identified drainage outlet or stream mouth.

WORK: All the activities to be done under the permit, in accordance with the approved plans, specifications, these Standards, and conditions.

101.06 Enforcement of Standards

Failure to comply with requirements set forth by this Manual may necessitate enforcement actions by the Administrator or Director of BNS in accordance with Sections 561–261 through 267 of the City Code.

101.07 Penalties

Any person violating any provisions of this Manual shall be subject to the penalties in accordance with Section 561-265 of the City Code and may be required to correct such violation at their expense.

Section 102. Plan Submittal Policy and Procedures

102.01 Professional Certification

Site plans, specifications, and supporting computations shall be prepared by a registered professional as defined in Section 561–224 of the City Code and submitted to BNS, for review and approval prior to the initiation of any on-site land alteration as required by Section 102.03, “Platted Subdivisions, Commercial, and Industrial Developments” of this Manual**.** The certification should be in the form provided by the "Certification of Sufficiency of Plan" presented in Section 561-224 of the City Code.

102.02 Plan Submittal and Approval Process

A stormwater permit may be issued if the criteria listed in Section 561–222, Eligibility to obtain permit, and Section 561–223, Application, issuance, of the City Code have been met. As a general rule, all land alterations will require a:

1. Stormwater Permit Application;
2. Stormwater Plans;
3. Technical Information Report;
4. Sediment and Erosion Control Plan or SWPPP;
5. Operation and Maintenance Manual for all detention, stormwater, water quality structures, and conveyances; and
6. Digital submittal in compliance with the Digital Data Submission Standards (DDSS).

Each of these is described in the following Sections. Every site development project is different in nature and scope and thus may result in the plan approval process being altered to accommodate the specific considerations of the project. Therefore, the designer should consider a pre-design meeting at which any alterations to the plan submittal process are discussed and documented.

Progress toward completion of approved drainage plans and associated drainage permits is subject to the time constraints defined in Section 561-224, Professionally prepared and certified drainage plans, and Section 561-226, Expiration of permit by operation of law; extensions, of the City Code.

The zoning of any properties for which drainage permits are applied must be consistent with the proposed land use before drainage permits will be approved.

Work and on-site land alteration, including clear cutting, stump removal, grading, and filling, shall not commence prior to approval of a drainage permit and installation of all sedimentation and erosion control devices required by the approved permit.

102.03 Platted Subdivisions, Commercial, and Industrial Developments

Stormwater plans shall be submitted to BNS for approval for sites that comply with the criteria listed in Section 561-222, “Eligibility to obtain permit,” and Section 561-223, Application, issuance, of the City Code. In addition to the requirements listed in Section 561-224(a) of the City Code, the following information must be submitted for approval:

1. Construction Features. The stormwater plan shall demonstrate and describe surface and subsurface drainage and include the following:

    a. Stormwater Plan: The stormwater plan shall be drawn to scale, preferably one (1) inch per fifty (50) feet, or a sufficient scale to accurately depict all features that affect stormwater design, and an arrow indicating north shall appear on each page. Due to filing limitations, the stormwater plan shall be presented on a maximum plan sheet size of twenty-four (24) inch by thirty-six (36) inch. Existing and proposed on-site land contours shall be shown at one-foot contour intervals except where slopes are steeper than twenty percent (20%). Off-site watershed boundary maps shall be submitted at an appropriate contour interval sufficient to depict drainage areas and slopes. A benchmark, which is easily accessible and re-locatable, shall be shown.
    b. Cover Sheet: A cover sheet shall be provided, including location and vicinity map. A map that indicates the location and vicinity of the proposed land alteration shall be included in the stormwater plan. It shall reference a nearby major roadway intersection. The cover sheet shall also include site address, as assigned by BNS, the BNS Compliance Information Block and a stormwater structure summary table. The summary table shall provide each proposed pipe size and respective length with the number of proposed structures. The cover sheet shall also include a table listing all stormwater BMPs with their State Plane center coordinates.
    c. Existing and Proposed Stormwater Facilities: The stormwater plan shall show the locations of all existing and proposed stormwater facilities. Storm drains, manholes and other structures shall be located by dimensions on the plans in relation to surrounding physical features. However, the areas where physical features are not available, coordinates of manholes and bearings of storm drains shall be based either on the State of Indiana's coordinate system or latitude and longitude. Indiana’s State Plane Coordinate System shall be used to identify the location of the outlet of each

BMP included it the plan. If applicable, the stormwater plan shall show the direction of flow, elevation of inverts, gradient, materials and size of existing and proposed storm drains.

d. Storm Drain Plan and Profile for all Class 1 pipe (within the right-of-way or conveying runoff from more than one parcel), a plan and profile shall be submitted. The plan shall be shown on the upper portion of the drawing. Generally, the plan shall be drawn on a scale that is clear and legible and not greater than one (1) inch equals fifty (50) feet.

   The plan shall show appropriate right-of-way and easement limits with instrument numbers, as applicable. The profile shall be shown under the plan and shall extend a sufficient distance downstream of the outlet to allow any pertinent information concerning the outfall channel to be shown. All invert elevations and pipe slopes shall be listed. For each pipe the length, size and material shall be annotated on the profile sheet near the dimension line. Detail title and/or number references shall be called out on the profile plan.

   Generally, the storm drain and inlet profile shall be drawn on a horizontal scale equal to the plan and with a vertical scale of one (1) inch equals five (5) feet. Where a storm drain is located inside the limits of an existing or proposed pavement or shoulder, the center line grade of the road shall be shown. Where a storm drain is located outside pavement or shoulder, the existing ground over the storm drain with proposed grading shall be shown. If the storm drain is to be constructed on fill, the profile of the undisturbed earth, at the storm drain location, shall be shown. All utility locations at intersections with the storm drain shall be shown.

e. Soil Type(s) and Location: The location of the predominant soil types on the site shall be described by a registered land surveyor or professional engineer. The description may be determined by the NRCS (Natural Resources Conservation Service) County Soil Survey or equivalent publication or by a certified professional soil scientist.

2. Additional Information. Administrator shall be empowered to require such additional information to be included in a drainage plan that is necessary to evaluate and determine the adequacy of the proposed drainage facility.
3. Certification Required. All stormwater plans submitted under this section to BNS for approval must be prepared by a registered professional engaged in storm drainage design, as specified in Section 561-224(6) of the City Code, under whose supervision the plans were prepared. The certificate shall be in the form of the "Certificate of Sufficiency of Plan" which can be found on the City's website.

102.04 Technical Information Report

A completed Technical Information Report (TIR) which provides a summarization of calculations, existing site conditions, specific problem areas identified during site inspections, known neighborhood concern(s), zoning commitments related to stormwater management, downstream conditions/restrictions with a justification for the level of downstream analyses performed, and a brief description of the planned stormwater management techniques which will be utilized to address these conditions is required as part of the stormwater permit application. Each page and attachment of the TIR should be numbered and dated.

Included with this Technical Information Report shall be the following information:

1. Design Calculations. Design calculations are required as part of the stormwater plan and shall accord with the requirements of Section 561-224 of the City Code and, at a minimum, include:

   a. Estimation of stormwater runoff. Runoff rates during the design and 1% Annual Exceedance Probability (Q_{100}) return interval storms; C-values or runoff curve numbers; and computed times of concentration. A time-of-concentration and time-of-travel calculation sheet has been provided in Appendix 200. A C-value or runoff curve number computation sheet has been provided in Appendix 200. Guidelines for determination of basin times-of-concentration and runoff rates are presented within Chapter 200 of this Manual, Hydrology.

      (1) Drainage area calculations including both the gross and impervious area for each drainage basin/sub-basin;

(2) Weighted curve number or runoff coefficient computations;
(3) Time of concentration computation indicating overland flow time, shallow concentrated flow time, and flow time in the swale, gutter, pipe and/or channel.

b. Inlet grate and gutter flow computations as described in Sections 305.07 and 305.08 of the Manual.
c. Closed conduit and open channel design computations:

(1) Size of pipe or channel cross section;
(2) Pipe or channel inverts slope in percent;
(3) Material and roughness coefficient;
(4) Flowing velocities in feet per second;
(5) Design capacity in cubic feet per second as per Section 305.03 of this Manual.

d. Storm drain flow and hydraulic grade line computations as described in Sections 305.03 and 305.04 of this Manual.
e. Erosion control methods and design calculations shall conform to the standards of Section 102.05 of this Chapter and all regulations promulgated there under.
f. BMP calculations illustrating the computation of TSS removal, water quality volumes, pollutant load removal, etc., shall be submitted in compliance with Chapter 700 of the Manual.
g. Existing features. Verification that existing water quality and quantity features to remain anywhere on the parcel have been inspected and maintained to function as originally designed and permitted. The report should also address the existence of any environmentally sensitive areas such as wetlands, any steps for mitigation of those areas and all regulatory permits required.
h. Drainage Area Map: A drainage area map shall be presented which indicates all existing and proposed on-site and off-site drainage areas and flow paths to stormwater facilities, and the limits of the FEMA floodplain for all areas with contributing drainage watersheds of five acres or greater in accordance with Chapter 300, Section 303.02 of this Manual;

2. An explanation of computer models used, where applicable, with information on input and output data.
3. Detention/retention summary information including existing and proposed release rates, storage volumes, etc.

102.05 Erosion and Sediment Control Plans

As stated in Section 561-381, Conformance with minimum standards for land alterations, of the City Code and Chapter 600 of this Manual, erosion and sediment controls are required for all land disturbing activities of any size.

If the Owner or Operator is required to prepare a Stormwater Pollution Prevention Plan (SWPPP) per the Indiana Department of Environmental Management (IDEM) general National Pollution Discharge Elimination System (NPDES) permit for construction activities, such plans shall fulfill the requirements of this Manual and Section 561 – DRAINAGE AND SEDIMENT CONTROL of the City Code. In this case, all applicable state and federal permits or notices for land disturbing activities shall be obtained or filed prior to commencement of land disturbing activities. All applicable state and federal standards shall be adhered to when conducting land disturbing activities. Copies of all applications, letters of intent submittals, plans and other erosion and sediment control related information developed for and/or submitted to state or federal authorities shall be included in the Drainage Permit Application.

Details concerning erosion and sediment controls can be found in Chapter 600 of this Manual. Details concerning the SWPPP can be found on the IDEM website.

102.06 Operations and Maintenance Manual

An operations and maintenance manual (“O&M Manual”) for all public and private infrastructure, including but not limited to pipes, ponds, ditches, and stormwater quality and/or quantity BMPs, shall be submitted

for the plan approval. The manual will become a maintenance guide for the drainage infrastructure once development is complete. The final O&M manual will be provided to the City in both hard copy and digital formats. The O&M Manual and maintenance agreement shall be recorded prior to issuance of the drainage permit. The O&M Manual will include the following:

1. Owner name, address, business phone number, home phone number, email address, cellular phone number;
2. Site drawings (8½" by 11" or 11" by 17"), showing both plan and cross-section views, showing the infrastructure and applicable features, including dimensions, easements, outlet works, forebays, all water quality and quantity features, inspection and maintenance features (ports, access drives, etc.), signage, etc., as well as an overall site map of the development showing all structures;
3. A stormwater management easement is required for each facility. The easement must include the BMP, all outlet structures and access to the BMP;
4. Requirement of current Owner to perform periodic inspections and maintenance, annually at minimum and as necessary to confirm the system is functioning as designed and permitted;
5. Frequency of required inspection and maintenance for each BMP;
6. Requirement of current Owner to keep records of inspections and maintenance activities;
7. Requirement of current Owner to self-certify when requested by the City that inspections and maintenance was performed according to the O&M Manual;
8. Requirement of the current owner to remove and replace filter media as need, determined by infiltration rate, drain down time, percolation test, etc.;
9. Page numbers;
10. Guidance on owner-required periodic inspections, including inspection forms specific to each water quality and quantity BMP type. The inspection forms shall include all applicable operations and maintenance concerns including, but not limited to:

    a. Address and general location of BMP
    b. Type of BMP
    c. BMP Unique ID (SWQ# assigned by city)
    d. Owner name, address and phone number
    e. Name of inspector
    f. Inspector company & contact information
    g. Date and time of inspection
    h. Weather conditions
    i. Date of last maintenance
    j. Note if items are satisfactory/unsatisfactory
    k. Location for comments, actions required and additional notes.
    l. Known complaints (residents, adjacent property owners, etc.)
    m. Public hazards
    n. Encroachments into the easements
    o. Sediment, litter, floatables and/or debris
    p. Sediment depth (specify depth at which cleaning is required)
    q. Sediment depth marker
    r. Channel erosion at inlet, outlet, emergency spillway, shoreline, etc.
    s. Rill erosion on slopes (pond slopes, embankments, etc.)
    t. Adequate and functional scour protection
    u. Vegetation composition and size according to approved plan
    v. Vegetation health
    w. Grass and/or other vegetation height
    x. Vegetation damage
    y. Invasive species
    z. Vegetation blocking the flow path, capacity or otherwise impeding function
    aa. Animal burrows, blockages, etc.
    bb. Water draining as designed and permitted (specify drain down time)
    cc. Water at normal pool, evidence of seepage
    dd. Clogging and/or blockage

ee. Flow path deviations
ff. Spalling, cracking, corrosion, structural damage
gg. Tampering and/or vandalism
hh. Elevations as designed and permitted (inverts, level spreaders, emergency spillways, etc.)
ii. Hardened forebay bottom as designed and permitted
jj. System functioning as designed and permitted
kk. Valves functional
ll. Embankment seepage, bulging, etc.
mm. Evidence of illicit discharges (Odors, colored liquids, unusual vegetation, oily sheen, foreign substances, etc.)
nn. Visible, notable pollution present
oo. Reporting protocol if illicit discharge is discovered

11. Guidance on routine maintenance, including mowing, litter removal, woody growth removal, signage, etc.;
12. Guidance on maintenance; such as inlet replacement, outlet works maintenance, etc.;
13. Guidance on sediment and trash removal, both narrative and graphical, describing when sediment removal should occur in order to ensure that BMPs and other infrastructure remain effective as water quality and/or quantity control devices;
14. A statement that the City's representatives have the right to enter the property to inspect the infrastructure;
15. A tabular schedule showing inspection and maintenance requirements; and
16. Identification of the property owner as the party responsible for all inspections and maintenance, including cost.

102.07 Single and Double-Family Dwellings

Site plans for single- or double-family dwellings, additions to single- or double-family dwellings and accessory structures as described in Section 561-225 "When a professionally prepared and certified drainage plan is not required" shall indicate the nature and location of all work to be accomplished pursuant to the stormwater permit.

In general, the site plan shall be neat, accurate, and legible, and include the following information:

1. The legal description of the property;
2. The exact, legal street address for the property;
3. The dimensions and borders of the parcel;
4. The name and address of the owner;
5. An arrow indicating north;
6. Location of all existing and proposed improvements, structures, paved areas, easements and rights-of-way on the site;
7. Existing and proposed grading showing positive drainage by contouring or sufficient spot elevations;
8. Location and elevation of all existing and proposed swales, ditches, culverts, drainage channels, surface or subsurface drainage devices and the direction of flow;
9. Adequate and appropriate stormwater quality controls including, but not limited to, erosion and sediment controls, dewatering filter, concrete washout containment, pollution prevention and inlet protection;
10. Information necessary to demonstrate conformity with all drainage requirements of Section 561, Article III of the City Code; and
11. The plot map shall illustrate the surface drainage pattern of the site away from structures and the final distribution of surface water off-site, either preventing or planning for surface ponding.

All single-family residential construction with land disturbing activities less than one acre shall employ, at a minimum, perimeter type erosion and sediment control practices including, but not limited to, filter socks and/or silt fences and gravel construction entrances. Tracking of sediment onto streets is to be minimized through the use of perimeter controls and vehicle access controls and limitations. Other pollutants shall also be properly contained, controlled and disposed of including concrete washout.

102.08 Incomplete Stormwater Permit Applications

Engineering design plans and specifications submitted to BNS for issuance of an approved drainage permit that do not meet the minimum requirements of Section 561-224, Professionally prepared and certified drainage plans, or the contents of this Manual will be handled as described in Section 561-224, Professionally prepared and certified drainage plans, of the City Code.

102.09 Deviations from Approved Plans

As stated in Section 561-227, Notice of change in permit information; amendment of permits and plans, of the City Code, material deviations from the approved site development plans and specifications shall not be made without written approval from BNS. Examples of material deviations from the approved plan shall include, but are not limited to, the following changes:

1. Pipe size changes.
2. Pipe grade changes that will affect the hydraulic capacity of the stormwater facilities.
3. Stormwater facility horizontal alignment changes greater than five (5) feet. Where the proposed stormwater facility has been required to be constructed within a right-of-way or stormwater easement, horizontal changes that place the stormwater facility outside of the limits of the right-of-way or stormwater easement area will not be accepted by BNS. Storm drains constructed on privately owned property, outside of public rights-of-way or stormwater easements may vary more than five (5) feet in the horizontal alignment, provided the hydraulic performance of the facility has not been altered, and no other portion of the approved construction plans has been changed. All stormwater quality and quantity BMPs shall continue to be entirely within an easement.
4. Construction materials and installation that are not in conformance with the requirements of this Manual.
5. Changes in grade of the site that will affect the stormwater direction, velocity, amount or concentration or may expose structures or streets to a greater risk of flooding than under approved plans.
6. Changes to stormwater quality and/or quantity BMPs.

102.10 Inspection and Maintenance Responsibilities

The responsibility of inspection and maintenance of stormwater facilities shall be as set forth by Section 561-211, Inspection and Maintenance of drainage facilities, and Section 561-252, Drainage facilities inspection and maintenance, of the City Code.

Inspection and maintenance access shall be provided to stormwater facilities as set forth herein to assure continuous operational capacity of the stormwater facility. As a means of providing the necessary availability for access to stormwater facilities, sufficient stormwater easement areas or rights-of-way shall be required by the Department to achieve satisfactory present and future drainage of the parcel and the area surrounding the parcel as referenced in Section 561-232, Execution of covenant, and Section 561-233, Dedication of easement, of the City Code. In accordance with Section 561-211, Maintenance of drainage facilities, of the City Code, the granting of an easement to the City does not alter the property owner's duty to maintain the property's drainage facilities.

102.11 Performance Sureties

Performance bonds, properly conditioned irrevocable letters of credit or other accepted performance sureties, made payable to the Indianapolis Department of Business and Neighborhood Services, may be required to be submitted as described in Section 561-231, Posting of bond, of the City Code. In accordance with Section 561-231(b) of the City Code, the acceptance of properly conditioned irrevocable letters of credit or other accepted performance sureties is subject to the approval of departments and agencies whose interests are protected by the same bonding requirement. Such bonds or alternative forms of surety,

acceptable in accordance with the standards of this Manual and Section 561-231 of the City Code shall name the City of Indianapolis and County of Marion as parties who can enforce the obligations thereunder. These bonds, properly conditioned irrevocable letters of credit, or other accepted performance sureties may be a part of the total bonding required by the plats committee of the City's Department of Metropolitan Development. Performance sureties shall be in a form approved by BNS, and may be based upon the contract amount for the cost to complete proposed site improvements, including:

1. Total installed cost for storm drain pipe, culvert, manhole, and box inlet installation, and
2. Total installed cost for stormwater quality BMPs such as, but not limited to forebay, SQU, and bioswale installation, and
3. Total cost for site filling and grading, including construction of open drainage swales and detention/retention facilities.

A separate performance surety may be required for the installation of erosion and sediment control measures and regrading of minor drainage collector swales. Erosion and sediment control performance sureties shall be in a form approved by BNS, and may be based upon the contract amount for the cost to complete proposed sediment and erosion control installation including:

1. Re-establishment of erosion and sediment control devices,
2. Re-grading of the site,
3. Seeding or other stabilization of the entire denuded area,
4. Cleaning of the storm drain system, and
5. Reestablishing final grades and elevations for stormwater BMPs.

Prior to the release of the stormwater facility and erosion and sediment control performance sureties, a maintenance bond will be required. This surety will be in an amount not to exceed twenty (20) percent of the cost of construction and cover a period of three (3) years from the date of acceptance by BNS.

Section 103. Construction Inspection and Approval

103.01 Introduction

The installed storm sewer system shall not be accepted by BNS until all requirements for inspection and testing established by this Manual and Section 561 of the City Code, are completed. Inspection of the stormwater drainage system and associated land grading and erosion control measures shall be completed by BNS as set forth herein to monitor conformance with the approved site construction plan and supporting documents. Any portion of the stormwater facility not passing the tests prescribed herein shall be repaired or replaced to the extent required by BNS, and retested.

103.02 General Requirements

The Contractor and/or Owner shall provide written notice to BNS of the planned commencement of construction forty-eight (48) hours prior to such commencement. Subject to the exceptions outlined in Section 13-18-27-16(c) of the Indiana Code, a Stop Work Order shall be issued by BNS for all projects that are proceeding without the required "Notification of Work."

A pre-construction meeting to include a representative of BNS, the Inspection Consultant, the Contractor, and the Land Owner or Developer will be scheduled upon request of any party. This meeting will be scheduled by BNS after the issuance of a "Notification of Work."

Once construction begins, the contractor shall be responsible for informing and/or notifying the Inspection Consultant assigned of the following:

- Daily work schedule including any changes in schedule.
- Prior notification if work is to be performed on weekends and/or holidays.
- Date mandrel tests are to be performed.
- Date "as-built" verification is to be performed.

BNS, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be performed under the observation of the Inspection Consultant. It shall be the Contractor's responsibility to schedule the testing with the Inspection Consultant and/or BNS. Test results obtained in the absence of the Inspection Consultant will not be accepted.

103.03 Construction Observation Services

Construction observation services, testing, and Record Drawings as set forth in this Manual shall be provided for those developments meeting the following criteria:

1. All platted single- and double-family and all platted commercial/industrial developments;
2. All commercial/industrial developments that will not be subdivided and platted, which however, plan a disturbance of one-half (1/2) acre or more of land area;
3. All land alterations that involve installation of Class I and/or Class II stormwater systems; or
4. All land alterations that require stormwater quality or quantity BMPs.

The storm drain system shall not be accepted by BNS until all requirements for inspection and testing established by this Manual are completed. Any portion of the stormwater facility not passing the tests prescribed herein shall be repaired or replaced to the extent required by BNS, and retested.

Prior to issuance of an approved stormwater permit and the commencement of construction of a storm drain system, the Owner shall make arrangements with BNS for construction observation services to be provided.

A pre-construction meeting to include a representative of BNS, the Inspection Consultant, the Contractor, and the Land Owner or Developer will be scheduled by BNS which will include a discussion and observation of the erosion and sediment control measures. At that time, a "Notification of Work" will be issued by BNS. Subject to the exceptions outlined in Section 13-18-27-16(c) of the Indiana Code, a Stop Work Order shall be issued by the BNS for all projects that are proceeding without the required "Notification of Work."

103.04 Drainage Fees

The drainage permit fee schedule is posted on the City’s website https://www.indy.gov/activity/license-and-permit-fees.

103.05 Testing and Inspection

Once constructed, all storm sewer pipes and manholes shall be soil tight. The Contractor shall repair to the satisfaction of BNS all visible points of possible bedding and/or backfill infiltration into the system. The method of repair shall be per the approval of BNS. When necessary, the Contractor shall remove and reconstruct as much of the work as is necessary to obtain a system that passes the minimum tests prescribed herein.

1. Mandrel Tests for Plastic Pipes

All storm sewers using flexible pipe shall be tested for deflection by means of a go/no-go mandrel gage or

other methods as approved by the Department.

The mandrel deflection test shall be as follows:

1. Waiting Period: The mandrel deflection test shall be done no sooner than thirty (30) days after final backfill has been placed.
2. Equipment:

    a. Mandrels shall be constructed with nine (9) or ten (10) arms. Mandrels with fewer than nine (9) arms are not allowed.
    b. The Length (L) shall be measured between points of contact on the mandrel arm.
    c. The Diameter (D) mandrel dimension shall carry a tolerance of ± 0.01 inches.

3. Allowable Deflection:

    a. The allowable deflection shall be 5% based on the inside diameter as determined on a case-by-case evaluation of the pipe design.
    b. The Contractor shall provide proving rings to check the mandrel. The proving rings shall be clearly labeled with the dimensions and ASTM Standard.

4. Testing Procedure:

    a. The mandrel shall be hand pulled through all sections of the sewer lines.
    b. Determination of Line Acceptance. If the mandrel can be hand pulled through the entire length of the section tested, the section shall have passed the test.
    c. Determination of Line Failure:

        (1) If the mandrel cannot be hand pulled through the entire length of the section tested, the section shall have failed the test.
        (2) The Contractor shall be required to uncover, replace, or repair any section of sewer not passing the mandrel test.

2. CMP and RCP Inspections

Forty-two (42) inch diameter and smaller reinforced concrete pipe (RCP) and corrugated metal pipe (CMP) may be required to be inspected through closed circuit television viewing (CCTV) by BNS representative as described herein. In those instances, where CCTV is a required part of the stormwater permit approval, this televised viewing shall be completed in conformance with these minimum guidelines.

All reinforced concrete and corrugated metal storm sewer pipes which are thirty-six (36) inch diameter and smaller and are located within a public right-of-way or drainage easement shall be visually inspected by lamping in the presence of the Inspection Consultant or other representative of BNS.

These inspections shall be required in order to identify, as examples, excessive sedimentation, joint failures, excessive deflections (CMP), damaged coatings or pavings (CMP), structural defects, misalignments, sags, or other system defects which have the potential of affecting the hydraulic performance, durability, or structural integrity of the line segment. Reference should be made to Chapter 400 of this Manual for guidance on criteria sufficient to warrant rejection of the installed storm sewer system.

Excessive deflection of CMP's shall be considered to exist under the following conditions: variations from a straight centerline; elliptical shape in a pipe intended to be round; dents or bends in the metal. Metallic or bituminous coatings that have been scratched, scraped, bruised, or otherwise broken shall be considered acceptable criteria for rejection of the installed system.

Those storm sewer systems of thirty-six (36) inch diameter and smaller which are found through lamping to possess greater than 3 defects noted per line segment during the above referenced visual inspection shall have that individual line segment further inspected by closed circuit television inspection (and recorded) between manholes as follows:

1. A camera equipped with remote control devices to adjust the light intensity and one thousand (1,000) lineal feet of cable shall be provided. The camera shall be able to transmit a continuous image to the television monitor as it is being pulled through the pipe. The image shall be clear enough to enable BNS to easily evaluate the interior condition of the pipe. The camera should have a digital display for lineal footage and project number and an audio voice-over shall be made during the inspection identifying any problems.
2. The pipe shall be thoroughly cleaned before the camera is installed and televising is commenced. Cleaning of the pipe shall be the responsibility of the Owner.
3. The video record of the entire storm sewer line and reproduction map indicating the pipe segment numbers of all the pipe that has been televised shall be submitted to the City for review and placement in their permanent file.

Any pipe and/or joint found to be defective as a result of the televised viewing shall be required to be repaired or replaced to the satisfaction and approval of BNS. A re-televising of that portion of the storm sewer line identified as needing repair or replacement shall be required.

All RCP and CMP storm sewer pipes and open culverts greater than 36" in diameter and located within a public right-of-way or drainage easement shall be visually surveyed along their entire length in the presence of the Inspection Consultant or other representative of BNS.

These inspections shall be required in order to identify, as examples, excessive sedimentation, joint failures, excessive deflections (CMP), damaged coatings or pavings (CMP), structural defects, misalignments, sags, or other system defects which have the potential of affecting the hydraulic performance, durability, or structural integrity of the line segment. Reference should be made to Chapter 400 of this Manual for guidance on criteria sufficient to warrant rejection of the installed storm sewer system.

Excessive deflection of CMPs shall be considered to exist under the following conditions: variations from a straight centerline; elliptical shape in a pipe intended to be round; dents or bends in the metal. Metallic or bituminous coatings that have been scratched, scraped, bruised, or otherwise broken shall be considered acceptable criteria for rejection of the installed system.

Any pipe and/or joint found to be defective as a result of the televised and recorded viewing shall be required to be repaired or replaced to the satisfaction and approval of BNS. A re-televising of that portion of the storm sewer line identified as needing repair or replacement shall be required.

3. Manhole and Box Inlet Inspection

Each manhole and/or box inlet structure within all storm sewer line segments shall be visually inspected by a representative of BNS for excessive leakage, backfill infiltration, or improper workmanship and materials. Manholes or box inlet structures which fail to meet minimum construction standards shall be repaired or, if necessary, replaced, and re-inspected.

4. Erosion and Sediment Controls

The Inspection Consultant shall inspect erosion and sediment controls for compliance with this manual and Section 561 of the City County Code weekly from when the project begins earth disturbance (clearing and grubbing, demolition, grading, etc.) until the drainage permit is closed.

103.06 Release of Sureties

Notice of the scheduled date for completion of construction shall be provided to BNS at least seventy-two (72) hours prior to its planned completion. The Contractor or Owner will schedule the final inspection with the Inspection Consultant. After successful completion of the final inspection, the storm drain and site grading performance sureties may be released after submittal and approval by BNS of the following information:

1. Record drawings prepared under the supervision of and certified by a Professional Engineer or Land Surveyor registered in the State of Indiana and submitted in accordance with the DDSS
2. For subdivided and platted or developments larger than five (5) acres, a copy of the storm drain maintenance bond in a form approved by BNS.
3. A "Certificate of Completion and Compliance" from the Inspection Consultant certifying that construction observed has been performed and completed in conformity with all requirements of Section 561-241 of Indianapolis City Code and this Manual. The certificate can be found on the City's website.
4. Recording of the O&M Manual(s) for all stormwater quality BMPs and stormwater quantity facilities.

For platted single- and double-family developments, the performance surety for installation of required erosion and sediment control measures may be released only after construction has been completed on eighty-one percent (81%) or more of all single- or double-family homes proposed within each individual section of the development.

103.07 Record Drawings

As part of the final acceptance process, record drawings of the stormwater facilities must be submitted to BNS, as set forth herein, for the following types of developments:

- all platted subdivisions
- all public infrastructure
- all projects with stormwater quality BMPs
- all projects with stormwater quantity facilities
- all projects with stormwater infrastructure (12-inch or larger pipe and/or 2-foot bottom or larger ditch)

Record drawings shall be certified by a Professional Engineer or Land Surveyor registered in the State of Indiana, and provide the following information:

1. Building pad elevations.
2. Structure inverts, pipe inverts, top-of-casting's, and the flowline of rear and/or side yard swales at fifty (50) foot intervals or at lot lines.
3. Horizontal alignment of storm drain pipes, culverts, BMPs, streets, and storm drain structures, to a minimum accuracy of +/- two (2) feet. All BMPs will be located by Indiana State Plane East Coordinates (NAD 1983, US Feet).
4. The as-built survey of all stormwater quantity management facilities as well as as-built profile of all drainage conveyances (ditches, swales, etc.).
5. The horizontal location and/or bank cross sections for all stormwater quantity management facilities or other information sufficient to verify that the constructed stormwater quantity management facility provides the required minimum runoff storage volume.

Record drawings shall meet the requirements of the DDSS and be submitted digitally in accordance with the City's DDSS.

103.08 Enforcement of Standards

Failure to comply with those minimum guidelines set forth by this Manual may necessitate one or more of the following actions to be taken by BNS:

1. Posting of a Stop Work Order on the project;
2. The procurement of performance sureties;
3. A denial of further stormwater permits for the subject project in noncompliance with this Manual;
4. Necessary legal action by BNS to affect the implementation of the approved plan or restoration of the site;

5. Issuance of a fine; and/or
6. Revocation of permits pursuant to Section 561-262 of the City Code.

Section 104. Other Requirements

104.01 Floodplain Management

Floodplain management shall be in accordance with Sections 740-201, 740-202, 740-901, and 742-203 of the City Code. The City of Indianapolis has adopted floodplain regulations through the Flood Control District Zoning Ordinance of Marion County, Indiana. The most current effective Flood Control District Zoning Ordinance is on the Indy.Gov website. In addition, all levees constructed will be required to be designed and operated by the Owner in accordance with FEMA and USACE requirements at the time it is designed.

Notwithstanding any other requirements of this Manual or the provisions contained in Sections 740-201, 740-202, 740-901, and 742-203 of the City Code, the City of Indianapolis may, on a case-by-case basis, place additional requirements on developments and redevelopments in areas located in dam failure inundation zones, levee failure residual risk areas, or areas shown as protected by dams, levees, or other flood control facilities.

104.02 Stormwater Quality

The City of Indianapolis and Marion County are subject to the requirements of a permit that has been issued by the Indiana Department of Environmental Management (IDEM) under the National Pollutant Discharge Elimination System (NPDES). Under this permit, the City is required to establish regulations, standards, and policies that address the water quality impacts of stormwater runoff from redeveloping areas and areas of new development. The policies set forth in this section are intended to meet the requirements that the City address pollutants of concern in local stormwater runoff and comply with narrative standards in the permit.

The pollutants of concern that are to be addressed in stormwater runoff from newly developing and redeveloping areas include:

Totals suspended solids (TSS). TSS is a problem pollutant in stormwater runoff nationally, regionally, and in the City of Indianapolis. In 2001 the City adopted a policy that includes the control of stormwater runoff quality countywide based upon the management of TSS. All post-construction best management practices (BMPs) approved for use in the City of Indianapolis are deemed to be capable of meeting or exceeding the TSS removal target when installed as approved.

Floatables. The City's NPDES Stormwater Permit (No. INS040001) states that floatables, or floating debris are not authorized stormwater discharges. The policy for floatable control in Indianapolis is that the runoff water quality control practices for all areas of new development and redevelopment will be designed to capture and retain floating material. Individual components of the stormwater control system do not have to comply with this policy, but the final discharge from the development site must.

The water quality management program of the City of Indianapolis is performance-based. In a performance-based program it is essential that any approved BMP be properly maintained to ensure that the BMPs perform as designed. An operations and maintenance plan for any approved structure will be required (see Section 102.06). As will be stated in the operation and maintenance manual, maintenance will be the responsibility of the property/BMP owner. The City encourages the use of high-efficiency, low maintenance BMPs that have the potential for removal of multiple stormwater pollutants.

BMPs defined in Chapter 700 of this Manual as being capable of meeting the specified performance criteria for pollutant removal will be acceptable if designed to the standard specifications in Chapter 700 of this

Manual.

Alternative BMPs shall be approved by the New Products Committee and professionally certified prior to the approval for use. Alternative BMPs may also be approved via the variance process as outlined in City Code Section 561 on a case-by-case basis.

104.03 Redevelopment

Redevelopment shall adhere to the following requirements:

1. Redevelopment of sites within the Regional Center Secondary Zoning District that do not comply with current stormwater design standards are exempt from current stormwater detention requirements. In-lieu of providing stormwater detention, redeveloped sites must limit peak discharges to pre-project conditions or available downstream capacity for the 2- (50% AEP), 10- (10% AEP), 25- (4% AEP), and 100- (1% AEP)-year storm events, the more stringent requirement shall apply. For sites that have more than one (1) outlet under pre-project conditions, the allowable peak discharge to each proposed outlet shall be calculated based on the peak discharge to each pre-project outlet. Redevelopments within the Regional Center Secondary Zoning District that do not comply with current stormwater design standards and disturb less than a half (0.5) acre are exempt from current stormwater quality requirements, if the cumulative disturbed area is less than a half (0.5) acre. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001.

2. Redevelopment and/or alteration of existing developments that do not comply with current stormwater design standards are exempt from current stormwater quality and detention requirements, if the cumulative disturbed area is less than a half (0.5) acre. In-lieu of providing stormwater detention, redeveloped/expanded sites must limit peak discharges to pre-project conditions or available downstream capacity for the 2- (50% AEP), 10- (10% AEP), 25- (4% AEP), and 100- (1% AEP)-year storm events, the more stringent requirement shall apply. For sites that have more than one (1) outlet under pre-project conditions, the allowable peak discharge to each proposed outlet shall be calculated based on the peak discharge to each pre-project outlet. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001.

3. Redevelopment and/or alteration of existing developments that exceed a cumulative disturbed area of a half (0.50) acre will be required to comply with the current stormwater regulations for stormwater detention and quality by mitigating two times (2X) the area disturbed up to a maximum of the total site or property area. For example, if a property owner wants to add one (1) acre of parking and plans to disturb one and a half (1.50) acres to do it, the owner would be required to mitigate three (3) acres of development within the same on-site watershed to meet the current stormwater regulations. If there was only an additional three-quarters (0.75) acre of existing contributing drainage area on-site upstream of the disturbed area, the owner would be required to mitigate two and one-quarter (2.25) acres of development. The cumulative total disturbed area will be evaluated based on City records of permit activity from October 1, 2001.

Redevelopment projects that propose to deviate from the stormwater management standards in this Manual must apply for a variance in accordance with the process outlined in Section 561-271 of the City Code.

The complicating factor for many redevelopment projects is the lack of available land on which to develop detention and water quality control facilities. The following paragraphs are intended to provide some guidance on how redevelopment projects can be implemented while still meeting the stormwater design standards. The Green Infrastructure Supplemental Document, which contains additional guidance on low impact development, can be found on indy.gov.

1. Minimize imperviousness. The best way to minimize the impact of stormwater design regulations on a development is to minimize the impact the development has on stormwater runoff. By building up (multi-story development) rather than out (sprawling one-story development) green space can be incorporated into the site plan resulting in reduced stormwater infrastructure needs, costs, and stormwater user fees. The use of green development techniques, as discussed in Section 104.04 of this Manual, can also

result in lower infrastructure costs and reduced stormwater user fees.

2. Go to the rooftop. If the project has issues that would make ground level or below ground stormwater management infrastructure impractical it might be possible to address storage and/or water quality issues by looking at the rooftops for detention storage and/or water quality control. Rooftop detention can be employed in conjunction with stormwater quality units to meet the City's water quality standards. The green roof concept provides detention of stormwater runoff and reduces runoff by vegetative interception and evapotranspiration.
3. Go underground. If reduced imperviousness, rooftop alternatives, and green design are not practical, the on-site stormwater management program may be provided below ground. There are numerous storage system solutions for use under parking lots that can provide the detention capacity control and storage volume needed for most projects. These solutions can be integrated with in-ground stormwater quality units to also meet the water quality control requirements of the City.

104.04 Green Development Incentives

Green development techniques lessen the impact of development and redevelopment on downstream drainage area by reducing the amount of impervious surface. Although some of the "green" options do not recreate natural conditions, they approximate those conditions to the extent that they lower runoff curve numbers, reduce "heat island" effects, and help to reduce pollutants via infiltration and evapotranspiration. The net result is that less impervious surface may lower runoff peak flows, lower runoff volumes, and lower pollutant export. For the post-construction property owner, the reduced imperviousness may mean lower stormwater user fees.

Examples of the types of features that might be part of a green design approach include:

- Green roofs
- Roof gardens
- Pervious pavement
- Tree planting
- Vegetated swales
- Grassy swales
- Street swales
- Vegetated filter strips
- Biofiltration
- Rain gardens
- Vegetated infiltration basins
- Sand filters
- Wet, extended wet, and dry detention ponds
- Stormwater wetlands
- Manufactured treatment technologies
- Structural detention facilities
- Rainwater harvesting
- Drywells

Infiltration and exfiltration facilities are not allowed within the Wellfield Protection Secondary Zoning District as defined in the City Code 740-202.

For more information on the incentives of green development, including example computations on infrastructure cost savings, please refer to the City of Indianapolis website, www.indy.gov and search for Green Infrastructure Supplemental Document and Stormwater Credit Manual.

104.05 Stormwater Discharges to Combined Sewers

All projects, regardless of size, that drain to a combined sewer system or propose a new connection to a

combed sewer system must obtain approval from Citizens Energy Group (CEG). The more stringent design standard regarding stormwater quality and quantity between this Manual and CEG requirements shall apply.

104.06 Work within a Levee Influence Zone

All projects that are within a City owned parcel or easement having a levee embankment or floodwall influence zone or that impact a levee or floodwall on the same must obtain approval from the Department. The work that is done within the influence zone of the levee or floodwall must meet the guidance of the United States Army Corps of Engineer's (USACE) Standard Operating Procedures (SOP) as well as USACE's *Design and Construction of Levees* (EM 1110-2-1913). If the levee is under federal jurisdiction, a Section 408 Permit through the USACE in coordination with the Department is required and the review funded by the stakeholder completing the work.

104.07 Dam Embankment Construction or Rehabilitation

For all projects that construct or rehabilitate a regulated dam (applicability described in Indiana Code 14-27-7.5-1) or appurtenant spillway, the owner and/or applicant shall inform the Indianapolis Department of Public Works as well as IDNR of such proposed action(s). Construction/Rehabilitation must be designed and certified by a registered professional engineer in the State of Indiana and must meet the requirements outlined in Chapter 7.5, Regulation of Dams, Indiana Code 14-27-7.5. In addition, the stakeholder shall acquire a Construction in a Floodway Permit or other necessary regulated dam permit from the IDNR. State documentation of IDNR approval shall be sent to the Department of Public Works – City Engineer.